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International Seminar



Environment, Sustainable Development and Human Health

February 11-15, 1995

ABSTRACTS

DEPARTMENT OF GEOGRAPHY
FACULTY OF SCIENCE
BANARAS HINDU UNIVERSITY
VARANASI - 221005
INDIA

NATIONS ENVIRONMENT PROGRAMME SPONSORED ACTIVITY

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- ❁ IGU Study Group on Sustainability of Rural Systems, Leicester, U.K.
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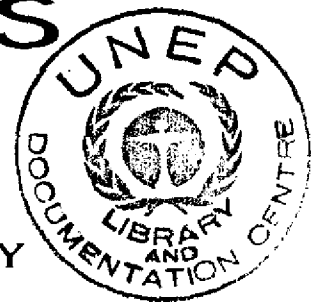
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ENVIRONMENT, SUSTAINABLE DEVELOPMENT
AND
HUMAN HEALTH**

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P R E F A C E

There have been significant changes in the development paradigm and the sustainability concept since 1970's. Environmental awareness has continuously grown and environmental implications of the development process have been better understood during the two decennia between Stockholm and Rio de Janeiro. Problems of human health arising out of affluence and associated chemical pollution (modern diseases) in developed countries and owing to lack of development (traditional diseases) in the developing countries have worsened during this period inspite of significant improvements in life expectancy, literacy and infant mortality in the latter. India, being a newly industrialising country, suffers from both types of diseases. In spite of two International Decades to this effect, lack of safe water and proper sanitation still accounts for 80 per cent of the diseases in the developing countries. Thus environment, sustainable development and human health seem to be intimately interlinked and have aroused absorbing interest in developed and developing countries alike.

Realising the need to infuse environmental dimensions into developmental activities in order to promote health of the people, Teachers' Council of the Department of Geography unanimously resolved to organise an International Seminar on Environment, Sustainable Development and Human Health during 11-15 February, 1995. The objective of the Seminar is to highlight the nexus between health, environment and development and to suggest concrete measures for sustainable health in the region.

The following themes were identified—(i) Environmental Concerns, Challenges and Endeavours, (ii) Environment and Sustainable Development, (iii) Environmental Disasters, (iv) Environmental Pollution, (v) Environmental Change and Impact: Global, Regional and Local, (vi) Environment and Human Health and (vii) Environmental Education, Policies and Management—to be discussed in Technical Sessions. Also, four topics were selected—(i) Science, Technology and Sustainable Development, (ii) Poverty, Population Growth and Quality of Life, (iii) Water Supply, Sanitation and Human Health and (iv) Role of International Organizations in the Promotion of Environmental Health in Developing Countries—to be debated in Plenary Sessions.

The response to our Seminar has been very encouraging both from India and abroad. We received about 225 abstracts contributed by more than 350 scholars. The seminar is inter-disciplinary in nature as contributors belong to more than two dozen disciplines including Geography, Environmental Studies, Medicine and Health Care, Life Sciences and Ecology, Civil and Mining Engineering, Economics and Development Studies, Renewable Energy and Technology Transformation, Demography and Planning, Agriculture and Forestry and Remote Sensing Applications. The response to the identified themes has been somewhat uneven and the contents of most of the papers are overlapping and hence, the abstracts are not presented themewise in this Volume.

Some of the contributions did not fit into the identified themes and the authors were advised to revise the title and/or the contents and I am happy that nearly all of them cooperated with us. Some of the abstracts (excluding that of Prof.C.M.Jariwala's, Prof.R.M.Prasad's, Prof.R.S.Ambasht's and Prof.O.N.Singh's of Banaras Hindu University--their invited abstracts though received in time had to be clubbed with late abstracts for some reasons) were sent very late and hence had to be kept separately at the end unedited.

This Volume owes its completion to the untiring efforts of many research scholars and colleagues of the department. I thank Shri Rajeev Ranjan, Dr.C.S.Kumar, Shri Narayan Chopra and Shri Avinash Kumar Singh for putting in long hours of arduous work in printing it. I am grateful to my colleagues, Dr.D.N.Singh for editing some of the abstracts and Dr.Mrs.T.D.Singh and Dr.B.N.Singh for proof reading. Thanks are also due to all those research scholars and students who helped in various ways to bring out this Volume in its present form.

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SOIL CONSERVATION RE-VISITED: SOME POLICY
CONSIDERATIONS FOR POST-APARTHEID SOUTH AFRICA

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Since Beinert's analysis of southern African soil conservation policy a decade ago there have been few subsequent in-depth critiques. However for South Africa a successful policy is important, since both food security and export earnings from agricultural products, each crucial to the country's long term well being, are dependent to a significant degree on the sustained productivity of soil. This paper considers the main characteristics of apartheid soil conservation policy within the context of an overall evaluation of success and failure.

The policy's most obvious feature is its dualistic nature, but other weaknesses included failure to establish overall responsibility for soil conservation, inequitable division of conservation resources, and inadequate baseline data on soil erosion rates, processes and distribution. Policy at this point also saw soil loss primarily as an agricultural rather than an environmental problem. Main positive points were acceptance of the need for soil conservation, recognition of the close interdependence of soil and water conservation, and a working conservation infrastructure.

The evolution of South African policy has followed a parallel pattern to that observed in many former colonies and developing countries, and until recently striking similarities were apparent. Dualism, with different parcels of land subject to different strategies and sets of legislation is common, and by the end of the colonial period few countries were able to report significant success in reducing soil losses and maintaining land fertility. In the immediate post colonial period conservation activities in several countries lapsed entirely, as they were seen merely as an extension of repressive

activities of previous colonial governments. Later, increasing involvement of NGOs and aid organisations promoted conservation projects, but success rates were as low as 50% in some agencies, an indication that policy in general was failing.

In other countries the experience of governments, as well as aid and conservation organisations shows that without popular support soil conservation will fail, if not immediately, then as soon as external resources are withdrawn at the end of a project. In some countries, this has resulted in a change to the more holistic strategy of land husbandry. With such an approach soil conservation becomes an integral part of general land use and care. Any conservation procedures introduced are approved by land users, technology employed is often determined by local communities, and is therefore appropriate to local prevailing socio-economic conditions.

By 1994 South African policy had not formally considered land husbandry as a conservation strategy, and has not reached the stage where participation by land users could play any role in its development, especially as far as subsistence and small-scale land farmers were concerned, and it is in this regard especially that other national experiences could be informative. Participatory approaches in Rajasthan, India, for example have had some success, and experiences there may provide useful indicators. One important lesson is that South African soil conservation initiatives must change from their present technological top-down format to a people-centred development approach, if conservation schemes are to have any hope of success. Extensive grass roots environmental education has also a critical role to play, and incorporation of community conservation knowledge should be a focal point of any policy restructuring.

Other factors must also be taken into account. Redistribution of land may result in unskilled and inexperienced farmers, becoming an integral component of small scale agriculture. Some land presently farmed is so degraded it cannot possibly support any sustained agricultural activity, and authorities will have to recognise that solutions to

soil erosion problems may not always be found in situ. Finally the role of soil conservation in relation to other post apartheid agricultural and environmental initiatives must be clearly established.

IMPACT OF THERMAL POWER PLANT EMISSION ON
VEGETATION AND SOIL

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Impact of the thermal power plant emission on vegetation and soil in and around Korba, Bilaspur (Madhya Pradesh, India) was assessed. Pollutant concentration in the area gradually decreases with the increase in distance from the plant and a gradient of structural and functional changes in plants and soil are observed. Depending upon the capacity of plant species to withstand the damage due to pollution, a sensitivity index has been worked out and different species have been graded and identified as pollution tolerant or sensitive.

Power plant emissions have direct bearing on soil and eco-physiological characteristics such as pH, organic matter and N,P,K and S concentration in soil, number and distribution of plant species, percentage of photosynthetically active leaf area, leaf injury symptoms, chlorophyll content in leaves, accumulation of N,P,K and S in leaves etc. The study indicates that if the emissions continue unabated, there is danger of possible elimination of plant species--first the trees then the shrubs and lastly the herbs and grasses from the environs of the thermal power plant. The increase in soil acidity in the area may cause cation-anion imbalance and reduction in microbe population adversely affecting soil fertility.

INDIAN SPIRITUAL LIFE AND ENVIRONMENT

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It has been said that the ultimate goal of every human being is to achieve Moksha (Salvation). People of ancient India adopted a particular way of life which enabled them to arrive at the ultimate goal (salvation). They were trying to perform only those activities that were prescribed in the religious texts. The Indian mind, at that time, was moral as well as pious. Thus the life in ancient India was spiritual and disciplined.

The people of ancient India worshiped Prakriti (Nature). For them Nature was nothing but their God. Through different prayers, sacrifices, they always tried to satisfy their God i.e. Nature. They never tried to go away from Prakriti; in other words, they always treated it as the part of their life.

With this background, in the present paper, the following points were discussed:

- (a) Concept of Environment as presented in the ancient Indian Literature.
- (b) The Regular Duty of the people of ancient India towards the preservation of the environment.
- (c) Different means adopted by the ancient Indian people for preserving the environment.

PLANNING DISASTER

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It is difficult to apportion responsibility for disasters. Natural disasters are 'acts of God' and

technological 'accidents will happen.' Hence what we, unfortunately, call 'disaster planning' is concerned with (a) how to predict and prepare for the unavoidable, and (b) how to mitigate the effects of the unavoidable.

I read 'disaster planning' differently, i.e. as the avoidable process by which elite groups deliberately plan and implement major projects which are regarded as unmitigated disasters by (a) opposition groups and external appraisers, e.g. P.Hall's Great Planning Disasters, and (b) the victims displaced by the project, e.g. J.D.Porteous's Planned to Death. My particular concern is with the planned annihilation of places, or topocide.

Topocide is the legal, but unethical, murder of a place. Domicide is its effect, as felt by the displaced inhabitants, and memoricide is the destruction of individual and collective memory of places. Topocide dichotomizes into war-time events (e.g. Bosnia), where blame is readily settled, and peace-time events, where the responsibility lies with persons (individual or corporate) or with governments.

Recent large-scale planned topocide in peace-time includes: urban renewal in inner cities (e.g. Boston's West End) and squatter peripheries (e.g. Lima, Capetown); the siting of major public facilities, such as airports (e.g. London), and dams (e.g. James Bay, Canada; Three Gorges, China; Narmada River, India); and large-scale resettlement/villagization processes due to settlement rationalization (Newfoundland, Greenland, Norway) or ideology (South Africa, Mozambique). Aboriginal peoples are frequently threatened by domicile, and many groups and even whole nations have been repeatedly displaced.

Topocide is a global issue, for it runs the gamut from a single dwelling, through urban neighbourhood and village, valley and city, region and country, to the possible annihilation of the earth itself.

INTEGRATION OF REMOTE SENSING AND GIS
FOR SUSTAINABLE DEVELOPMENT

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The study on Integrated district developmental planning, aimed at demonstrating the role of remote sensing in conjunction with Geographic Information System has been taken up to develop viable methodology for Integrating spatial and nonspatial data bases using GIS and to evolve a pragmatic developmental plan, consistent with resource potentials and problems, basic needs of the people, Governmental priorities and national policies for overall development of the district.

Chandrapur district in Maharashtra endowed with very good ground water potential, relatively fertile soils, quality teak forests, well established mining industry with abundant reserves of coal, known deposits of iron ores and cement grade limestone is selected for the study.

Consistent with the district level planning requirement thematic maps on Geomorphology, Geology, Soils, Land use/Land cover, Forest/Vegetation, drainage and slope are generated on 1:50,000 scale. Both the digital and visual techniques are followed interactively. Special techniques of stratification, layered approach, composition, aggregation and refinements are adopted wherever necessary to improve the quality of mapping.

The integration of the various thematic maps and attribute data, and further manipulation/analysis for identifying alternatives for development are carried out using the state-of-art Geographic Information System. The software package GEOSPACE a PC-based GIS, developed indigenously by RRSSCs is used for the analysis. The digitally classified outputs corresponding to geology, geomorphology, ground water potential, soils, land use, slope and their derivatives are feature-coded and stored in the map information system. These individual maps

from corresponding map files are integrated to arrive at "Composite Mapping Units" (CMUs).

Integration of geological, geomorphological and land use data with geophysical investigations has resulted in ground water potential map. This coupled with surface water potential, when matched against tapped water resources helps in estimating unrealised water potential to meet the primordial demands of irrigation, industries, drinking water and others. Alternatives are developed within the framework of optimal land use. On applications of land capability classification (LCC) model, optimal broad land use category is derived from Composite Mapping Unit (CMU). This when matched with present land use (indicated by CMU) helps decision of broad land use revision matching LCC. Water resources development plan and Land resources development plan are generated for Umanadi watershed in the Chandrapur district and suitable sites for water harvesting structures through farm ponds, check-dams, nalla bunds, subsurface dykes, etc; sites for soil conservation; sites for agro-forestry, horticulture, fuel-fodder plantation, silvi pasture, agro-horticulture, double cropping with appropriate conservation methods, are suggested.

ENVIRONMENTAL POLLUTION IN OPENCAST COAL MINING COMPLEX - A CASE STUDY

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Large scale opencast coal mining in recent years has on one hand helped the country to increase productivity of the mines, but simultaneously resulted in modifications of geomorphological, hydrological and biotic processes both at regional and local levels.

A detailed survey has been conducted to examine degradation of the environment in Singrauli coalfield area, one of the largest opencast coal

mining complexes of India. This complex with about ten projects under various stages of development is producing about 31 million tonnes of coal and over 90 million cubic metres of overburden per year. Such large scale mining operations in the area are bound to have an adverse impact on the environment of the surrounding area. Observations reveal that suspended particulate matter (SPM) in the area is above the background concentration. Some of the mining projects are having acid mine drainage problem thereby affecting the quality of the natural water streams in the area. Various measures to control pollution caused due to mining operations are also suggested.

ENVIRONMENTAL MONITORING SYSTEMS FOR SADC REGION

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A regional environmental monitoring system is proposed for ten countries (Mozambique, Swaziland, Lesotho, Botswana, Namibia, Angola, Zimbabwe, Zambia, Uganda and Tanzania) in the Southern Africa Development Community (SADC) region. In order to be able to manage the environment properly, a country needs trained personnel, databases and physical facilities for environmental monitoring. Since none of the countries of the region are in a position individually to afford the kind of training, databases and physical facilities needed, the only practical and cost-effective way they can get started is by having the training together, by having linked databases, and by sharing the Environmental Monitoring Facility. By adhering to a common system of data acquisition and databases, the proposed approach will facilitate inter-comparison and harmonization of environmental data between the member countries.

The monitoring system is addressed to the following environmental problems of SADC region (with the focus being indicated in each case):

(i) Soil resources management for sustainable agriculture (to improve agricultural productivity, ameliorate soil erosion, and prevent soil contamination by agricultural chemicals) - these are common for the region.

(ii) Water resources management (to develop and protect water resources, particularly for domestic use) - these are common for the region.

(iii) Coastal ecosystems management (to prevent marine pollution and protect mangroves and corals and the quality of seafood) - these are relevant to Angola, Namibia, Mozambique, Tanzania, etc.

(iv) Industrial pollution (to mitigate pollution due to manufacturing industries, transport systems, etc.) - these are common to the region.

(v) Mercury pollution due to artisanal gold mining - these are particularly relevant to Tanzania, Zimbabwe and Mozambique.

(vi) Endemic fluorosis, foiter and cretinism - particularly acute in Tanzania.

Apart from benefiting the region as a whole, the project is so designed as to be able to contribute to the environmental planning of the member countries.

A MODEL OF SUSTAINABLE SOCIETY
(CONCEPT AND METHODOLOGY FOR A CASE STUDY)

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The present paper proposes to reflect over the meaning of sustainable society and to suggest a methodology for preparing a project report on the theme in the context of a given region. It emphasizes that the task involves an understanding of the society sustainability and a formulation of strategies which link these with the parameters of efficient economy, just society, egalitarian polity, and stable ecology. A 'scenario analysis' approach

is adopted and a choice is made amongst a variety of envisaged futures. Ultimately the job boils down to two things:

- (i) capturing of the society's dreams about its future; and
- (ii) designing of feasible schemes to achieve these.

WATER'S ELECTROMAGNETIC MEMORY BITS AND
ENVIRONMENTAL HEALTH HAZARDS

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This study shows that one of the chief culprits for the environmental health hazards is non-ionizing electromagnetic radiations (NER) due to electricity, and various radio-frequencies and microwaves.

The NER have been found to cause health effects by imprinting their signatures and differentially altering the structure of biological cells, natural water and, also synergising the effects of chemicals dissolved therein.

If the level of NER is not minimised by imposing standards, the humanity may face the unpredictable menace of epidemics, pandemics and NER-health syndromes without any control and cure. The steps to be taken as precautionary measures and guidelines for setting environmental NER exposure standards are described.

IN SEARCH OF A LOCAL MODEL OF
SUSTAINABLE DEVELOPMENT

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"Environment" and "sustainable development" are relatively new terms in the everyday parlance of

Malaysians. Although the various communities in the country have been practising these concepts through different cultural expressions, the term "sustainable development" is still largely the vocabulary of academicians and a select few. However, the Brundlandt Report and agenda 21 of the Rio Summit have exerted some impacts on the local politics and planning. At the same time Malaysians are slowly becoming more conscious of the need to "develop in our own mould." Vision 2020 has laid out nine challenges which Malaysians need to overcome in order to become a "self-styled" industrialised nation by the year 2020. "Development" is not only being carried out with environmental sensitivities, but also with increasing efforts to make it "human friendly." It is necessary to approach the present model of sustainable development with some caution since it is another development in modern man's search for a "perfect" environment. This paper will attempt to illustrate how Malaysia's history, cultural convictions, and changing attitudes are contributing towards the evolution of a local model of sustainable development.

MAN-MADE ENVIRONMENTAL DISASTERS IN THE
ICHHAMATI-BIDYADHARI INTERFLUVE AREA, WEST BENGAL

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The present paper is concerned with the environmental disasters caused by human interference in the Ichhamati-Bidyadhari interfluve area. It is a part of the reclaimed Sundarban area. During the early part of British rule, need for the various forest products increased and the virgin Sundarban forest attracted the attention of the then British rulers. The main objective of reclamation initially was to clear and make suitable as much jungle-swamp as possible for cultivation and human settlement. By comparing the forest margin as shown by J. Rennell (1764-77) in his map No. I and XX, we find that the

reclamation was more extensive in the north and the southwest covering large parts of the present police stations of Haroa, Bhangar and Kultali. Parts of Hasnabad, Canning, Baruipur, Jaynagar and Patharpratima Police stations were also covered. It is clear that the people of Sundarban area extended the land by constructing embankments along the low-tide lines. As a result we observe that such premature reclamation led to relative rise of the floor of the creeks and turned the reclaimed land into permanent marshes as the huge amount of silt that was carried by the creeks could not have been deposited on the adjoining lands to raise their level and instead was deposited on the beds of those creeks and often salt water encroached through breaches in the earthen embankments. So, many areas turned into useless saline marshes, excepting in few cases where these saline marshes were turned into fisheries by rich holders. After independence in 1947, with the abolition of Zamindari system the responsibility of maintenance of those embankments passed to the Government and accordingly the State Government formed a plan which included the construction of lock-gates in the embankments. But these were unable to stop the silting up of the channels, and, ultimately the flood hazard due to the breaching up of the earthen embankments has become a regular phenomena.

ENVIRONMENT AND DEVELOPMENT: ROLE OF
INFORMATION SYSTEMS

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This paper describes the factors contributing to the degradation of environment such as inefficient and highly polluting industries, unsustainable agricultural practices, and mounting pressure on natural resources and examines the relationship between environmental degradation, ill-health and poverty. The poor are both the victims and agents of environmental changes as a majority of them are

forced to live on ecologically fragile zones--marginal agricultural lands, urban slums.

Environmental challenges demand for immediate environmental action plan and strategies that aim at sustainable development which in turn calls for creation of environmental information systems to improve environmental planning and management and to generate greater public awareness and participation.

THE ROLE OF PARTNERSHIP IN SUSTAINABLE DEVELOPMENT
IN DEVELOPING COUNTRIES

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The Partnership for Change Conference held in Manchester, U.K. in September 1993 was a landmark in the development of an effective strategy for promoting the message of environment and sustainable development. It shows, among other things, that the best approach so far made to achieve sustainable development is that which succeeds in bringing together of all the interested parties and their interests. The examples of successful partnerships include several from the U.K. as well as from developing countries.

This paper describes examples of partnerships of different complexities and in different stages of development in Nigeria, all aimed at pursuing the goals of long-term sustained development with minimum impact on the physical environment and its resources. The parties involved in the partnerships include non-governmental organisations (NGOs), business communities, indigeneous (community-based) institutions, development agents, including government departments and boards/corporations, citizens and citizen groups among others.

As in the U.K. and U.S.A. examples, many of the experiments are new. However, they hold very great

hopes for the achievement of the goals of sustainable development at minimum cost.

SPATIAL PATTERNS OF MAJOR DISEASES IN THE DROUGHT PRONE ANANTAPUR DISTRICT OF ANDHRA PRADESH, INDIA

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The present paper is aimed to study the spatial pattern of major diseases and identification of disease prone areas and associated diseases in the drought prone Anantapur district of Andhra Pradesh.

About twelve major diseases such as infection and parasitic diseases, malignant neoplasm diseases, diseases of the nervous system, diseases of the circulatory system, skin diseases etc., are considered for mapping spatial patterns. Infectious diseases show high incidence rates in the central part of Anantapur district comprising ten mandals. Malignant and Neoplasms have relatively high rates of incidence only in three mandals. Epidemic nutritional and metabolic diseases have high occurrence about three mandals. Whereas diseases of blood and blood forming organs have high incidence in about 1/3 of the mandals. Several maps were prepared showing the spatial variations of diseases and they reflect four major disease prone areas where three to seven diseases have high incidence rates. The potential disease prone areas are generally found in the irrigated mandals.

HEAVY METALS IN THE DIET OF THE LOCAL POPULATION OF AVANIAPURAM SEWAGE FODDER FARM (ASF), MADURAI, INDIA

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Usage of sewage water for agriculture in the

Avaniapuram Sewage Fodder Farm (ASF) in Madurai city of Tamilnadu is taken up for investigation to find out concentration of heavy metals such as Copper, Zinc, Iron, Chromium, Nickel, Lead and Cadmium, in the diet of local population.

Four types of edible greens are cultivated regularly in ASF. Heavy metals analysis was done for these edible greens (*Amaranthus oleracea*, *Amaranthus viridis*, *Sesbania grandiflora* and *Alternanthera sessilis*) using wet acid digestion of MAFF 1981. The digested samples were analysed using Atomic Absorption Spectrophotometer (Perkin-Elmer 5000).

Household surveys were made for the population who consume greens daily and their Provisional Tolerable Weekly Intake (PTWI) of these greens were worked out and compared with the 'permitted weekly intake' decided in 1984 by the Committee of Experts of the FAO-WHO.

The results showed +0.125, -0.19, -0.42 and -0.3 mg/Kg of Copper in *A. Oleracea*, *A. viridis*, *S. grandiflora* and *A. sessilis* as compared to the standard (permitted weekly intake) value of 0.5 mg/Kg respectively.

Zinc showed +0.03, +0.43, +0.24 and +0.17 mg/Kg in *A. Oleracea*, *A. viridis*, *S. grandiflora* and *A. sessilis* as compared with the standard value of 1.0 mg/Kg respectively.

Lead showed +1.08, +0.43, +0.24 and +0.17 mg/Kg in *A. oleracea*, *A. viridis*, *S. grandiflora* and *A. sessilis* as compared to the standard value of 0.05 mg/Kg of maximum permitted daily intake, respectively.

Cadmium showed +0.902, +0.242, +0.162 and +0.102 mg/Kg in *A. oleracea*, *A. viridis*, *S. grandiflora* and *A. sessilis* as compared to the standard value of 0.91 mg/Kg of allowed maximum daily load, respectively.

Iron showed +6.2, +5.5, +2.1 and +2.2 mg /Kg in *A. oleracea*, *A. viridis*, *S. grandiflora* and *A. sessilis* respectively as compared to the standard value of

0.8 mg/Kg of allowed maximum daily intake, respectively.

The study shows that accumulation of Lead, Cadmium and Iron is more than the FAO-WHO standards. Therefore, there is every possibility of ill-effects on health of population consuming the greens of ASF in Madurai.

DYNAMICS OF SOCIAL ENVIRONMENT IN A TRIBAL AREA

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Alleviating poverty is a moral imperative and a pre-requisite for environmental sustainability. The poor suffer most from environmental degradation and also contribute to its degradation because of their poverty. The socio-economic aspects of eco-deterioration, especially in under-developed tribal regions did not receive much attention. The present study is an attempt in the same direction. It is based on a detailed field study of tribal behaviour vis-a-vis ecological paradigm emphasizing interlinkage of cultural, social and economic conditions in tribal society. Also, an attempt has been made to work out an 'environmental calendar' through a detailed sample survey of Babhani Block of Sonbhadra district of Uttar Pradesh. The causal relationship between poverty and environmental status of this tribal belt is examined.

AN APPLICATION OF THE IMPACT OF LANDCOVER CHANGES IN THE CATCHMENT AREA OF LAKE ELMENTEITA, KENYA

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This study investigates landcover changes within the catchment area of lake Elmenteita and the associated

geomorphological effects on the Lake as well as the rivers draining into it. According to the study, recent encroachment of settlement and farming into forest and grassland areas within the catchment area as well as farming of horticultural crops along rivers through irrigation accelerates erosion of top soil. Landsat Multi-Spectral Scanner (MSS) and Thematic Mapper (TM) imagery were used to determine the type and spatial extent of landcover changes for the period 1973-1984 within the catchment area. The Landsat imagery revealed that landcover within this area has changed. It was noticed that annual crops are replacing forests and grasslands. Also, riverine vegetation along rivers draining into the Lake was found to be decreasing while farming of small scale foodcrops and market gardening along rivers was found to be increasing. It was found that annual cropping is affecting the partition of rainwater between overland flow and infiltration into the soil. Exposure of bare soil to rain, sun and wind reduces its capacity to absorb heavy rainfall resulting in immediate overland runoff which in turn is aggravating the surface soil erosion. The eroded top soil from fields under annual crops was found to be transported by rivers and deposited along river channels and in the lake itself, thereby reducing its capacity. The results of this study suggest that deltaic deposits at the mouth of river Mereroni (being at the present level of Lake Elmenteita) are due to recent sedimentation caused because of landcover changes within the catchment area of the Lake.

STUDY OF CO POLLUTION DUE TO AUTOMOBILES

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Urban environment is now-a-days polluted by automobiles contributing Carbon monoxide, hydrocarbons and Oxides of nitrogen. Emissions from vehicles unlike those from industrial sources, are not governed by a uniform combustion process. The

changes in the modes of vehicle operation cause changes in exhaust levels.

Unlike in other western countries, the light vehicle and two-wheeler traffic is quite high in Indian cities. The important exhaust emissions from two wheelers which are having two stroke gasoline engines are CO, HC, and NOx. The exhaust emissions of these gases vary with the air-fuel ratio. The exhaust emissions of these gases vary with the air-fuel ratio, sparking time and the engine operating conditions.

In the exhaust emission levels from light vehicles, the CO levels are found to be in the range of 0.02 to 6.83. In this study, the results of average CO value observed for about 400 two-wheelers are discussed.

A POSITIVISTIC STUDY OF ANCIENT TRADITIONS TOWARDS WATER POLLUTION AND PURIFICATION

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In the present paper an attempt has been made to present some evidence from ancient literature on social and secular values that have scientific implication to remove water pollution. Since pollution of water creates havoc on a large scale, 'Nitya Karma' (daily ritual) which is common and compulsory for all, is performed daily. Just as taking bath, brushing teeth, washing clothes, sweeping the house clean, cleaning utensils are required to done daily, 'Nitya Karma' has to be performed daily not only to protect mental region from filth and dirt but also to remove water pollution for the happiness of an individual but also of mankind. Evidences like this show that the Hindus of yore were aware of water pollution that leads to environmental and health hazards.

CONTAMINATED WATER AND INFANT MORTALITY
IN RURAL VARANASI

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Most of the health problems in under developed countries are largely due to lack of safe drinking water. In order to assess the impact of contaminated water on infant mortality, a study was conducted in the Cholapur block of Varanasi district. It was observed that the infant morbidity and mortality were very much due to contaminated water causing diarrhoea. It was also noticed that after the provision of safe water supply there was marked decline in both infant morbidity and mortality rates.

SUSTAINABLE URBAN DEVELOPMENT
THE SINGAPORE EXPERIENCE

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This paper argues that a new paradigm is required to tackle urban environmental problems. Cities are man-made and engineered environments. They are a product of Science and Technology and are manifestations of a cultural landscape. In view of this, it is futile to talk about achieving sustainable development in cities through an ecological paradigm. In cities, it is difficult to achieve a human-nature harmonious balance. Human beings dominate a city environment and the environments that they live in are created by human design or end up as unwitting by-products of their activities. Sustainable urban development requires a proactive and anthropocentric perspective in order to tackle urban environmental degradation.

Singapore's experience in maintaining sustainable

urban development has been a product of several pro-active government motivated programmes. Singapore's urban development is predicated on deliberate urbanisation which is translated in terms of urban planning and far sighted goals. The government takes an active role in the provision for infrastructure, especially in housing, health and transportation. When the government set up its Ministry of Environment in 1972, its chief interest was in maintaining high levels of public health. All the campaigns over the last 30 years have been targeted in maintaining high standards of public health. The maintenance of Singapore's clean and green environment has also been a product of heavy legal enforcements and severe penalties for individuals and companies that transgress environmental laws and standards. Singapore provides a model city for sustainable urban development. As urbanisation is likely to be the main area of growth for the developed world in the next 50 years, it is important that we find suitable models for urban development.

ENVIRONMENTAL AND ECOLOGICAL DETERMINANTS OF A HUMAN
DISEASE: A STUDY WITH REFERENCE TO LEPROSY

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Leprosy continues to remain an important public health problem in Tamilnadu. The total number of leprosy cases in the country is estimated to be around 4 million based on the average prevalence rate of 5 per 1000 to 15 per 1000 in Tamilnadu. Leprosy is caused mainly due to environmental and ecological factors like poor socio-economic status associated with unhygienic and poor sanitary conditions associated with overcrowding, high housing density, illiteracy and slum population etc. The present study is an attempt to analyse the spatial distribution of leprosy in Tamilnadu with reference to environmental and ecological determinants based on the following main objectives:

(i) to analyse the role of patients compliance and satisfaction level towards treatment in general, (ii) to analyse the determinants of environmental and ecological aspects of leprosy and health care system with special reference to Multi-Drug Therapy (MDT), (iii) to conceptualise the facts and suggest measures towards a better health care system and environmental management.

The study was based on the primary data collected in all the districts of Tamilnadu on random sampling basis and the samples chosen were 300. The data was analysed with the help of multivariate statistical technique to identify the major dimensions such as leprosy and environmental condition, ecological condition of PB and MB leprosy patients, efficiency of MDT on MB and PB leprosy patients and leprosy and socio-economic status. The study has identified that the environmental and ecological parameters played a vital role in the health status of the population in general and leprosy patients in particular.

SUSTAINABLE DEVELOPMENT IN RURAL SCENE: A CASE STUDY

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There has been a temporal shift in the paradigm of development due to changing contemporary problems and planning methodologies. But, an equitable distribution of benefits of development both in social and geographical space has remained the focus of 'development' strategies and models. Keeping the contemporary problems and the idea of 'equitable distribution' in mind a study of Suithankalan block of Jaunpur district in Uttar Pradesh with predominantly an agricultural economy, low literacy rate and poor infrastructural facilities, was conducted to suggest measures to ensure availability of resources not only to the present generation but

to future generations also. The parameters taken for the study are--several aspects of agriculture, irrigation, education and health status.

ENVIRONMENTAL IMPACT OF DEVELOPMENT ACTIVITIES
ON WETLANDS IN BANGLADESH

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In Bangladesh, there are different types of wetlands; and wetland issues vary from type to type. This paper highlights freshwater wetlands which possess enormous potential and which are affected most due to development activities. The main objectives of the paper are--to know the present status of freshwater wetlands in Bangladesh; to identify the importance of freshwater wetlands for the country as a whole; to evaluate the environmental impact of various development projects in the wetlands; to prepare and recommend interventions necessary and future action programmes. Most of the materials and data used in this research work were collected from different government and non-government, published and unpublished sources. With the available materials and data, different tables, maps and diagrams were prepared to show the impact of development activities on wetlands. Some suggestions and recommendations towards preparation of national strategy for conservation and management of freshwater wetlands, have been made in the paper.

NEED FOR A NEW STRATEGY TO AMELIORATE POVERTY
IN INDIA

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An overwhelming majority of the Indian population

lives in the rural areas. Most of them suffer from abject poverty due to unemployment, under-employment, very low income, high growth rate of population, lack of ownership and productive skills, malnutrition, morbidity and lower life expectancy and illiteracy. To improve the situation of rural poor, effective rural development strategies and policies are required. An increase in the contribution on non-agricultural activities towards rural growth in particular, is very essential to make the rural economy broad based and more relevant to the landless and the poor. Decentralisation of planning and administration and building up of participatory mechanism for providing greater say for the rural people in decision-making must be introduced. An attempt has been made in this paper to examine the impact of various poverty eradication strategies by generating income and creating employment opportunities.

USE OF NON-CONVENTIONAL ENERGY: AN ALTERNATIVE STRATEGY FOR ENVIRONMENTAL HEALTH

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Use of energy in various forms has contributed significantly to environmental pollution and consequent human health problems apart from causing drain on certain valuable resources. Development of non-conventional energy may partly solve some of the environmental and consequent human health problems. The present paper analyses the relevance of applications of non-conventional energy technology in rural areas, particularly in view of its dual advantages--economic viability and reduction in environmental pollution.

In order to realise the objective, Itha village has been selected for detailed study of its energy generation and consumption pattern. Here the main sources of energy are bio-gas plants and some experiment-based solar cookers. Information has

been obtained through questionnaires, from 57 households who maintain as many as 65 bio-gas plants. The sustainability of the existing plants and prospects of future development is examined. Suggestions for promoting non-conventional energy in the rural areas have been listed.

HEALTH STATUS OF POPULATION IN UNDERDEVELOPED AREAS
IN HUNGARY

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In 1991, 31% of all settlements in Hungary are considered as underdeveloped ones, where about 8% of the total population lived. Their underdevelopment is justifiable not only with natural, historic, societal, economic factors, but also with the quality and composition of their population. The health status is very important among the features of quality (age, sex, education, qualification, etc.) of the population, because it determines the economic activity, the relation to work of the population as labour force. In general those who are in good health can work better, they are able to reach higher achievement than those who are the valetudinarian. However, the health status depends on many factors like, environmental endowments, income conditions, style of living, social position, demographic features, etc. All these factors are more unfavourable in the underdeveloped areas than in other parts of the country. So, the health status is worse in the underdeveloped areas than in the other regions of the country.

The purpose of this article is to introduce the health status of the population in the underdeveloped areas of the country with Mid-Tisza underdeveloped region as an example. Using different kinds of methods (survey, interview, analysis of data) the study was conducted and it shows that the poor health status of the population

in the underdeveloped areas is not only the consequence of the underdevelopment, but also the reason for the underdevelopment.

It is particularly unfortunate that over the years the regional inequalities continued to increase between developed and underdeveloped areas, and the backwardness of the latter keeps growing, and, due to which the health status of the population continues to grow from bad to worse.

SPATIO-TEMPORAL VARIATION OF COMMUNICABLE DISEASES
WITH SPECIAL REFERENCE TO TUBERCULOSIS IN INDIA

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Environment plays a vital role in the spread of most of the communicable diseases including Tuberculosis. Tuberculosis is one of the major diseases in India that takes a heavy toll of people and spreads due to deterioration in the environmental and hygienic standards. The present study attempts to map the spatio-temporal variation of communicable diseases. The study also throws light on the regional and intra-regional variation in the spatial distribution of communicable diseases (Diphtheria, Whooping Cough, Tetanus, Measles, Poliomyelitis, Tuberculosis, Meningococcal infection, Syphilis, Gonococcal infection, Rabies). The study was based on the data collected at national level from various Health Directorates concerned. Simple descriptive statistical techniques were applied to explain the significance of disease-ecological structure of communicable diseases in India. In the case of Diphtheria, Madhya Pradesh and Karnataka reported to have more number of cases whereas whooping cough is found to be high in Madhya Pradesh, Andhra Pradesh, Orissa and Assam. Tetanus incidence is very high in Madhya Pradesh, Orissa and Rajasthan. Kerala, Andhra Pradesh, Assam, Madhya Pradesh, Maharashtra and Jammu & Kashmir registered more number of Measle cases. Syphilis is found to be very high in Andhra

Pradesh. Maharashtra, Andhra Pradesh, Madhya Pradesh, Rajasthan and Karnataka recorded more number of TB cases and consequent death rates are very high in Andhra Pradesh, Maharashtra and Rajasthan.

DEFINING AND DETERMINING THE QUALITY OF LIFE:
A CASE OF TOWNS OF U.P. HIMALAYAS, INDIA

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The present paper is an attempt towards measuring the life quality in Uttar Pradesh Himalayan towns. It is based on three hypotheses--(i) living space is one of the good indicators of life quality, (ii) place attractions judged by the amount of immigration speak of livability of the place or areal unit in question and (iii) literacy (particularly of females) is highly correlative with life qualities and livability. Life quality indices (L.Q) were calculated for 25 towns of the Uttar Pradesh Himalaya having population size of 4000+ in 1981 Census of India. Initial values and the final indices were standardized as fractions of 100.

Despite the probability of shortcomings of the data and the method used, results were found to be fairly interesting. Towns like Tehri, Chamoli, Gopeshwar, Uttarkashi, Pithoragarh, Pauri and Rishikesh got the highest index (about 30 and above); while the well known centres like Dehra Dun, Haridwar, Nainital, Haldwani and Almora were ranked as medium in terms of life quality. Mussoorie, Chakrata, Bageshwar and Majra had the lowest values; whereas towns with a good administrative-religious base ranked high. The centres which are almost stagnant in growth were placed lowest.

HYDROGEOLOGICAL ENVIRONMENT OF VARANASI CITY WITH
SPECIAL REFERENCE TO NITRATE CONCENTRATION

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With increasing urbanisation there is marked increase in the exploitation of ground water resource and disposal of effluents and sewage into the ground as well as surface water bodies. So, there is adverse impact not only on the quantity of ground water resource but also on its quality. The present study is designed to investigate the changes in hydrogeological environment of Varanasi city. An attempt has been made to identify spatial pattern of Nitrate concentration in ground water resources. The study brings out that changes in the hydrogeological environment of western part of the city--Mahmoorganj and adjoining belt--has changed significantly. Sixteen samples of ground water from wells and hand pumps were collected on random basis and were tested for nitrate concentration. The results reveal that Nitrate concentration varies from 0.30 ppm at Khojwa to 24.95 ppm at Phulwaria. On comparing the results with the standards set by Indian Council of Medical Research (ICMR), the nitrate concentration in ground water of Phulwaria and Bhojubir were found above the permissible limits. It is perhaps due to leakage of sewage and other effluents into the aquifers. Increased concentration of nitrates may affect human health.

COMMUNITY PARTICIPATION FOR CONSERVATION OF
ENVIRONMENT IN LWANG/GHALEL VDC OF KASKI DISTRICT OF
WESTERN NEPAL

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Annapurna Conservation Area Project (ACAP) had

initiated agro-forestry and community development programme in Lwang/Ghalel Village Development Committee (VDC) in January 1990. The main objective of ACAP is to promote conservation of the nature and natural resources in the target area of Annapurna region covering 80 VDCs. The present study focusses mainly on agro-forestry and community development programme of Lwang/Ghalel VDC.

The strategy adopted to implement the programme comprises of the following aspects of conservation for development, people's participation, sustainability and privatization and transfer of technology. The project acts as facilitator. The working approach with the villages is effective, prompt and flexible.

There has been good progress in the implementation of Agro-forestry and community development programme. The people have become more aware and contributed substantially for conservation of the nature and natural resources of the area. There has been active participation of the local people in planting trees on the community lands, in the preservation of the forest area and in judicious (sustainable) utilization of the forest products. Construction of walking trails, drinking water schemes, toilets, smokeless chulos (stoves) and awareness generating activities led to better and healthy sanitary and environmental conditions.

SUSTAINABILITY OF A BACKWARD RURAL REGION: ISSUES IN ENVIRONMENTAL MANAGEMENT AND DEVELOPMENTAL STRATEGY

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The main objectives of this paper are to study Panchal Region, a backward rural and hilly area in Gujarat, for sustainable developmental programme, both at macro and micro levels. An attempt has been made (i) to understand the problems and prospects of land capabilities to enhance the capability through

environmental management measures and (ii) to suggest a diversification of land based, non-farm activities, suitable to local eco-system and to improve rural employment through local organisations.

In the study a regional approach has been adopted and statistical, geophysical and automated cartography and GIS, have been used to compare actual land use with that of proposed land use. Data was collected both from published secondary sources and from primary sources with the help of field questionnaires. Satellite imagery has also been used.

The study revealed that (a) 30% of land has been degraded in the region during 1967-1988, (b) there has been a reduction in sustainability in net sown and gross cropped area and in yield rate during 1981-91, (c) there has been changes in land use with an increase in waste land, (d) the growth rate of population has come down and (e) there has been decline in income per person, per acre and consumption of nutrition per person. A planning model has been suggested for proper environmental management.

REGIONAL DISPARITIES IN THE LEVELS OF DEVELOPMENT IN ANDHRA PRADESH

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In the present study an attempt has been made to identify the levels of development and disparities in Andhra Pradesh state. About 40 variables relating to population, education, health, agriculture, industry, power, transport and communication, recreation, have been considered. Factor analysis has been employed to analyse the variables. The cluster analysis has been used to group the districts according to their levels of development.

The analysis has yielded nine factors explaining a total variance of 85.90 per cent. The first five factors explained 67.69 per cent. These are the major dimensions of the forty variables in 23 districts. The first component is labelled as primary activity component. While the second component is labelled as industrial component. Similarly all the components are suitably named according to the leadings of the variables on respective components.

The districts were grouped by cluster analysis according to the level of development. Out of 23 districts, only three districts are very highly developed, four are highly developed, eight districts are moderately developed and the rest of the eight districts are less developed. Within the three regions of Andhra Pradesh--coastal Andhra, Telangana, Rayalaseema--it has been found that four districts in coastal Andhra, three in Telangana and one in Rayalaseema are highly developed; about six districts in Telangana show very low development.

CHARACTERIZATION OF GROUND WATER - A CASE STUDY FROM
GYANPUR AND BHADOHI TAHSILS, UTTAR PRADESH

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The current status of ground water in Gyanpur and Bhadohi Tahsils of Bhadohi district in Uttar Pradesh was examined with a view to evaluate its suitability for irrigation and domestic consumption. Thirty one tubewells and dugwells were identified for the study. Water samples were collected during the months of May and October, 1992, i.e. before and after the monsoon. The samples were analysed for Na, Ca, Mg, HCO_3 , CO_3 , Cl, SO_4 , following standard APHA methods. Results obtained were plotted on Hill-Piper diagram, U.S. Salinity Lab. Diagram, Back's Facies Diagram and Gibbs' diagram. Corrossovity Ratio and Hardness were also computed. The results indicate that ground water in northern parts in the two tahsils is of low mineralization

than that in the southern part. It belongs to low salinity and low-medium hazard and thus is suitable for irrigation. Drinking quality with respect to hardness is also suitable. Plottings on Hill-Piper diagram indicate that all the water sources are relatively isolated thereby eliminating any chance of self mixing and that the changes in composition are prone to the affect of local factors. Data on hydrochemical facies indicate a small mineral water interaction modifying the water consumption. No point source responsible for increasing salt loads in the waters was identified.

PUBLIC HEALTH INFORMATION SYSTEM IN BUDAPEST CITY

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A special geographical information system was elaborated in the Geographical Research Institute of the Hungarian Academy of Sciences in 1991-1994. It is a spatial, graphic system consisting of 4 types of data concerning public health. The 4 data fields are demography and living conditions (age, sex, job and density of population, social characteristics of flats), environmental pollution (the distribution of air polluting elements, noise and radiation levels, traffic intensity, wind ventilation, green area quality), data concerning the National Health Insurance district doctors' surgeries (like the turnover of the patients, number of urgent calls, that of the hospitalized, quality of the diagnostic instruments serving the doctors, technical state of the buildings of the surgeries), and the spatial distribution of the registered cases of certain diseases (like mamillary cancer, bronchitis, melanoma). This data was collected, mapped and digitized in a test area of Budapest City. The data base consists of maps for the years 1986, 1991 and 1994, so the changes can also be examined during this period. The GIS program enables the user to display each map and to compare several ones of them and to assign scores to each map and to assess them

altogether in order to obtain a synthesized map showing the totalized effect of different spatial data. So ranking and site selection functions can be performed on the test area. This information system is meant to be used by experts of the local authority, the self-government, which is responsible, among other things, for public health management in the district. The system stores and operates with up-to-date graphic information visualized by maps showing the street network to help orientation.

ENVIRONMENTAL POLICIES, LEGISLATION AND MANAGEMENT
OF SELECT SMALL SCALE INDUSTRIES: CASE STUDIES FROM
BANGALORE CITY, INDIA

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Bangalore city has about 237 small scale units generating hazardous wastes. These range from lime-kilns, chromium plating, battery manufacture, textile mills, dyeing units to distillaries. Pollutants from these and other units have defiled land, air and water sources rendering them hazardous to health. The increase in pollution can be attributable to a variety of factors such as lack of implementation of stringent legislative policies to curb pollution, the lack of will to implement them, high costs of treatment plants, the ignorance of people and the lack of environmental consciousness and education among the owners of the units. The government has identified 32 industries as hazardous and subject to follow pollution control norms. Nevertheless the economics of treatment measures do not make it possible for them to set up treatment plants. In view of this situation the study takes a look into the viability of common treatment plants especially in industrial estates as a collective measure for pollution control.

This paper presents an insight at the guidelines in siting industries, the laws, policies and

legislations in the management of the environment from small scale industries, and the lacuna in them on one hand and the will and consciousness of the administration and factory owners in the implementation of the same on the other. The study presents factual information and case studies in substantiating the impact of small scale industries on environment. The study suggests measures that would be viable to the administrators in the implementation of policies and the owners of the units to implement policies without being heavily taxed to manage the environment effectively.

REMOTE SENSING BASED PLANNING FOR SUSTAINABLE
DEVELOPMENT OF A MINING-INDUSTRIAL REGION: A CASE
STUDY OF TALCHER-ANGUL AREA, INDIA

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As the mining and industrial activities are found in localised and concentrated form, the production and allied activities concentrate in one big unit or in a number of big units clustered together. Such concentration has its advantages and disadvantages. These activities have led to unfavourable and sometimes irreversible impacts on the environment. Talcher-Angul region in Orissa state, fast emerging as a big source of coal and thermal power besides having heavy water and alumina plants, has come under public criticism due to attendant eco-degradation.

Hence, planning for sustainable development of a mining and industrial region like Talcher-Angul, is a crucial task because care should be taken so that the environment is not endangered. Such a task requires reliable and up-to-date information on the spatial distribution of natural resources, their present status, trend of growth or destruction of natural resources in addition to climatic conditions

and socio-economic conditions of the people living in those areas.

Use of spaceborne remotely sensed data in providing up-to-date thematic information of the terrain, aids in such a planning process. In order to provide details of developmental plans of Talcher-Angul region at macro-level, various thematic maps such as land use, soil, hydrogeomorphology, geomorphology and slope maps have been prepared at 1:50,000 scale using IRS LISS-II and Landsat MSS False Colour composites and topographical sheets. Trend of change in landuse pattern of the region over a period of ten years i.e. 1983-1993 has also been studied. Integrating various thematic sets of information, suitable resources development measures i.e. agro-forestry, agro-horticulture, suitable sites for ground water exploitation, pisciculture, plantation, double crops, etc., have been suggested for surrounding areas of the major coal mines.

ENVIRONMENTAL ETHICS AND AWARENESS IN INDIAN CULTURE AND RELIGION

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In the present paper an attempt has been made to project the environmental ethics and awareness enshrined and pronounced in Indian religion and culture. The Vedas, the Gita and the Ramacharitmanas and many other Indian texts provide many examples and evidences on love and respect for environment. It is remarkable that people as early as 5000 years ago, while Indian culture was being formed in the magnificent forests, pronounced words of wisdom through Atharvaveda preaching that the resources of the earth are not something which could be damaged at will. The Indian religion has accorded the status of deities to PRITHVI (earth), JAL (water), VAYU (air) and VANASPATI (plants). Lord Krishna has pronounced himself as PEEPAL tree in Chapter 10, Verse 26 of the Holy GITA. Krishna

Chaitanya has warned against greedy and speedy exploitation of earth without reverence to the environment. Indian religion preaches to preserve flora and fauna to main human habitation, prosperity and ecological balance on this planet. In the modern materialistic world marked with consumerism, mankind may become a victim of environmental degradation because of its indiscriminate exploitation. So, there is need to remind it/him of the ideals of his own religion and culture on preservation of environment.

ENVIRONMENTAL PROBLEMS AND ISSUES OF
HILL ROAD DEVELOPMENT IN NEPAL

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The kingdom of Nepal is a landlocked hill-mountain dominated small country of South Asia region. Among the various modes of transportation, road transport has occupied important role for the simple reason that it provides most flexible form of transport for the movement of men and materials.

Road transport has been provided top priority in the planning process. The motorable road length has increased substantially in the country. Total road length was merely 600 km in 1955, which rose to 9,470 km by 1993. The roads were categorised into Highway, Feeder Roads, District Roads and Urban Roads on the basis of their functions, technical standard and importance. Farm to market roads to cater the rural needs along with national highways and feeder roads connecting different parts of the kingdom were constructed. However roads service facility in the hill and mountain regions, in particular are still felt insufficient. More roads are to be built in the coming days to meet the growing transport demand.

Although the construction of aforementioned hill roads contributed to breaking up the remoteness and

isolation of the hill and mountain regions and also assisted to promote economic and development activities, they are not however free from adverse environmental impact. Environmentally unsound construction methods, coupled with underlying unstable geological formations and technically unsound road alignment have created severe environmental problems and issues and also damaged the hill environment seriously. The noted environmental problems faced by the country are landslides, soil erosion, mass wasting, destabilization of mountain slopes, etc. Likewise, deforestation, air and noise pollution are some of the localized types of environmental impacts occurred in and around road construction sites. Use of heavy road construction equipment such as dozer and excessive use of blasting materials have intensified the adverse impact on environment. It has created migration along with the problem of ribbon development or roadside development.

The current Eighth Plan (1992-1997) has paid due attention to mitigate environmental problems by incorporating policy relating to road construction. Green Road approach has been tried as an experimentation. It is tested in Palpa and Dhading districts of Western Development Region of the kingdom. As a matter of fact, these pilot projects aim to build low cost, low traffic, fair weather village access roads adopting conservation-oriented and labour-intensive construction techniques. However, road sector EIA guidelines is yet to be developed and practiced. It is in the process of formulation.

SUSTAINABLE DEVELOPMENT IN THE INDIAN DESERT

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In this paper the trophic levels of biotic, abiotic and socio-economic resources have been analysed in the background of agro-pastoral activities in the

Indian Desert Region of Western Rajasthan. The sustainability without compromising the ecological resilience in a marginal region lies in the stability of land productivity and is centered around the conservation, restoration and intensification of soil health and plant protection management endeavours. In the present paper a sustainable systems framework has been devised to achieve this goal in the Indian Desert Region of Western Rajasthan.

DELHI DUST - A CAUSE FOR CONCERN

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There are 11 air polluting industrial areas in Delhi. Among 4652 registered factories, there are 114 air polluting industries besides the three thermal power plants (located in Delhi). In Okhla Industrial area CO₂ ranks highest in contribution to total emissions; it contributes 21.4 tonnes per month (t/m) adding 58%, followed by HC with 4.82 t/m and SO₂ with 4.22 t/m. The contribution of SO₂ and CO₂ by Shahdara Industrial Area is 24.9 t/m (16%) and 79.9 t/m (52%) respectively and particulate matter is 19.2 t/m (13%). The amount of different pollutants emitted from other Industrial Areas vary depending on the industrial processes and types of fuels used.

This study of Delhi tries to understand the nature of mineralogy and chemistry of dust fall-out and its possible effects on life. The grains show a multitude of shapes. The coal ash being spherical should settle down the fastest (offering least resistance to the air), but they are found and collected almost 16 km away from the points of emission. Delhi's terrain being quartzitic, silica makes up the largest dust constituent. The dust fall over Delhi is dominated by lithogenic particulates but the ubiquitous presence of carbon soot due to uncontrolled rise in the number of

vehicles, industries and thermal power plants, is conspicuously alarming.

The trace element analysis shows a high iron, zinc, lead, copper and chromium content in the dust. The size distribution analysis of the primary harmful constituents in the particulates shows a major fraction of critical range which is retained easily in the lungs leading to serious health complications.

IMPACT OF URBANISATION ON ENVIRONMENTAL POLLUTION
A CASE STUDY OF BANGALORE CITY

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An attempt has been made in this paper to study the correlation between urban population growth and its impact on environmental pollution in Bangalore city. Bangalore is one of the most important and fast growing city in the country. The urban population of Bangalore has gone up at an alarming rate. During 1901, the city's population was just 0.22 million and today (according to 1991 Census) the population has increased to 4.13 millions, and it is expected to reach 5.5 millions by the end of this century. With the increasing urbanisation along with a conglomeration of industries and commercial activities in Bangalore city, the transport demand has consequently increased. Due to inadequate public transport system the use of personalised vehicles has correspondingly increased. Consequently, the urban population of the city is facing the following problems:

(i) transport crisis: buses running to various parts of the city are over-crowded; (ii) industries are running all the 24 hours; (iii) the problem of shelter; (iv) fast deforestation for residential

purposes; (v) schools are over crowded; (vi) unemployment is increasing and thefts/robberies are a common occurrence. Many of these problems are creating and aggravating environmental pollution in Bangalore.

STRATEGIES FOR PROMOTION OF ENVIRONMENTAL HEALTH

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Environmental health is a complex area of research especially because of tremendous pressure on natural resources and consequent deterioration in environmental conditions. The causal factors responsible for the present state are varied in nature and, taking all that into account, strategies are suggested to ameliorate the situation.

NATURAL RESOURCE MANAGEMENT PRACTICES AND ASSOCIATED PROBLEMS IN ETHIOPIA

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Natural resource management practices refer mainly to deforestation and soil erosion followed, gradually, by depletion of bio-diversity, eviction of wildlife, water logging, salinity, siltation and many other environmental problems. The present spatial patterns of land degradation seem to be closely associated with the history of population settlement in Ethiopia. The northern parts of highland Ethiopia where sedentary agricultural activities were long practised, are the most eroded and stripped off their vegetation cover than their southern counterparts. The most irregular terrain, the steep slopes and the relatively short and sporadic rainfall in the north make the area

vulnerable to erosive agents. The topography in the south and southwest is comparatively less rugged and is characterized with long and consistent rainfall that supports a vegetation cover dense enough to counterbalance the forces of erosion. The predominantly communal/rist land tenure system in the northern parts and the private and gult land tenure systems in the southern parts (where tenancy prevailed) do not show any substantial difference in as far as conservation (land treatment) and productivity of the farmers are concerned. There is neither any positive change in conservation practices and in improving the productivity of the peasant farmers and the land after the 1975 land reform which brought land under public ownership. There has never been any government policy in Ethiopia which has been effectively implemented to enhance environmental conservation. The farmers (85% of population) have never been genuinely involved in policy formulations and implementations. Disheartening market prices of agricultural commodities, heavy and numerous forms of taxation have always incapacitated the farmers to invest on land for conservation. Land use policies, since the 1974 socialist revolution have never given farmers security of land. Policies themselves have, therefore, played their part in the deterioration of the environment in Ethiopia. Retaining the present land use system (public ownership where a farmer is not sure where he will plough next season) is an indication of lack of seriousness on the part of the government. The Ethiopian government should, therefore, revise all policies and approaches of policy implementation that have been impediments for the conservation of natural resources.

ENVIRONMENTAL CONDITION OF AN EMERGING INDUSTRIAL
CITY IN BANGLADESH: A CASE OF NARAYANGANJ

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The city of Narayanganj is regarded as one of the

important industrial and commercial centres of Bangladesh. The unique location of the city on the two banks of the river Sitalakhya along the inter connecting roads have facilitated to a great extent, its emergence as an industrial city. Of late, various types of industrial establishments have concentrated their activities in the city. As a result the industrial and commercial activities, smoke and waste from the residential buildings and immigration of the population from the villages have exerted immense pressure on its environment. The air, water, noise and municipal and land pollution problems have been creating a serious impact on human habitation. This is evident from the analysis of the water of the Sitalakhya river flowing through the city. The analysis points to a probable environmental crisis for Narayanganj city. This paper also tries to explore certain solutions to avert such a crisis.

SUSTAINABILITY OF URBAN INDUSTRIAL SYSTEM

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Sustainable industrial development is possible only if it can adopt eco-friendly techniques. The main cause of pollution in urban areas is the rising number of small scale industries. Though it is a good step taken by the government to encourage the establishment of small scale industries to generate employment for the educated unemployed, such industries should be made to follow environmental guidelines. At present there are a total of 46000 industrial units in Delhi, 77% of which are with less than 10 workers and 16 % are with workers between 10 and 20. The second Master Plan for Delhi estimates that the number of industrial units in Delhi by 2001 would increase to about 93,000 i.e. more than two-fold increase in a span of eleven years. Hence, there is need to make environment impact assessment from time to time.

HEAVY METAL CONTAMINATION IN AND AROUND LEAD-ZINC
MINING COMPLEX-A CASE STUDY

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Until recently maximum exploitation of the deposit was considered a desirable objective and least importance was given to environmental degradation caused by mining and processing operations. But due to ecological awareness of the public and strict environmental policy of the Government of India, the concept of maximum exploitation has changed. The current trend is towards sustainable mining practices which is aimed at optimal utilisation of natural resources within the carrying capacity of ecosystem.

A case study of one of the largest and oldest on-going lead-zinc mine, producing about 1.2 million tonnes of ore per year, has been examined to see the environmental scenario in the mining area. Although the management has taken all preventive measures to control the pollution and also claiming that they have developed eco-friendly mining technology in the area, the observations on air, water and soil qualities show that these environmental parameters are influenced by mining and processing activities in the area. Metal content like lead, zinc and cadmium in airborne dust and soil were found to be higher than the natural background concentration. Effluent discharge from the mill contained higher concentration of dissolved solids and traces of heavy metals. In the present paper, an attempt has therefore been made to assess the environmental degradation caused by mining and processing activities of such type of sulphide ore deposit in and around the mining complex.

GROWTH VERSUS ENVIRONMENT
NEED FOR SUSTAINABLE DEVELOPMENT

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Development and growth rate are at the centre of a debate in different contexts. Development is a continuous process, but characterised by high degree of inequality. The richest 20 per cent of the world's people now receive more than 150 times the income of the poorest 20 per cent. Almost one-third of the total population of developing countries is still in absolute poverty. Even in developed countries 15 per cent of the people live below poverty line. Fortunately, of late, there is serious political and social awakening in both the developed and developing nations to restrain the destruction of world environment so as to achieve sustainable development with a shift from growth versus environment to growth and environment. So, the need of the hour is formulation of policies which could promote development with sustainability as its main tenet.

ECOLOGICAL CONSTRAINTS IN AGRICULTURAL DEVELOPMENT
IN THE HILLS OF NEPAL

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Ecological constraints of slope, altitude and climate have restricted the development of agriculture in the hills of Nepal. These factors are acting as impediments in development. Cultivation of soils beyond the ecological limits has accelerated the processes of land degradation. The present paper attempts to analyse the effects of ecological forces on the development of hill agriculture. The study is based on detailed field survey data of Begnas Tal-Rupa Tal watershed of Kaski district in Nepal. The Crop-Yield

Concentration Indices Ranking Coefficient and the Index of Cropping Intensity are applied for the analysis of data. The results show that the expansion of agricultural land towards steep slopes has raised the cost of production as well as the rate of land degradation. The yield of crops per hectare is less with increasing altitudes. There is intensive use of land in higher elevations. The deficiency of soil moisture and temperature conditions are also well reflected in the declining productivity of the lands. Over-expansion of agriculture towards marginal environment has resulted in ecological disorder and a situation of economic hardship.

SPATIAL DATA INTEGRATION BY GEO-INFORMATION SYSTEM
FOR SUSTAINABLE DEVELOPMENT IN CHANDRAGIRI WATERSHED
KORAPUT DISTRICT, ORISSA, INDIA

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For sustainable development of a region, it is now accepted that the first priority to achieve the same is proper land and water management to increase the production and the optimum utilisation of existing resources by integrated spatial planning. As integrated management approach requires information about the topographic and terrain parameters, water availability, land capability and socio-economic condition of the inhabitants, a spatial database of the watershed can be generated using remote sensing and other secondary data. The objective in the present study is to determine the efficacy of remote sensing data in spatial database generation and GIS for data integration in tackling local area problems to achieve the objective of sustainable development in Chandragiri watershed, Koraput district, Orissa.

Remote Sensing data in conjunction with topographic, groundtruth and surveyed data are used to generate

the spatial database of the watershed (landuse, geology, geomorphology, hydrogeomorphology, soil cover, drainage, slope and land capability etc.). Temporal data is used to study the land transformation process. Analytical functions of GIS (map overlaying, multiplied image and derived map generation, buffer analysis, 3D terrain models, change detection and statistics generation etc.) are used for alternative planning scenario generation.

Raster database of the watershed was generated using a cell dimension of 50 x 50 mt. Raster maps are overlaid to generate aspects maps (groundwater potential and land capability maps etc.) to be used as input maps in alternative landuse plans and management scenarios. The aspect maps are used by GIS analytical option to prepare derived maps with selective attributes required for action plan preparation. Finally selective superimposition was done to suggest sites for forest plantation, horticulture, agro-horticulture, cash crop plantation, fodder development, contour cultivation and avenue plantation etc. For example, hills with scrub/grass cover (attribute of aspect map i.e. wasteland map) having 5 to 15 per cent slope, shallow soil depth and poor to moderate ground water potential (land capability class VII) are suggested for forest plantation. For water management of the suggested sites location for nala bunding, water harvesting structure, dugwells and tubewells are suggested by superimposition of drainage, structure, geology, geomorphology, slope and land capability maps. The scenarios developed for land management are also superimposed on the 3D relief map (contours from topographic data are used by GIS programme) generated for the watershed to study the implementation aspect and field realities of proposed activities. Catchment area analysis was also done along the transportation networks for suggesting sites for avenue plantation and village forests around settlements. Thus the present study demonstrates the integrated approach and the technique of local area resource management by remote sensing and GIS for sustainable development.

ENVIRONMENTAL EDUCATION IN SCHOOLS: A CASE STUDY
OF ALLAHABAD SCHOOLS

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This paper discusses the status of environmental education in schools with special reference to junior high schools of Allahabad. In the developing countries like ours environmental problems are not only multifaceted but also posing a serious threat to the very survival of organism including humans. Various Acts have been enacted even by the Parliament to solve the environmental problems but desired goals and objectives have not been achieved yet. This has necessitated efforts to create awareness in the school children about environment and its problems, provide them knowledge and skills to enable them to work for the protection of environment.

A survey has been conducted of Allahabad schools to assess and evaluate the objectives and status of environmental education in schools. An important aspect emerging out from the preliminary analysis of survey data is that though facilities like trained teachers, resource materials are available in these schools, the environmental education objectives are not being achieved due to poor teaching methodology, poor monitoring and weak administration.

The curriculum needs a continuous evaluation and revision. As for environmental education at primary and junior levels there is need to use separate teaching methodologies for these levels of schools. Also, there is a need to train all the functionaries of the school especially the teachers. From the survey and analysis it has become clear that though a beginning has been made, a much more serious and multidimensional effort is required for effective teaching of environmental aspects in schools. Interaction among the environmentalists and functionaries from school boards and Directorate of Education would help to identify the modes and strategies for environmental education feasible at various stages of school education.

AIR-TV TRANSMISSIONS AND HEALTH HAZARDS:
A CASE STUDY ON CHILDREN OF VARANASI CITY

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This paper presents the results of an epidemiological study conducted on health of pre-and school going children of Varanasi city due to AIR-TV transmission. Five hundred and fifty pre-and school going children residing around 13 km areal distance from Varanasi Radio and TV transmitters were randomly selected for this study. All the informations were collected from their mothers through interview schedule.

Results of present study reveal that pre-and school going children residing near radio and television transmitters are affected with fever, headache, sleeplessness, exertion, irritability, excitation, eye sight defects. Further, radio and television electromagnetic signals were noted to affect normality of face, eye, hair, tongue, teeth, gums and skin. Children residing around 2.5 km (areal distance) from these transmitters are worse affected. So, it is suggested that Government of India should take quick decision to relocate Varanasi Radio and TV transmitters at sufficiently far away place from the city. In the light of above observations, it is suggested that Government of India should immediately work out RF exposure standards.

TOWARDS A MORE ENVIRONMENTALLY SUSTAINABLE SYSTEM
OF AGRICULTURE IN THE DRY ZONE OF SRI LANKA

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In Sri Lanka, present day traditional agriculture is based on the village tanks and include a three fold system of land use--yaya: Paddy land, gangoda:

homestead and hena: area devoted to shifting cultivation. Modern agriculture in the colonisation/settlement schemes is based on large reservoirs and include a two-fold system of land use--lowland: areas cultivated used to raise paddy and highland: constituting the homestead. This paper analyses the main features of these two systems of agriculture and brings out the principal problems associated with the two systems. The study is based on the field experiences of the author and also on secondary sources. Finally suggestions towards the development of a more environmentally sustainable system of agriculture have been made.

INCIDENCE OF PULMONARY TUBERCULOSIS IN
GARHWAL HIMALAYA: A GEOMEDICAL STUDY

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Garhwal Himalaya with over 30090 sq. km. of area stretch over five districts viz., Chamoli, Uttar Kashi, Tehri, Pauri and Dehra Dun with 2.44 million population, 8449 villages and 24 towns. Rural population is about 79.4 per cent. Data from published sources, field study, interviews, samples studies are used to analyse human health and health care in remote settlements. According to an estimate nearly 25% of total population is in the grip of tuberculosis. The number has increased 2.5 times in the past ten years. Rate of incidence is very high--422 cases per hundred thousand population in 1981. Greater number of cases are found among females due to their excessive involvement in agricultural operations. Tehri Garhwal has high number of tuberculosis cases as compared to the other districts. There are many cases of Pleurisy also in the study region.

GEOTECHNICAL AND ENVIRONMENTAL ASPECTS OF URBAN
WASTE DISPOSAL

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Presently selection and design of disposal sites is a neglected area in our country. A vacant valley, nearby river or drain, is very commonly used for the disposal of urban wastes. In order to have an optimum balance between geotechnical and environmental aspects of urban waste disposal, site design for the disposal is very essential. The present study is aimed at the geotechniques of urban waste disposal. The unplanned disposal of urban wastes may result in undesirable compressibility and volume changes, erosion, changes in seepage behaviour and slopes and embankment failures and reduction in bearing capacity of the soil. Further, it may cause degradation of natural environment and consequent human diseases. The present study gives an overview of the geotechnical aspects of urban waste disposal.

HYDROGEN: AN ENVIRONMENT FRIENDLY ENERGY CARRIER
FOR THE FUTURE

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The world energy scenario has undergone a sea change in the last two decades. The rise in crude oil prices effected by OPEC has caused tremendous inflationary impact particularly on the countries which import oil. The recent Middle East crisis has added a complex dimension to the petroleum availability in India. High prices coupled with limited availability of petroleum based fuels provide a compelling incentive to search for new and renewable energy sources and also to undertake conservation efforts.

As a result, a number of alternative fuels have emerged. Any consideration of a viable solution to petroleum crisis, instantly leads to hydrogen as the most favoured choice. Hydrogen can be widely used as a fuel to replace petroleum products in future, not only in transportation, but also in most of the other areas such as chemical industries, spacecrafts and even as domestic fuel. Besides, it is environmental friendly giving out water vapour and traces of NO_x as the combustion products.

The solar hydrogen offers an opportunity for a renewable worldwide energy system for the future, in harmony with the nature and inexhaustible.

In the present paper, an overall view of the production, storage, transportation and application of hydrogen is presented. A call for the immediate awareness of the subject is emphasized.

ENVIRONMENTAL PROBLEMS AND REGULATIONS IN PAKISTAN

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In this paper it is sought to estimate the extent to which the existing legal provisions in Pakistan have been effectively used against the sources of pollution. The main sources of degradation of environment are grouped into three kinds of processes--population and settlements, production (agricultural and industrial) and transportation (both land and sea). The pollution magnitude is spatially variable. The pollution problems is very serious at the Karachi harbour (Manora Channel). Some laws and regulations do exist which have hardly been effectively used for controlling the sources of pollution. The Environmental Protection Ordinance 1983, provides for the establishment of an Environmental Protection Agency with wide powers to draw rules and regulations for controlling the environmental pollution in Pakistan. But, this has not yet been made effective.

FOREST RESOURCES IN DARJEELING HIMALAYAS:
NEED FOR SUSTAINABLE DEVELOPMENT

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Darjeeling Himalayas were covered with dense forests and only 22 per cent of the total area was occupied by settlements and agriculture. Deforestation started during the last half of the nineteenth century due to introduction of tea plantation by the Britishers. In this tract, in 1892, the population was 22,000 but, by 1991 it has increased to 6 lakhs. This high rate of growth of population is due to tea industries, tourism and influx of population from other countries. In 1991, the percentage of forest cover here was 38.5% which is higher than the State average (12%) and the stipulated norm (33%). The per capita forest cover in Darjeeling Himalayas is 0.05 which is higher than the State average (0.03). Most of the forests are degraded due to random felling of trees for fuel and wood, overgrazing and encroachment for cultivation and settlements. The rate of deforestation during the last few decades (1951-1991) was more than 17 per cent. Consequently, there is a serious imbalance in this mountain ecosystem. In this paper various ways and means are suggested to precisely work out the various environmental parameters so that measures can be taken to reduce the environmental disasters.

ENVIRONMENTAL ISSUES AND SUSTAINABLE DEVELOPMENT:
NEED TO STUDY THE HUMAN-ENVIRONMENT INTERACTION
USING GENERAL SYSTEMS THEORY

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The biosphere is treated as one General System by treating it as a large scale open non-linear, non-equilibrium thermodynamic system with solar energy acting as an input which maintains some order in it

in the form of climatological cycles, agricultural production, ecological balance and certain socio-economic structure. Priogogine's idea of order through fluctuations is used to show that discoveries like those of motor car and paper technology act as fluctuations in this system and generate a different type of order which acts as a disorder in the biosphere. Another General System is introduced which involves the standard methods of modern science to study the biosphere. However, in this context, limitations imposed by methods of physical sciences to understand human systems are discussed. It is then suggested that the interdependence and the wholeness demanded in such systems can be understood by introducing the concept of implicate order of quantum mechanics and a GST type of approach.

To study practical problems, it is argued that one must discuss the sustainable development in a very generalized way. Two examples are given. First, it is necessary to study the stability and sensitivity levels of the biosphere under the growing threat of pollution. Secondly, it is essential to increase food production and generate employment opportunities by minimizing environmental degradation. Both these require systems modelling, operations research techniques and integrated approaches etc.

It is then suggested that this type of approach can also help in considering the effect of the value system, ethics, culture and philosophy on the environment. Actually some ideas from Indian philosophy and culture are mentioned and their relevance is discussed in the light of general systems and order etc.

IMPACT OF ENVIRONMENTAL POLLUTION ON HUMAN LUNGS

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Lung is an organ which experiences maximum exposure

of the environment. Every minute about 10,000 ml of air enters and leaves out of the lungs. Thus, both particulate and gaseous pollutants exert their noxious effects on the lung parenchyma which manifests in the form of various diseases of the respiratory system. The dust particles of size of more than 10 micron are filtered by the nasal mucosa, but those of 5 micron and less are inhaled directly into the lungs and are retained there. Very small particles remain suspended in air and move in and out with respiration. Gaseous pollutants like Sulphur dioxide act as simple irritants producing mild cough and make one vulnerable to exacerbation of bronchial asthma, chronic bronchitis or other respiratory diseases. Ozone has direct effect on respiratory mucosa by activating alveolar macrophages which in turn releases various active principles. Higher concentration of NO_2 is immunosuppressive and therefore it makes a person more susceptible to respiratory infections. The working environment of people also plays an important role in the cause and recurrence of diseases of the respiratory system. The present study gives some aspects of respiratory allergy due to aeroallergens.

URBAN ENVIRONMENT AND SUSTAINABLE DEVELOPMENT
IN MAHENDRA NAGAR TOWN OF NEPAL

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In Nepal the level of urbanization is very low as compared to the other South Asian countries. In the census of 1991, Nepal's urban population constituted 9.2 per cent of its total population. Mahendra Nagar town located in western border district of Kanchanpur is a zonal and district headquarters of Mahakali zone. It has a population of 26,345 persons and growth rate increase is 9.02 per cent per annum (1991). The study attempts to analyse the present urban environment and sustainability and its impact on health of the urban society. It is based

on primary information collected during May 1994. Because of an increase in the population, the encroachment on the surrounding forest is very high. Almost all the forested area around it has been cleared for cultivation and settlements. This urban centre owes its development to malaria eradication programme, immigration, development of transport (Mahendra High Way) and to communication facilities.

INTEGRATED CHILD DEVELOPMENT SERVICES AND HEALTH CARE FACILITIES IN RURAL AREAS: A MICRO-LEVEL STUDY

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Health care facilities along with nutritional status is a significant direct determinant of the health-status of the society. Hence, access to health care facilities is considered a basic human right. Realising this fact, World Health Organisation (1978) resolved to ensure 'Health For All by the year 2000.' Being a signatory of Alma-Ata Declaration, India in its National Health Policy (1983) accepted the responsibility to provide primary health care facilities to the entire population by the end of the twentieth century. Taking into account the miserable nutritional and health conditions of children especially of those from rural poor families, government in coordination of the Integrated Child Development Services (ICDS) launched, in 1976, a comprehensive scheme to reduce infant and maternal mortality and to enhance the health and nutrition and providing learning opportunities of pre-school children and mothers.

During the last couple of decades, numerous national and state level programmes have been launched in the country for control/eradication of diseases and for improving health and nutritional status.

Despite considerable expenditure incurred in providing health infrastructure, health services especially in rural, tribal and urban slums are still very miserable. Furthermore, the socially and economically weaker sections of these areas are relatively more deprived from the viewpoint of health and nutrition.

In the present study an attempt has been made (i) to examine the utilization pattern of Anganwadi centres; (ii) to evaluate the nature and extent of utilisation of the health care facilities; and (iii) to analyse the relationship of (a) utilization of Anganwadis, (b) utilization of health care facilities, with social, educational and economic status of the household.

The present study has been conducted in Kalwas village of Hisar district of Haryana, which is situated about 15 km south of Hisar town. The study is based on primary information collected through a field survey of Kalwas village during January 1993. The household level data has been generated through canvassing a semi-structured questionnaire to all 293 households of the village. Some information based upon the personal observations of the field investigators have also been taken into account while analysing the data.

In order to relate the social status of the households with the health conditions, the village community has been classified into four social strata as reflected by the caste hierarchy. All the households have been put into four broad caste groups i.e. upper, upper middle, lower middle, and lower castes. On the basis of level of education of the head of the household, the households have been divided into four categories of educational levels viz., illiterate, primary, middle, matric and above. On the basis of the size of ownership holdings, the households have been classified into five economic classes viz., landless, marginal, small, medium and large farmers. The modified Sopher's disparity index has been used to measure the gender bias in immunization of children.

In the village about half of the households with

children send their children to Anganwadis. The proportion of beneficiary households has been higher among upper and lower castes than Bishnois and OBCs, and among landless households than farmers. The cooked meal served in Anganwadis has been the main reason for sending the children to Anganwadis. On the other hand, distance has been major hindrance for not sending the children to Anganwadis.

The preventive aspect of immunization has been well received as 90 per cent of the children have been immunized. The immunization has been 100 per cent among the children belonging to upper castes and households with middle and matric level of education. The female children have been discriminated against in immunization. The degree of gender biasness has been highest (0.17) among lower castes than other social groups. Illiterate households recorded higher degree of gender disparity in immunization (0.12) than other educational categories. The condition of maternity care in the village has been very miserable as about 70 per cent of the deliveries have been attended to by traditional dais.

Anthropodborne and intestinal infections accounted for 52 per cent of total ailment incidences in the village. Although for the majority of the patients (59 per cent) the first source of treatment has been public health care services, there is remarkable castewise, educational status-wise variations in selection of first source of medical treatment. In other words, the easily available and inexpensive village dispensary has been major source of socially, educationally and economically deprived sections of the vilage society. In contrast to it, city based private hospitals have been major source of treatment for socially and economically forward sections.

POLLUTION PROBLEM DUE TO FERTILISER INDUSTRY
IN INDIA

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Fertiliser industry has become one of the biggest pollution generating industry in India. Air emissions, liquid effluents and solid wastes discharged by fertiliser plants create severe air, water and land pollution and ultimately have an adverse effect on human health, plants and animal life.

There are 49 Nitrogenous (N) and NP/NPR complex, 81 Single Superphosphate (SSP) and 1 Triple Superphosphate (TSP) fertiliser plants distributed in sixteen states. Among them hundred percent of complex, fifty percent of N and around twenty five percent of SSP plants have coastal location polluting the marine environment.

Although intensive efforts are made by the Central and State Governments along with the authorities of these plants to combat this problem, there is no conspicuous improvement. This paper emphasizes pollution caused by these plants and its harmful effects and the efforts that are being made to combat these problems.

A CRITICAL APPRAISAL OF THE GANGA WATER QUALITY
AT VARANASI

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Ganga has its origin in the snowy peaks of the Himalayan ranges where its water is pristine but deteriorates as it flows downstream. Throughout its length of about 2500 km, from the place of origin to

the ocean, it serves a total population of about 380 million people. Its water quality has gone down all along its course and is particularly polluted along the major cities on its banks. Varanasi, the cultural and religious capital of India is one such city spread along a 7 km stretch on the left bank of Ganga. The studies have revealed that the river water in the bathing areas of the city's bank does not meet even the bathing water standards. It contains large amounts of fecal coliform, enteric pathogens besides chemicals and suspended solids.

This paper highlights the past and the current status of Ganga water quality and lists some of the possible reasons responsible for deterioration of the water quality at Varanasi. Water quality upstream of the city is good and is having a BOD₅ of 1 mg/100 ml, fecal coliform <10 colonies/100 ml. The water quality deteriorates down stream of the city. The BOD₅ ranges from 3 mg/100 ml upto 60 mg/100 ml and fecal coliform ranges from 4000 upto 1-2 lakhs/100 ml within the religious bathing area of the city. The major reason for deterioration of water quality seems to be due to direct flow of sewage into the river.

BICYCLE AS A MAJOR TRANSPORT MODE TO IMPROVE
URBAN ENVIRONMENT AND HUMAN HEALTH

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The unprecedented growth and expansion of urban areas lead to environmental degradation which is detrimental to healthy living. Rapid increase in living standards in some cases, and the changing of life-style in others, have led to an enormous growth of urban mobility which is being mostly fulfilled by the use of motor vehicles. This has created a mammoth pressure on the environment with injurious effects on health and safety. The uncontrolled motor vehicle could endanger the freedom of mobility itself. Present day problems with regard to traffic

and transport in urban environment can be solved by an integral approach with people, vehicles, infrastructure and legislation taking as key elements.

The present study examines the problems associated with the rapid expansion of motor vehicle as a mode of mobility in urban environment and discusses the advantages and the appropriateness of the bicycle as a mode of urban transport to safeguard the urban environment and the human health. The paper gives special attention to developing countries and makes constructive suggestions to popularize the bicycle as an urban mode of transport. The study is based on secondary and published data. The major arguments and conclusions are drawn by the author's experience and personal knowledge.

IMPACT OF MINING ENVIRONMENT ON HUMAN HEALTH
A CASE STUDY OF JHARIA MINING AREA

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In this paper an attempt has been made to identify the health hazards and to assess their impact on the society in the Jharia Mining Area. The Jharia mining area is situated at about 260 km north-west of Calcutta in the heart of Damodar Valley, covering an area of about 456 sq. km. This coal field is a leading contributor to India's coal production and thus is under extreme pressure to achieve maximum possible production. It has been observed here that the mining activities are affecting the human health. Mining pollution related diseases like Pneumo coniosis, lung and ophthalmic diseases are prevalent in the area. Also many of the diseases are related to malnutrition and unhygienic living conditions. Some fast means of communication, field observations and remote sensing methods are used in conducting the present study.

ECONOMIC GROWTH, ENVIRONMENTAL PROTECTION AND
SUSTAINABLE DEVELOPMENT WITH SPECIAL REFERENCE TO
WEST BENGAL

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The year 1992 witnessed substantial improvement in most sectors of Indian economy as it has responded positively to a major programme of structural reforms which was initiated in July 1991 to deal with a serious economic crisis. The Indian economy with 4.2 per cent growth, performed clearly better in 1992. The agricultural output rose by an estimated 3.5 per cent. Food production registered a growth of 5.7 percent. The industrial production also did not lag behind, as it made some recovery in 1992. The liberalised trade and industrial policy made the imported inputs available adequately at lower price which in its turn, stimulated the output. The improved agricultural production gave a boost to the business of agro-based produce. Doubtless these are indications of economic growth. But unfortunately these economic indicators failed to account for the depletion and deterioration of the natural resources. The distinguished gathering of the economists and ecologists alongwith scientists and bureaucrats in a recently held International Conference in Joka at Calcutta deliberated that developing countries should maintain high rates of economic growth to cater to their economic requirement, but they should concurrently follow sound environmental protection policy so that the prospects of their future generation are not jeopardised. As the concept of sustainable development rests on optimal resource management by concentrating on "maximising the net benefits of economic development, subject to maintaining the services and the quality of natural resources." An attempt has been made in this paper to examine economic activities that have caused environmental degradation.

HIGH CONCENTRATION OF TOXIC ELEMENTS IN THE
LOWER GONDWANA AND TERTIARY COALS OF INDIA
ENVIRONMENTAL AND HEALTH IMPLICATIONS

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The qualitative and quantitative trace element determinations have been carried out in the coals of twenty eight major Gondwana and seven Tertiary coal fields of India. In the present paper trace element study has been used to know the possibilities of environmental pollution and health hazards due to the higher concentration of known toxic elements. Nineteen trace elements viz., B, Ba, Co, Cr, Cu, Ga, Ge, La, Mn, Mo, Ni, Nb, Pb, Sn, Sr, V, Y, An, Zr, were analysed and out of these Pb, Cr and Zn are considered to be toxic. As indicated by different workers, these trace elements may cause cardiovascular diseases (CVD), cancer in digestive system and dental decay if their observations show that the concentration of Pb and Cr exceeds the safe limits in the coals of major coalfields of Damodar-Koel Valley, Mahanadi Valley, Transitional Belt between Mahanadi and Son Valley, Son Valley, Satpura Valley, Wardha Valley and Godavari Valley. Further, the concentration of An is above normal levels in the Raniganj Coalfield of Damodar Valley.

In the Tertiary coalfields of Northeastern India, concentrations of Pb, Zn and Cr are abnormally high. However, in the Tertiary coals of Northwestern India, only Pb has higher concentration.

The above observations reveal that precautionary measures have to be taken in the utilization of these coals. Further, proper methods must be adopted to check the release and assimilation of these toxic elements in the environment.

ENVIRONMENTAL CHANGES AND SUSTAINABILITY ISSUES
THE CASE OF NEPAL

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Trends of environmental changes are discussed for the country as a whole with the support of some case studies. Sustainability issues with regard to resource base are addressed in the context of major causes of natural resources degradation. The dominant scenario characterizing greater parts of Nepal is the persistent negative changes in environmental resources within a short period over the last 40 to 50 years and several alarming trends have emerged. Nepal can ill-afford to overlook this aspect as the environmental resource base is a critical issue in the country. Nepal is a part of dynamic geological system that is prone to natural environmental changes. Even without a human population the resource base is subject to active natural processes. Of course, people are also becoming a cause for environmental degradation because of high rate of population growth and widespread poverty.

HUMAN ECOLOGICAL STRESS AND DEMOGRAPHIC DECLINE
A CASE STUDY OF NEGRITOS OF ANDAMANS

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The demographic decline among the Negritos of Andamans seems to be exceptional in a country where the population is increasing rapidly. The British policy of taming the hunters-gatherers anthropologically and geographically the most isolated race of the world proved to be devastating in many respects. Several epidemics and contagious diseases were transmitted to them. The Japanese occupation of their territory between March 1942 and October 1945, and the colonization policy and

practices adopted by the Indian government after 1950 have given another blow to these dwindling communities. The two civilized communities today number only 140 (Great Andamanese 35 and Onge 105) from 4200 (3500 and 700 respectively) in 1858. The hostile communities namely Jarwa and Sentinels resisted the proffered hand of friendship and could save themselves from a similar fate. The present welfare policy of local administration has failed to prevent civilized intervention into their eco-system but certainly controlled the process of depopulation. The health and the reproductive behaviour have to be improved to save them from the verge of extinction.

HUMAN WASTE AS A TOOL IN BIOGEOCHEMICAL EXPLORATION

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In the recent years, 'Geomedicine' has evolved as an important branch of science dealing with the influence of ordinary environmental factors on the geographical distribution of pathological and nutritional problems of human and animal health. In view of its practical value, the biogeochemical interactions between man and his surrounding environment is studied through faecal material and urine at Mangampeta barite mining area. Composite samples of male and female mine labourers from Mangampeta were collected. For purpose of comparison, faeces and urine were also collected from males of Tirupati area. Trace elements namely Ba, Sr, Mn, Cu, Pb, Zn, Co, Cr, Ni & Cd were analysed by AAS on ash weight basis.

From this analysis, Ba, Co, Cr, Ni and Cd in the faeces and Ba, Sr, Zn, Co, Ni and Cr in the urine of men of Mangampeta area are higher than those of

Tirupati. It is very interesting to note that the heavy metals namely Cu, Pb, Zn, Mn and Sr in faeces and Pb and Mn in urine are higher on ash weight basis than those of Mangampeta men.

Unlike in western world, the people in rural areas of India, derive their dietary materials grown in their surrounding habitat. Therefore, faecal material and urine of human beings can be used as important tools in mineral exploration as they reflect their immediate geochemical environment.

DEVELOPMENT, DISPLACEMENT AND ECOLOGICAL DISASTER
A REVIEW

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Economic development can be pursued on a sustainable basis without damaging the environment and the perceived dichotomy between development and environment is only superficial. This, however, has been only at a theoretical level as the experience has shown. The process of economic development in India, especially through the construction of huge multi-purpose projects, has compromised environmental and ecological aspects. The Srisailem project in Andhra Pradesh is one such engineering marvel but is also a man-made ecological disaster for the socially and economically weaker sections of the displaced population in particular and the Krishna basin in general.

While the best irrigated lands were submerged, the upland dry areas were not provided with adequate irrigation facilities. After exhibiting a totally callous and vindictive attitude towards the nearly one-lakh population for almost a decade the state government resorted to implementing the IRDP schemes, in a half-hearted manner, as a rehabilitation measure under the guidance of the World Bank. The success and impact of these schemes is only marginal. In the struggle for survival a

significant number of small and marginal farmers and rural poor in the displaced villages continue to depend on the submerged lands along the margins of the reservoir. Situated as it is in a semi-arid region, Srisaïlam reservoir is getting silted up at a faster rate than visualised by its planners.

SPATIAL PATTERN OF DISEASES IN A METROPOLITAN CENTRE
A CASE STUDY OF VARANASI

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Varanasi is a new entrant into the Metropolitan class. With a population of 10,27,819 (1991) persons, it is now one of the 23 'million' cities of India. Since 1950s rapid population growth, resulting from heavy influx of new migrants and visits of pilgrims and tourists in large numbers, has put heavy pressure on civic amenities and urban environment in terms of scarcity of space, housing, water, sewerage and waste disposal and economic opportunities. Keeping in view close interlinkages in prevailing environmental conditions and status of human health, the present study is an attempt to identify the spatial pattern of diseases in Varanasi.

The study is based on primary data. The data was collected from two sources with the help of two sets of questionnaires--medical practitioners and resident population. The questionnaire used for collecting information from 51 general medical practitioners had 7 items of information dealing with personal data, diseases, causal factors, remedial measures, and people awareness to health care and preventive measures. The other questionnaire, used for collecting information from 245 urban households, contained 43 items of information dealing with personal data, housing facility, environmental perception and health.

The basic method consists of discussion of

environmental quality and analysis of spatial pattern (seasonal as well as aggregate) of diseases through a series of 4 maps as envisaged by general medical practitioners and need of environmental improvement as perceived by the resident population in order to prevent the recurrence of diseases related to environmental pollution and degradation.

ECO-TOURISM: TERMINOLOGY AND DEFINITIONS

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This is the first of a series of papers on aspects of eco-tourism to be produced as part of a research project entitled 'Eco-tourism in Central America: Practice and Potential.' It sets the context for the project by outlining the relatively recent growth of the tourism industry and the problems resulting from this growth. Eco-tourism has developed in part as an attempt to obviate these problems. But the practice, planning and principles of eco-tourism are still in their infancy. The terminology and definitions associated with the field, therefore, are still uncertain, as yet there is little consensus on the bounds of the study of eco-tourism. This paper surveys the relevant terms and some of the definitions currently in use. Rather than attempting to delimit the field of study in a rigorous and definitive way, it is concluded that examination, assessment and criticism of the activities and features of eco-tourism should be made with reference to the basic principles behind it rather than according to any one given definition.

Note: The hyphenated version of the term 'eco-tourism' is used in this paper except in the case of quoted remarks where the source has used the term 'ecotourism.'

APPLICATION OF REMOTE SENSING FOR RURAL
ENVIRONMENTAL CHANGE STUDY: A CASE STUDY OF
BLOCK SAMRALA, DISTRICT LUDHIANA, PUNJAB

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This study was undertaken with the objective of delineating different categories of land use/land cover of the block Samrala in Ludhiana district of Punjab, using remote sensing techniques. The terrain, physiography and land use data have been obtained from the analysis of IRS-LISS I diapositive FCC on 1:1m scale and topographic maps of the area. Land use/land cover data together with socio-economic conditions of the block have been analysed to study the environmental change and its effect on the sustainable development of the block.

LOW INTENSITY ELECTROMAGNETIC FIELD AND
EMBRYOGENESIS

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Flow of electricity is associated with an electromagnetic field around it. Thus overhead electric wires, domestic electric lines and electric equipments create electromagnetic fields in the environment around them. Importance of such low intensity and extremely low frequency electromagnetic fields has increased since their use for therapeutic purposes like wound healing and bone repair. Exposure to such time-varying magnetic fields of very low intensity (of the order of Earth's geomagnetic field) inside human dwellings has been reported in epidemiologic studies as a causal factor of childhood cancer and other diseases. Under laboratory conditions also similar fields have been shown to affect biological systems specially the growing embryo. The effect of pulsed electromagnetic field of low intensity on chick

embryos has been reported from this laboratory. The present paper will discuss the effects in general and on rat embryogenesis in particular. Pregnant rats were kept inside coils and exposed for 48 hours to electromagnetic fields of varying intensity and frequency. An increased tendency to develop abnormalities were seen in exposed embryos.

JUSTIFICATION FOR SENIOR ENVIRONMENTAL HEALTH SCIENTISTS IN KENYA

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The state of nations's health is primarily a reflection of the state of its environment. It is therefore the responsibility of the government to train senior environmental health specialists capable of addressing complex environmentally induced problems. Like many other developing countries of the world, Kenya continues to experience rapid industrialization. It is obvious that all forms of development taking place in the country affects the environment adversely and consequently, the health of the nation at large. In order to effectively meet the challenges of environmental nature, the country requires various experts who are technically trained in environmental health. Currently, Kenya does not have enough of these experts. This paper attempts to justify this need and quantified the number of senior environmental health specialists needed now and even beyond the year 2000.

TOWARDS AN ENVIRONMENTAL INFORMATION SYSTEM IN INDIA

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The information system on environment should form a

crucial guiding dimension for plans and programmes in each sector of development. It must take care of all relevant aspects covering all aspects of environment. Also, it has to take into account the specific information requirements of each development sector. The present paper highlights some aspects of information system on environment and the need to develop such information systems.

IMPLICATIONS OF GREENHOUSE INDUCED FUTURE SEA-LEVEL RISE: A CASE STUDY FOR GOA COAST

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The projected world wide rise of sea level in the near future will be felt in the low lying areas of the coastal belt of many of the developing countries. India, having a huge population and economic establishments along its coastal belt, will be certainly confronted with an adverse impact.

This paper has defined the meaning of the new federalism for coastal resources planning and management and has suggested areas in which impact may be felt in the State of Goa, as a case study. The Goa coast exhibits a variety of environmental settings including estuaries, marshes, sandy and pebbly shores and cliff exposures. These coastal belts are the locations of main developments, harbour (defence and civil), tourist places, agricultural land, coastal roads, fishing, transport, ground water and settlements. If the greenhouse calculations are accepted in their present form, along the 104 km long coastal belt of Goa, our analysis for loss and socio-economic implication for a rise of 1m concludes that the whole 16064 hectares (160.64 sq. km.) land supporting more than 16453 houses and 84,835 people will be affected. While under the 2m rise scenario, 21,974 hectares (219.74 sq. km.) supporting 21,743 houses and 1,17,386 people will be affected. Densely populated areas around Panaji in Tiswadi

taluka, the North Goa district where the population density is 667 and the Salcete taluka of South Goa district where on the average population density is 708, will be the most effected regions. In the case of 2m transgression scenario, directly or indirectly about half of the city of Panaji will be affected.

TOURISM AND ENVIRONMENTAL APPRAISAL
A STUDY OF POKHARA, NEPAL

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With variegated natural beauty and rich cultural heritage Pokhara (Central Nepal) has been attracting a large mass of tourists from different parts of the world. Excluding Indian tourists, Pokhara received more than 30 per cent of the total arrivals and 60 per cent of the trekking permits issued in Nepal in 1991. Pokhara is the gateway to Annapurna, one of the most popular destinations for trekkers and mountaineers. With the increasing pace of world tourist population, Pokhara is also developing very fast. But, at the other end, scenic and environmental beauty of Pokhara is threatened due to tourism. The alluring scene of Machhapuchre Himalaya (6993m) from the Phewa lake and its imaging shadow reflected in the lake, have now been disillusioned by the unchecked house construction and urban expansion. Deterioration is speeded up by the flux of tourists. It is not too late that a framework of sustainable strategy vis-a-vis eco-tourism i.e. to expand both conservation and tourism in an optimal way, be implemented as soon as possible to save the natural environment surrounding Pokhara. These issues are discussed with the help of primary data and field experiences.

RESPONSE OF LENTIC ENVIRONMENT OF LAKE DEORIA TAL
(GARHWAL) TO NATURAL AND ANTHROPOGENIC PERTURBATIONS

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Present contribution encompasses the physico-chemical and biological characteristics of lentic environment of lake Deoria Tal (located at an altitude of 2250m above msl in Garhwal Hills) and its reponse to natural and anthropogenic stresses. The physical parameters like temperature ranged from 6.0 C to 24.0 C, pH from 6.39 to 6.91 and rainfall from 2.0 mm to 784.0 mm in the lacustrine environment. The chemical parameters which includes dissolved oxygen varied from 5.30 mg l⁻¹ to 9.0 mg l⁻¹, free carbondioxide from 0.20 mg l⁻¹ to 2.50 mg l⁻¹, alkalinity from 0.4 l⁻¹ to 3.0 mg l⁻¹, phosphate 0.002 mg l⁻¹ to 0.042 mg l⁻¹ etc., in the lentic environment. Biotic components were contributed by phytoplankton, zooplankton, benthos and fish.

An indepth analyses of the factors influencing lacustrine environment have been enumerated. Some of the most important problems faced by environment of Garhwal lake (natural acidification, soil erosion, deforestation) in the catchment area and influx of pilgrims have been highlighted and their workable solutions for the sustainable development and management of the lake Deoria Tal have been suggested.

NATURAL AND ANTHROPOGENIC ENVIRONMENTAL DISASTERS
THEIR INFLUENCE ON AQUATIC ECOSYSTEMS
AND MITIGATION MEASURES

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The present contribution encompasses an in-depth analysis of the impact of natural (frequent flash floods, landslides, blockade formation in rivers,

acidification in high altitude water bodies, earth quakes, heavy soil erosion and sedimentation), and anthropogenic (excessive deforestation, road constructions, river valley projects, extraction of stones, pebbles and sand mining from river bed, uncontrolled sewage, high influx of pilgrims, etc.) environmental disasters on the aquatic ecosystems (lentic and lotic) of Garhwal Himalaya. Geomorphological, physical, chemical and biological characteristics of the aquatic ecosystems have been altered upto great extent due to these eco-disasters. Some of the most vulnerable elements of aquatic life have been reached upto a precarious number, some are struggling hard for their survival in these stressed ecosystems. Some suggestions have been made to mitigate the negative impact of these environmental disasters for the sustainable development of the water bodies in Garhwal hills.

GROUND VIBRATION AND ITS EFFECTS ON THE SURROUNDINGS DUE TO BLASTING: A CASE STUDY

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Blasting continues to be the most economical method of rock breakage. However, the process itself is inefficient as only a part of the explosive energy is actually utilised. The rest goes waste producing ill effects e.g. ground vibration, airblast, back break, overbreak, noise, fly rock etc. Ground vibration produced due to blasting is considered as a major nuisance. It not only damages important surface structures but also disturbs the inhabitants living close to the blasting site, psychologically. Many times disputes arise between the local residents and the mine management. Vibration affects the ecology also. That is why ground vibration studies are an important part of Mine Environment Plan. A number of criteria have been developed to predict the ground vibration due to blasting and techniques have been evolved to contain the vibration within the safe limit. The authors

personally experienced/felt and recorded ground vibration produced due to blasting in a mine. The experience gained at this mine is reported in the present case study. The blasting practice of the mine is discussed. Methods of recording and analysing the vibration are described. Important vibration criteria available in the literature were used to predict the vibration level and the one best suited to the present study was adopted.

NGOs AND MANAGEMENT OF LAND RESOURCES IN KERALA
A POTENTIAL FOR SUSTAINABLE DEVELOPMENT?

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In the State of Kerala major changes in the utilisation of land resources which are going on may have a significant influence on their sustainability. The changes include, urbanisation in rural areas, conversion of wetland paddies and replacement of mixed cropping area by rubber plantations. Without neglecting the importance of market forces and governmental development interventions, this paper focuses on the role of Non-Governmental Organisations (NGOs) in influencing land management practices and changes.

The NGO sector of Kerala is huge and very heterogeneous. Besides manifold activities in fields like health or education, many NGOs conduct agricultural, horticultural and integrated village development projects related to land management. In such projects (like in others) NGOs mostly operate through local organisations like farm clubs, women's associations or saving/credit groups. Such micro-level organisations guarantee the institutional sustainability of development projects. Further, they form effective mediums to channel their (NGO) services like marketing support for agricultural goods, training in alternative cultivation practices, etc., to weaker sections of the society. NGO activities, however, may have only limited

impact on the overall land use changes in Kerala because these changes are to a great extent generated by people normally not belonging to the target group of NGOs like better-off farmers and non-farmers. Nevertheless, NGOs' efforts have a positive impact on many poor people's livelihoods and on the sustainability of their homestead cultivation which in general is highly diversified. Furthermore, co-operation between the NGOs' (capability to facilitate people's participation) and the governmental and private sectors' (technical capacity) may prove highly fruitful and advantageous in the context of Kerala with particular reference to the management of land resources.

JAPANESE ENCEPHALITIS IN ASSAM
SOME ENVIRONMENTAL CORRELATES

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Japanese Encephalitis (JE), a major public health problem in Assam appeared in early seventies and established itself by 1976 in Assam. The areas affected by JE epidemic outbreak are mostly in the plains and outer fringes of foot hills of the state. Monsoon in these regions spreads from April to September. Epidemiological analysis of JE data for 10 years revealed that reported human JE cases in Assam fluctuated in early eighties from 314 (1980) to 29 (1983) with 162 and 5 deaths respectively. However, in late eighties two major epidemics of JE were recorded. In 1986 there occurred 88 cases and 311 deaths while in 1989 with a total of 1310 cases of JE (about 1/5th of total cases of India) 453 deaths were recorded. Interestingly during inter-epidemic period the case fatality rate was significantly higher (around 50%) than the epidemic period (around 35%). Available data indicate the highly seasonal nature of this disease in Assam and the peak is registered in September/October with a decline in the following month. Spatial distribution of JE cases brought about an

interesting fact that maximum cases were reported from eastern and north-eastern part of the state with less number of cases reporting from western and southwestern part. Out of total 23 districts of Assam, four viz., Dibrugarh, North Lakhimpur, Dhemaji and Sibsagar were highly endemic for JE which together contributed to 63% of total JE cases and 66% of JE deaths of the entire state. And, among these endemic districts, Dibrugarh recorded maximum number of JE cases and deaths which works out to a total of 32% and 35% of the average annual cases and deaths due to JE in Assam.

ENVIRONMENTAL HAZARDS OF NALLAMALAI HILLS AND THEIR
ENVIRONS, ANDHRA PRADESH

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The study reveals that the forests in Nallamalai hills are deforested at a faster rate leaving behind barren hills and shrubs. The rate of soil erosion is high in the pockets where deforestation has taken place and in pockets where cultivation of slope regions has been practised without adopting soil conservation measures. Due to high rainfall in the monsoon period the disturbed slopes are subjected to landslides. The rate of siltation is high in Srisailem and Somasila reservoirs which partly receive their waters from these hills. The valleys in Nallamalai hills are also subjected to severe winds and dry sands from the streams, and river beds are encroaching the fertile lands. About 6000 tribal people living in Nallamalai hills depend upon forest products. A primary survey conducted among 2% of the tribal population revealed that they use medicinal plants available in local areas for curing head ache, joint pains and snake bite etc., thereby depleting forest cover over these hills. Also, in the present paper an attempt is made to bring relationship between ecoclimatic elements (water balance calculations) and environmental hazards of Nallamalai hills.

ETHICAL VALUES AND THE SPIRIT OF SUSTAINABILITY IN
INDIAN THOUGHT

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Vedic texts and mythology in Hinduism refer to the five gross elements (Mahabhutas)--the earth, water, fire, sky/ether, and air--and, also to the five basic life incarnations (of Lord Vishnu)--the Fish, Tortoise, Boar, Narasimha (man-lion), and the Dwarf. These five incarnations refer to the evolutionary theory of organic life and their relationship with nature-phenomena. In course of time, the environmental sensitivity took a form of religious belief. In this light the idea of 'reverential development' is to be taken as a paradigm shift to maintain sustainability through responsibility, frugality and ecojustice. There are several examples and evidences in Indian Thought which prove the concern the ancient Indians showed to sustain the environment.

SUSTAINABLE DEVELOPMENT OF TROPICAL FORESTS:
EXTRACTION, MODE OF SUBSISTENCE AND
ETHNOBOTANICAL KNOWLEDGE

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Ethnobotanical research in tropical forests has focussed on identifying useful plant species, understanding the strategies employed by tribal societies to sustainably manage forest resources, and determining how local knowledge can be incorporated into conservation and sustainable development programe. Among the alternatives that have been examined, petty extraction and marketing of native species appears to be one of the more promising. Most of this research, however, has been biased towards groups pursuing a small-scale agricultural as opposed to foraging mode of

subsistence. This paper reconsiders the extraction option in light of comparative ethnobotanical research carried out with hunter-gatherers and with shifting cultivators in Brunei Darussalam, Borneo, using a 1-hectare, plot-based census of primary forest useful species.

Preliminary findings suggest that hunter-gatherers recognize and use significantly fewer species than their horticultural neighbors. Roughly 10% of the tree species have material value to the Penan, whereas the figure for the Dusun reaches nearly 80 per cent. These findings are consistent with the results of quantitative ethnobotanical surveys carried out in South America. Among the different species use groups, the Penan ethnobotanical lexicon is particularly depauperate in the use of Umber and medicine, whereas it is relatively over-represented in terms of edible plants, especially snack foods.

The Penan long ago adopted a nomadic and foraging way of life, and the cognitive forest skills associated with this mode of subsistence have left them poorly prepared for the transition to an agriculture-based market economy relative to swidden groups. Although their quantitative knowledge of plant taxa is relatively low, I suggest that their knowledge of regionally significant extractive species is high. The goals of conservation, indigenous protection, and regional development are more likely to be realized by building on the Penan's traditional hunter-gatherer skills rather than forcing them to adapt an alien mode of subsistence.

MINING ACTIVITIES AND ENVIRONMENTAL DEGRADATION
IN MEGHALAYA

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Meghalaya is one of the seven states of the North-Eastern India. Geologically it represents the

north-eastern continuity of the Indian shield and is rich in limestone, coal, siliminite and other atomic mineral deposits. The exploitation of the minerals is privately controlled by small scale ventures with most primitive skills and techniques. The existing mining regulations of Govt. of India remain inoperative in the state due to the prevailing land tenure/ownership system. The mining operations are controlled by individuals and are scattered throughout the state, as per land holding and ownership rights. In the present paper an attempt has been made to highlight various environmental problems associated with the exploitation of mineral resources and to suggest some corrective measures.

FILARIASIS, ENVIRONMENTAL SANITATION AND
HUMAN HEALTH: A CASE STUDY

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The primary health care strategy lays special emphasis on safe water and appropriate sanitation as the cornerstone of basic health. Contaminated water and poor sanitation are the main causes of mortality. The infant mortality rate in India (80/1000) is largely attributed to waterborne diseases such as diarrhoea and other intestinal infections and water contamination is mainly due to poor sanitation. Filariasis is one of the major public health problems in India. The present estimates indicate that about 304 million people are living the zones where lymphatic filariasis is endemic. In Tamilnadu the microfilarial rate is registered between 1.7 to 4.74% in places like Chidambaram, Vellore, Kumbakonam and Chengleput. The present research study attempts to analyse the spatial distribution of filariasis in Tanjore district in terms of environmental, socio-economic and demographic variables. The disease ecological

structure of filariasis is analysed with the help of environmental variables such as socio-economic environment, housing, household density, sanitation and so on. The present study also made an attempt to throw light on specific environment and geographical pathology particularly with refernce to physical health and selected environmental indicators. The statistical techniques of higher order are used to identify the major dimensions which ultimately stressed the significance of environmental dimension.

MONITORING URBAN ENVIRONMENTAL DEGRADATION
USING MULTI-DATE SATELLITE DATA

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In the present study, Ghaziabad, a fast growing city and a part of National Capital Region (NCR-Delhi) is taken to measure its spread during 1981-1991 period. The study is conducted through visual interpretation of IRS LISS-II supplemented by data from Survey of India's toposheets. According to SOI toposheets surveyed in 1972-73, 1975-76 the total area of Ghaziabad which was only 49.55 sq. km. has increased upto 133.10 sq. km. in 1989. This spread has caused many environmental problems and the study maps some of those problems using multi-date satellite data.

GROUND WATER QUALITY DETERIORATION DUE TO UNPLANNED
URBANIZATION IN REWA REGION, MADHYA PRADESH

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Water samples from the dug wells and hand pumps of the study area were analysed for the assessment of physico-chemical and microbiological aspects with

reference to Indian Standards (for drinking water). About 40 samples were examined from August 1993 to August 1994 for this purpose. It was noted that pH was within the permissible limits in all the water samples, while the total solids, calcium and magnesium hardness were excess to permissible limits recommended for the drinking water quality according to ICMR and IS. Nitrates, Sulfates, Chlorides exceed the permissible limits in almost all the water samples. Biological indicators are more important to know the extent of pollution. During the microbial studies it was noted that all the water sources are microbiologically contaminated and were unfit for human consumption. This study of the underground water indicates that water sources are highly polluted and their quality is deteriorating fast due to unplanned dumping of waste materials and poor physical condition of sewage channels.

PERFORMANCE OF MENTHA UNDER SALINE AND HEAVY METAL
POLLUTED SOIL AND WATER ENVIRONMENT IN VARANASI

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Performance of mentha was measured in earthen pots using different level of salinity and 10 t/ha sewage sludge. The herd yield and plant height were found to be more than normal at all levels of salinity even when 10 t/ha of sewage sludge was present in the growth medium. Oil yield also followed similar trend. So, on the basis of results obtained, it is inferred that mentha may be successfully grown under saline soil and water environment in presence of large amount of sewage sludge. Therefore, cultivators of the locality may be encouraged to take up production of aromatic crops in place of traditional crops--vegetables. Vegetable crops are suffering damage due to pollution by toxic heavy metals present in untreated sewage sludge.

ENVIRONMENTAL CHARACTERISTICS AND INLET MIGRATION
OF CHILKA LAGOON ON ORISSA COAST

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Chilka lagoon situated along East Coast of India in Orissa, is fed with fresh water by rivers Daya, Bhargavi, Nuna (distributaries of Mahanadi) and many other small streams which carry and deposit a lot of sediments into the lagoon. A large area, particularly the northern part of the lagoon is being infested by weeds at a very fast rate. The inlet frequently changes its position and is shifting towards north in recent years which in turn reduces tidal propagation. These processes have caused serious environmental degradation and have called for great concern at all levels. In order to understand these aspects scientifically, environmental monitoring of Chilka has been taken up. Water samples have been collected from the lagoon and different streams/rivers for salinity concentration and suspended sediment load estimation, respectively. Remote sensing data for the period from 1973 to 1993 have been studied to determine the waterspread as well as shifting of inlet. Water samples collected from different stations inside Chilka during 1992 indicate that mean salinity concentration of surface water is higher in central part (24.89 ppt) than southern and northern parts of the lagoon during premonsoon whereas southern part (7.88 & 13.41 ppt) records greater salinity than northern and central parts as well as outer channel of the lagoon in monsoon and early winter. Landsat imagery of 1973 indicates three inlets. IRS-1B data of 1993 reveals the existence of one inlet which is situated at a distance of 5.5 km from Arkhakuda village and the lake area is 813 sq. km. Environmental study of the Chilka lagoon infers a high rate of sediment discharge into the lagoon, shrinkage of water spread area, shifting of inlet and inadequate tidal propagation and finally rapid growth of hydrophytes. These degrading conditions call for a continuous monitoring to develop an effective management strategy.

WOMEN, HEALTH AND ENVIRONMENT: A MEDICO-GEOGRAPHIC
STUDY OF AIDS IN TAMILNADU

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Health is one of the important components in the socio-economic development and the role of women in the development process could never be ignored. The ecological approach to human health is necessary as the human system involves constant adjustments to deterioration in the social, biological and physical environment. The global AIDS crisis has had a devastating impact on women. Globally, it is estimated that 8 to 10 million adults are HIV positive, of which about 3 million are women. The high seroprevalence among women is alarming (North America 1 in 700 in 1991; South America 1 in 500 and Western Europe 1 in 1400). The present study is an attempt to analyse the spatial distribution of AIDS epidemic and the resultant health situation in relation to epidemiological and ecological aspects. The study also attempts to explain the major socio-economic and environmental determinants of AIDS patients. The study has identified the major dimensions with the help of factor analysis to explain the significance of each dimension and associated variables. It is also found that the rate of infection has increased in Tamilnadu particularly among prostitutes (0.5% in 1986 to 34.5% in 1990). The HIV positive cases in 1991 registered in the age group of 25-30 years suggesting the deterioration in the social and moral values in the living environment of women particularly among young. The sexually transmitted diseases registered an increase from 0.5 per cent to 6.00 per cent.

GEOMORPHOLOGICAL RESPONSE TO ENVIRONMENTAL CHANGES
IN CENTRAL HIMALAYA

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The Himalayan mountains rank among the most

geodynamically active and potentially erosive regions of the world. However, scientists agree that there is shortage of hard data on geomorphological processes and sediment transport in the region. The paper presents the results of long term data from two experimental studies on pluvial and fluvial processes which indicate that in the more rapidly developing parts of the Central Himalaya, the existing human activities have aggravated the geomorphic processes and posing a serious threat to the integrity of the environment. The first experimental study (1986-87) carried out in three instrumented runoff plots (3°) in the Central Lesser Himalaya reveals that anthropogenic activities have played a significant role in accelerating sheet erosion. Under identical geological, geomorphological and climatic conditions, the highly disturbed agricultural land causes 3 times higher sheet erosion (4.04 kg/sq. km.) than that of the least disturbed forest land (1.31 kg/sq. km.). The rate of sheet erosion in the deforested barren land (2.75 kg/sq. km.) is 2 times higher than forested land. The second experimental study concerns the results from representative instrumented catchments for undisturbed forested and disturbed agricultural steepplands in the Central Lesser Himalayan headwaters. Both the catchments are similar in all respects except landuse. Continuous monitoring of channel erosion has been started since August 1989 and July 1993 in forested and agricultural catchments, respectively. Water samples, collected weekly for 59 months indicate that the average sediment yield from one sq. km. undisturbed forested catchment is not more than $19.092 \text{ t/km}^2/\text{yr}^{-1}$ including $11.196 \text{ t/km}^2/\text{yr}^{-1}$ suspended, $5.652 \text{ t/km}^2/\text{yr}^{-1}$ dissolved and $2.244 \text{ t/km}^2/\text{yr}^{-1}$ bedload sediments. In degraded catchment these quantities increased several times. The 12 months channel erosion records of 0.21 km disturbed agricultural catchment contributed $314.746 \text{ t/km}^2 \text{ yr}^{-1}$ sediments including $230.565 \text{ t/km}^2 \text{ yr}^{-1}$ suspended load, $77.563 \text{ t/km}^2 \text{ yr}^{-1}$ dissolved load and $6.618 \text{ t/km}^2 \text{ yr}^{-1}$ bedload. These results confirmed the serious impact of anthropogenic activities on the geomorphic environment in the Central Himalaya.

LAND RECLAMATION: A USEFUL TOOL FOR RESTORATION OF
ENVIRONMENT IN OPENCAST DUMPS

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Waste dump reclamation in mining areas involves both technical as well as biological design and planning like measures to control soil erosion, reforestation practices etc., and is one of the important aspects in environmental management. Cost parameter of the whole operation is also important to ensure the operation to be economically viable. The present paper discusses various aspects of technical and biological reclamation as a tool for environmental management. It includes discussion on the erosion of waste dumps due to rainfall, mechanical soil erosion controls, biological reclamation, reforestation and reclamation costs. Hypothetical case studies for the design of diversion ditches have also been discussed.

ENVIRONMENTAL CONDITION AND DEVELOPMENTAL ACTIVITIES
IN EASTERN NEPAL: A CASE STUDY OF ILLAM MUNICIPALITY

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The present paper focuses attention on the environmental deterioration of eastern part of Nepal specially in the case of Illam municipality. Illam is located in the eastern hilly part of Nepal, which is a district and zonal headquarters of Mechi zone. It occupies 27.7 sq. km. of area with 13,150 persons and is located at 1372 metres above sea level. The study is based on primary sources.

ENVIRONMENT AND HUMAN HEALTH

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Environment refers to the sum total of the surrounding conditions at a given point with respect to space and time. It consists of three basic components viz., abiotic (physical), biotic (non-physical) and energy. Any modification in any one of the components is compensated by changes in the other components of the environment. In the present century, phenomenal increase in population has resulted in urbanisation, industrialisation and deforestation as a consequence of which the environment has degraded beyond threshold levels. The present paper deals with impact of advanced agricultural technology on environment and consequently on human health.

INVESTIGATIONS ON SALINE AND ALKALINE (USAR) SOILS
BY REMOTE SENSING

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High salinity and alkalinity are inimical to agricultural development. In the present study an attempt has been made to demarcate Usar patches in Mathura district of Uttar Pradesh from aerial photographs. Nineteen ground water samples of the area have been examined. The results show that all water samples are alkaline characterised by pH values ranging from 7.5 to 9.00. However, eight of the samples show moderate alkalinity. This analysis shows that ground water in most of the places is unfit for domestic as well as irrigation use. The effect of using this water for agricultural purposes is clearly seen through vast stretches of affected lands as mapped from aerial photographs.

TOURISM AND DEVELOPMENTAL ACTIVITIES IN FEWA LAKE OF
POKHARA TOWN, NEPAL

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The town of Pokhara is an important tourist centre in the central hill region of Nepal. The river Seti divides the city into two parts--eastern and western. Fewa lake, located in the western section of the city is one of the most important lakes of this region. Being an inter-mountain lake city, Pokhara remained cut-off from the rest of the country till 1953. The present study tries to analyse the tourism environment and its impact on developmental activities during the last 30 years. Hotels have played an important role; 95% of hotels are mainly concentrated in the peripheral zone of Fewa lake area. The study is based on primary information collected during September 1994. Tourists usually visit such places which provide modern amenities. So, land for recreational purposes has become an established part of land-use programme of Fewa lake area.

ENVIRONMENTAL PERCEPTION: A CASE STUDY OF HISAR TOWN
HARYANA, INDIA

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Perception of environment, which is more concerned with the internalized coding and decoding of visual experience by humans needs precise and scientific evaluation as man's interaction with man-made or natural environment is linked up with the social environment. The understanding and study of perception of urban environment is complex and difficult to comprehend; which, of course is contrary to that of the physical environment which is measurable and predictable precisely through analytical scientific instruments. Here perception

of urban environment (housing) has been done on the basis of questionnaire/field work of a town located in Haryana. An 'Index of Satisfaction' (IS), 'Composite Index' (CI), and 'Composite Score' have been computed to know the 'spatial variations' of perception of urban environment.

FLUVIAL ENVIRONMENTAL CHANGES OF THE TISTA-TORSA
DRAINAGE BASINS

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The present paper analyses fluvial environmental changes of the Tista-Torsa drainage basins (located in West Bengal, Sikkim and Bhutan). The Eastern Himalayan rivers are affected by tectonics, climate, and human interventions at various scales. These factors have profound influence on the behaviour of river channels. In the present study an attempt has been made to study the effects of human intervention on the channel behaviour and changes and to formulate strategies to prevent negative changes.

PUBLIC RELATIONS, DEVELOPMENT PROJECTS AND
POLITICS OF ENVIRONMENT

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Planning of large development projects and efforts for conservation of environment are two sides of the same coin. Recently, some of the important development projects of our country, such as Narmada dam covering parts of Gujarat, Maharashtra, and Madhya Pradesh; Tehri dam in Uttar Pradesh; Kaiga Nuclear Power Plant in Karnataka, Coal Mining areas of Singrauli in Madhya Pradesh and Missile Testing Range at Baliapal in Orissa etc., have the focus of

political controversy in the name of protection of natural environment. Interestingly different political parties have listed the problems of environment in their election manifestos indicating that the environmental issues could be solved well in the political arena. In the cases of Narmada and Tehri dams, the initial intention of the movement was to protect the rights of the affected Adivasis and others. But because of inept handling of the situation (with total disregard to the scientific techniques and principles of public relations), the focus of movement became wider and vague encompassing theoretical and political issues. In the present paper an attempt has been made to explain how the principles and techniques of public relations could be successfully utilized to deal with the misinformation, misgivings and distorted propaganda of vested groups in the construction of large development projects while maintaining at the same time, the quality of environment and ecological equilibrium.

SOCIO-ECONOMIC SCIENCES AND THE ENVIRONMENT
ITINERARIES FOR THE CONSTRUCTION
OF TERRITORIAL APPROACH

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The proposal is to identify the contributions that the recent reflection in the social sciences can offer to the construction of a new environmental knowledge that is being formed. It takes forms in the cradle of systems thought and underlie the inseparability of economics, culture, ethics, environment and a 'refoundation' of the relations between natural sciences and social sciences.

In order to reach this goal, the contribution will be divided into the following steps:

- (i) the synthetic examination of the theoretical and methodological advances and limits of

environmental economics in order to outline the structure that supports ecological economics;

(ii) placing the new discipline within the framework of the broader current scientific debate on the philosophy and epistemology of scientific research. In particular, some fundamental contributions from the theory of complexity will be assessed; these are drawing special attention in geographical and territorial debate in general;

(iii) through these contributions we shall construct a scheme of intelligibility which defines the outlines of the challenge that ecological economics represents for territorial disciplines.

(iv) we shall locate this attempt within the wider debate which converge on a number of channels of research on the concept of local development.

ENVIRONMENTAL EVALUATION OF DRAINAGE BASINS IN HIMACHAL PRADESH

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The physical component of environment which is relatively static and apparent can be easily assessed and its interaction on human mode of life can be evaluated by different indices. In the opinion of the author, settlements which are the first imprint of man-land relationship could be a better index of environmental suitability. It is, therefore, assumed that the density of settlements in varying environmental set-ups may afford a good idea of the environmental viability or in the assesment of adhesive and non-adhesive values of a given environment. An area comprising of Dangri drainage basin was selected and subjected to intensive morphometric analysis. The parameters chosen were seen in relationship to the density of settlements. A scale of 1,2,3, ranks were demarcated which were in proportion to the increasing adhesive values of the environment. The composite scores

were computed and a classification of environmental units were proposed which outlined the areas of maximum adhesive (attractive) factors, moderate adhesive factor and non-adhesive (repellant) factors. It is found out from the study that the plains bordering the junction of hills are most suited for human habitation and so are the ridges. Slopes have moderate values of adhesive factor while steep slopes and occasional patches on the plains have negative values of adhesive factor.

STATUS OF CADMIUM AND LEAD IN ROADSIDE SOILS OF VARANASI REGION

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Present study was conducted to study the effect of distance from point source of contamination of Cd and Pb content in roadside soils of Varanasi region. Soil samples were taken at various distances from the highways on both sides. These samples were analysed for Pb and Cd for atomic absorption spectrophotometer. It was observed that the content of Cd in soil samples collected from various distances from the roads varied from 8.2 to 20.5 ppm (0-3m), 7.6 to 19.0 ppm (3-10m), 7.2 to 17.0 ppm (10-30m), 6.0 to 13.0 ppm (30-60m), 4.0 to 8.0 ppm (60-100+m) and 1.2 to 2.0 ppm (>200m). Pb content ranged from 90.4 to 140.5 ppm (0-3m), 85.0 to 135.0 ppm (3-10m), 75.0 to 125.0 ppm (10-30m), 60.0 to 110.0 ppm (30-6-m), 35.0 to 85.0 ppm (60-100m) and 15.0 to 50.0 ppm (>200m). Concentration of Cd and Pb in soils was found to be decreasing with increase in distance from the highways. This decrease was statistically significant at a distance of 30m from the roadside. As the soils under study are in the vicinity of highways, Cd and Pb enriched particulate matter emitted through automobile exhausts remains the main source of contamination.

CONTROLLING ENVIRONMENTAL POLLUTION THROUGH
VEDIC APPROACH

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Man in the process of ongoing developmental transitions has influenced, modified and thus adversely affected the environment. Earth has a definite environment having 'ozone layer' as the protective cover. It has been experimentally proved that this Ozone layer has been generated and maintained by virtue of Yagya-prakriya' and Yagya-dhumra'. In natural sciences 'YAGYA' is a continuous process. Presumably Yagya leads to origin of life in its various forms and thus it can prevent atmospheric pollution and environmental degradation. In Vedas, 'Pancha-Maha-Yagya' occupies a significant place. This Yagya when performed, results in purification of the 'Pancha-Maha-Bhuta', viz., earth-water-fire-air-sky. The scientific basis of Yagya and its relation with creation gives credence to its capacity to purify the environment. The damaged Ozone layer can be rectified by performing Yagya.

A STUDY ON THE CAUSES OF DETERIORATION OF THE RIVER
BHAGIRATHI-HUGLI

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The Bhagirathi-Hugli, a distributary of River Ganga and once the flowing life of Eastern India, is now in a lamentable state of decay. With the diminution of the period and intensity of supply of upland water, the tidal force has gained ground and the accumulation of silt in the tidal zones of the river has started to increase. It is practically threatening the very survival of the Port of Calcutta which controls the trade and commerce of the whole of eastern and northeastern India. In the

tidal stretch of the river, the net drift of sediment is towards the sea during the freshets. During the dry season, due to much stronger tidal currents, landward redistribution of sediments takes place. As many as 17 bars between Calcutta and mouth of Hugli can be seen and shoaling, creating navigational problems for ships visiting Calcutta Port. From the nature of sediments of the newly formed bars and shoals in the Hugli, it has been proved by the Research Wing of Calcutta Port Trust that the redistributed sediments are mostly riverine and not marine in origin. As most of the riverine silts brought down by the distributaries of Ganga are used up in silting their own thalwegs, the so called stability of the shoreline orientation of the Bengal delta has more or less been maintained since the time of Rennel. However, recent emergence of the island called 'Newmoor' clearly points to the very slow but regular progress of delta-building in this region. This paper deals with the causes of decay of the river and the slow development of the delta.

SUSTAINABLE DEVELOPMENT PRACTISED BY INDIGENOUS
PEOPLE: A HISTORICAL AND CULTURAL PERSPECTIVE

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The present study deals with the practices of indigenous people in the conservation of natural resources and rehabilitation of environment. Many facts and figures have come to light which substantiate the fact that, as these people are fully dependent on natural resources, they have developed a culture and tradition that ensured their sustainable use. The tribal practices and belief systems have been analysed and interpreted to understand their philosophy of equity, conservative orientation and renewability. The habitat of indigenous people in general is rich with natural resources. But, unfortunately, their surroundings are being exploited indiscriminately by outsiders,

thereby depriving these societies of their natural resources. This is leading to a transition of these tribal societies from constructive dependence on natural resources to destructive dependence on them. The Hobson's choice left to the tribal people has put them in a vicious trap. The consequent depletion of forest has resulted in the impoverishment of the communities that have traditionally depended on them. It is pertinent to mention that the cultural heritage of these tribal groups is characterised by indigenous modes of social control through divine legitimization of the forces of nature. Significantly, these beliefs are closely related to the preservation of important species which are linked to the continuity/sustainability of the tribe.

MALARIA IN KARACHI AN AGE OLD PROBLEM OR A NEW SURGE?

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Malaria is one of the menacing diseases in Pakistan and its connection with Pakistan is very old. It is suspected that uncontrollable Malaria might have been the cause of the mysterious disappearance of the great civilizations of the cities of Mohenjodaro and Harappa which flourished 4,500 years ago in the Indus valley of Pakistan. Malaria is now prevalent in almost all parts of Pakistan. Its incidence in the country is very high as reported by National Health Survey (1982-83) and Pakistan Demographic Survey (1990). However, the Malaria Control Program (MCP) of Ministry of Health claims that the incidence of malaria is very low in terms of parasitic rate (0.02/10000 people). However, in Karachi malaria remains a major problem. One of the major urban malaria carrier mosquito, *A. stephensi* is found in abundance and the most favourable breeding grounds for them are the over-head storage tanks. In this paper an attempt is made to (i) review the epidemiological situation of malaria in

Karachi, (ii) critically examine the SPR (Slide Positivity Rates) recorded by MCP, (iii) to observe the actual incidence of the disease by private doctors, (iv) to determine the malaria risk areas on the basis of socio-economic variables and (v) to assess the activities of KMC (Karachi Metropolitan Corporation).

EFFECT OF THE FARAKKA BARRAGE ON THE HYDRAULICS OF
THE RIVER BHAGIRATHI

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In the present study the effect of the Farakka Barrage on the stretch between Katwa and Nabadwip of the river Bhagirathi during the recent couple of decades is taken up for investigation. In this particular reach, the sediments carried from the river Ganga are accumulated in the river bed due to feeble discharge of water from Farakka canal. The huge amounts of sediments carried from the lateritic-ferralitic tracts of the Chotanagpur plateau by the east flowing tributaries of the Bhagirathi, are aggravating the situation. The river Bhagirathi has a very winding course here. Due to the inadequate discharge, the river often cuts-off a portion of its course and thereby straightens in order to adjust itself with the vagaries of nature. It is necessary to restrict the unabated sediment supplies from the tributaries especially the Ajoy and to augment the supply of water from the Farakka canal. In the lower reaches of this river, there is the problem of tidal incursion twice daily, which not only increases the salinity of the river but also causes sedimentation due to flocculation.

ENVIRONMENTAL EDUCATION AT THE POST-GRADUATE LEVEL

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The deterioration in the quality of environment during the past one century demands involvement of scientists to save the environment from further damage. Initiation of a general awareness scheme at the school level and gradually extending it to the the collegiate level may result in active participation of the students in the improvement of environmental quality. The present paper reviews the current education and research programmes, going on in India, regarding environmental management and policies. There is need for a two-year post-graduate course in environmental science incorporating in the curriculum the following papers: environmental pollution, ecology, environmental chemistry, environmental monitoring and instrumentation, environmental management, waste water treatment technology, air pollution control technology and system analysis. Besides these papers, a one month industrial training programme and five months project work (based on training) are recommended.

INDUSTRIAL GROWTH OF KARACHI AND ITS EFFECTS ON THE
QUALITY OF MARINE WATERS

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The objectives of the present study are (i) to show the industrial development of Karachi, and (ii) the effects of industrial effluents on the marine environment along Karachi coast.

Karachi being the largest industrial and the most populous city in Pakistan, produces enormous quantities of domestic and industrial wastes and

effluents. These pollutants are first discharged into Lyari river and Malir river and they finally find their way into the sea. With the result, the marine fishes are getting affected. The people consuming these fishes are adversely affected.

ECOLOGICAL PERSPECTIVE OF HILL AGRICULTURE: A CASE STUDY OF A HIMALAYAN WATERSHED

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The concept of watershed management in the Himalayan region is basically concerned with the development and optimum utilisation of land use according to the land capability in a manner to protect and conserve the soil, forest and water resources. Conversion of vegetal cover into crop land is leading not only in the reduction of forest land but also in damaging the quality of (forest) land. Consequently, the remaining forest cover has to bear the pressure of fuel and fodder requirements of the local population. Keeping in view the environmental approach to sustainable development, it is essential to rejuvenate and regenerate the pillaged environment so that it turns productive again. In this paper measures are suggested as to how the degraded land can be made productive.

LEGUME AS A COMPONENT OF CROPPING SYSTEM FOR SUSTAINABLE CROP PRODUCTION AND SOIL HEALTH

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Protein hunger looms large all over the world, more particularly so in developing countries. Therefore, grain legume will continue to be an important constituent of diet and obviously should occupy a

place of pride in our cropping systems. Role of legumes in soil fertility build up is well known as the crops grown either as a sole crop or intercrop fixes up the nitrogen need of succeeding crop to the tune of 20 to 40 kg per hectare depending upon the season, system, as well as kind and purpose of their cultivation. Further, fodder legumes contribute more nitrogen than grain legumes. In these days of spiralling fertilizer prices, this biological property of legumes offers a unique opportunity. With legumes in cropping systems enhancement in energy efficiency has also been observed. Legumes also improve the physico-chemical properties of the soils. Therefore, pulse/legumes based cropping system can serve as unique model for sustainable systems of the crop production.

ENVIRONMENTAL STUDIES OF THE WATER OF
KHANKRA GAD CATCHMENT

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The Khankra Gad is drained by a number of typical structurally controlled streams. A number of springs found in its catchment are the major source of not only the drinking water but also for irrigation. In this study, an attempt has been made to study the siltation rate in the Khankra Gad, its relationship with the flow, chlorophyll 'a' content of the periphytic Algae in relation to the rapids and pools in the stream and major soluble contents of the Khankra Gad water. It is found that the organic content in Khankra Gad waters is fairly high. It clearly indicates its pollution. The siltation rate is also very high and it has been on the increase during the last 12 years. This is due to road construction and deforestation.

ENVIRONMENTAL PROBLEMS DUE TO LEAD-ZINC WASTE DISPOSAL

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Mining operations, especially opencast mining generate huge quantities of waste spoils depending upon the nature of the deposits, topography of the area, method of workings etc. The depletion of high grade base-metals in the past few years and massive demand of raw material has compelled mining industry to exploit even lower grade ores from greater depth. This process generates large quantities of waste materials. Disposal of these materials pose serious problem to eco-system due to their toxic nature. Processing of minerals nearby the mines accelerates the pollution process. The corrosive and poisonous chemicals used for processing of ores enhance the pollution many times over. Lack of attention towards management of these wastes increase the possibilities of dispersion of the same into the various components of environment. A systematic, economic and technical reclamation plan is the only solution to prevent damage done due to dumping of waste materials. The present paper deals with various ill effects of disposed mineral waste, their mode of entry into the environment and some preventive measures which can be employed to control environmental degradation. Special attention has been paid to emphasize the necessity to know the major environmental issues and management problems associated with disposal of mining wastes, so that appropriate control measures can be applied before, during and after mining.

IMPACT OF MINING ON ENVIRONMENT IN CHOTANAGPUR

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Mining is an important polluting factor, but, unfortunately, it is not officially recognised as a

polluting industry. Although different kinds of minerals are being mined in Chotanagpur, the most extensive and intensive mining activity is in the coalfields region. As a result, pollution of water, air is quite serious. The polluted water and air in turn are affecting the health of the population. Private mining companies like TISCO and ISCO have shown better concern to control the level of pollution than some public undertakings. Data obtained from hospitals and field surveys support the facts presented in the study.

ENVIRONMENT: THE KEY FACTOR OF DISEASE CAUSATION

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The present study is based on a survey conducted at Sunderpur, an out-skirt area of Varanasi Corporation. It took seven months (1.6.1963 to 31.12.1993) to accomplish the relationship of place, time and environment with the occurrence of diseases. Seventy five randomly selected families were contacted on fortnightly intervals. Analysis of records of Sunderpur Urban Health Centre and of Department of Preventive & Social Medicine (Institute of Medical Sciences, Banaras Hindu University) was made to observe the trend of the morbidities.

Majority of the houses (68.0%) were either Kachcha or semi-pacca in structure. The sunlight was practically lacking in 76.0% of houses and with 88.0% rooms without proper ventilation. Only 32% of the houses had separate kitchen facility and 88.0% families had no smoke out-let facility in their kitchens. Though majority of the families (80.0%) used piped water, the quality of water was not satisfactory for drinking purpose. Open water pipe lines subject to contamination by animals, defecation and presence of open drains, habit of open field defecation (56.0%), indiscriminate refuse disposal (84.0%) and absence of cattleshed (68.0%),

over-crowding in the house, poor personal and insanitary condition of the environment etc., are notable problems causing health problems among the people of the area.

High occurrence of GIT and diarrhoeal diseases (41.31%) followed by ARI (26.91%) are great challenges to the epidemiologists. Various allergic disorders and skin rashes (8.04%), genito-urinary tract infections (4.96%), pulmonary tuberculosis (3.39%) and filariasis (1.99%) were found to have been caused due to poor environmental sanitation and personal hygiene. The occurrence of morbidities were observed to be associated with the climate.

ENVIRONMENTAL POLLUTION AND HUMAN HEALTH
A PERSPECTIVE ON VARANASI METROPOLIS

K.K.Dube & C.S.Kumar
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Rapid urbanization, traffic and housing congestion, immigration, emergence of slums, waste and garbage accumulation, poor condition of sewers and drainage system and lack of awareness of environmental problems, have led to pollution and deterioration in human health in Varanasi city. These factors cited, have caused various diseases like Cholera, TB, Asthma, Skin diseases and allergies, gastro-intestinal disorders and the like and consequently affected the quality of life of the inhabitants.

The study based on field work and secondary data attempts to assess the existing environmental scenario of the city with special emphasis on human health. It also highlights the environmental stresses arising out of the social pollution like exploitative attitude towards child labour, begging, malpractices in various rituals by Pandas and brokers, etc. The study also puts forward some suggestive measures to combat these problems.

ENVIRONMENTAL DEGRADATION AND RELATED HEALTH HAZARDS

Prithviraj Sen, K.S.Negi, A.K.Singh, V.K.Dubey
Anish Verma & Ajai Srivastava
Banaras Hindu University, Varanasi

The environment as a life support was the focus of discussion at Rio meet. At that meet, India's suggestion for a Planet Protection Fund was appreciated. The present study deals with the various aspects of environmental degradation, the reasons for its degradation and the consequential health hazards.

DISPERSION OF MEDICAL CENTRES IN MADHYA PRADESH

Sarojini Pacholi
Govt. Girls P.G.College, Bhopal

Seema Singh
Bhopal University, Bhopal

The present paper aims to find out the situation of health care centres in Madhya Pradesh. In the study, number of medical centres, their distribution, work load and dispersion have been calculated and analysed. The study is based on the secondary data obtained from the Department of Health and Family Planning, Govt. Reports published by Directorate of Health and the Census of India. The results clearly show the imbalance in the distributional pattern of the Medical Centres.

GEOGRAPHICAL APPROACH TO ECOLOGICAL PROBLEMS

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The focus in the present paper is on ecological

disasters caused by indiscriminate exploitation of natural resources. It deals with how the modern geographical science approaches the question of rational use of the natural resources to avoid serious eco-disasters. Scientific and technological revolution has an adverse impact on the environment. Keeping this in view, some theoretical aspects of urbanization and industrialization and their effect on environment are critically discussed.

MICRO-ORGANISMS OF SOIL AND SUSTAINABILITY OF SOIL FERTILITY

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The organic matter of the soil serves as food for soil micro-organisms which convert complex organic materials into simple substances which in turn are readily used by the plants. Organic matter also improves the working quality of the soil. The organic matter in the soil consists of plant remains, residues of micro-organism feeding on them and other decomposed products. The complex compounds are decomposed by micro-organism into simple mineral salts, carbon dioxide, water organic acids, ammonia, methane and free nitrogen. An attempt has been made in this paper to examine the role of Humus, Micro-organisms and earth worms in sustaining soil fertility over a long period.

ENVIRONMENTAL CHANGES AND THEIR IMPACT ON SOCIETY

Shiv Shankar Singh
R.H.S.P.G.College, Singramau

Twentieth century has witnessed exploitation of resources and generation of wastes resulting in problems of resource depletion and pollution on a

vast scale. With increasing population pressure and unlimited use of scientific and technological capacities, the situation has worsened. This paper presents some theoretical aspects, problems and remedial measures.

SUSTAINABLE DEVELOPMENT AND RURAL ENVIRONMENT
IN BARABANKI DISTRICT

Dhananjay Singh
D.A.V.P.G.College, Azamgarh

Rapid resource exploitation has caused a severe ecological imbalance. In Barabanki district several environmental problems are caused due to urbanisation, modernisation, migration and resource exploitation. In this study an attempt has been made to assess and examine the problems arising out of recent developments. Some suggestions and opinions are given to improve the socio-economic conditions of the people.

ENVIRONMENTAL POLLUTION AND THE ROLE OF JUDICIARY

Rakesh Kumar
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The industrial, urban and various developmental activities have caused and are causing environmental problems. The legislation, legal action can be used to safeguard the natural resources and environment. The principle of protection and improvement of environment and safeguarding of forests and wildlife have been enshrined in Article 48A of the Indian Constitution. The present study highlights the role of judiciary and trends of judicial approaches in protecting the environment.

ENVIRONMENT, DEVELOPMENT AND HUMAN HEALTH
IN SOUTH MIRZAPUR REGION

Chandra Shekhar Kumar & Alok Kumar Singh
Banaras Hindu University, Varanasi

Various types of environmental problems such as land and soil degradation, deforestation, over-exploitation of natural resources, pollution and human health problems, caused by rapid development of industries, power and other infrastructures are examined in this paper. Poverty, illiteracy, unemployment, nutritional deficiency, stress and diseases have been identified as the basic reasons for degrading the quality of life. A few suggestions towards improvement are suggested.

IMPACT OF ENVIRONMENTAL POLLUTION ON PATNA CITY
BIHAR

Rameshwar Prasad Singh
A.B.S.College, Vaishali

Environmental pollution is posing a great threat to Patna city. Tremendous quantities of industrial and domestic wastes are generated and the same are dumped indiscriminately and discharged into Ganga river. In this paper, an attempt has been made to identify the various environmental problems and the causative factors.

SCREENING OF SOME ENVIRONMENT FRIENDLY PLANT
EXTRACTS FOR THEIR PEST CONTROL PROPERTIES

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V.M.V.S.Sastry & G.R.Rao
Nagarjuna University, Guntur

Chemical pesticides are primarily used to kill pest

species to safeguard human, animal and plant health. However, once a chemical is released into the environment, the meteorological, chemical, physical, biological, and other allied factors determine its fate and distribution into the ecosystem where it contaminates and interacts with non-target organisms and materials. Hazardous implications of these pesticides and their residues at various tropic levels have caused incalculable damage to every aspect of environment, globally. As a result, efforts are on to replace these hazardous pesticides with the compounds of relatively safe to non-target organisms and easily degradable in the environment causing no ecological imbalances. In search of alternate strategies for chemical pest control, particularly for the control of agricultural insect pests, the importance of natural compounds of plant origin was realised and search for plant materials having pest control properties has currently become a vital research area.

Keeping these facts in view, the present study was aimed to screen out various solvent fractions of different parts of some 60 plants against agricultural insect pests--gram caterpillar, tobacco caterpillar, nymphs of cotton aphid, and cotton leaf hopper--for their insecticidal and antifeedant activity. Significant antifeedant activity was exhibited by most of the plant extracts against H.armigera and S.litura with some degree of variation, but surprisingly none showed insecticidal activity against these pests. Acetone extracts of Clistanthus collinus Roxb. gave as high as 93.00 per cent antifeedant activity against S.litura and hexane extracts of Physalis edulis Linn. gave 89.20 per cent reduction in the leaf area consumed over control with H.armigera. However, P.edulis and Glycosmis pentaphylla Corria showed 37.00 and 17.00 percent insecticidal activity against A.gossypii, respectively. The former was also found to be effective against A.biguttula biguttula with 50.00 per cent insecticidal activity.

ENVIRONMENTAL PROBLEMS OF TOWNS IN THE ALAKANANDA
VALLEY, GARHWAL HIMALAYA

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The present study is an attempt to identify the environmental problems of towns in the Alakananda Valley of Garhwal Himalaya. The basin is divided into upper, middle and lower parts. Most of the towns are located in the middle and lower parts while the religious town Badrinath and Kedarnath, Joshimath and Sonprayag are located in the upper part. The basic problems of the towns are, housing and road construction activity, natural hazards (landslides and slumping), drainage blockage, landuse changes, soil erosion, drying up of springs and pollution of their waters. The study has identified, that (i) the town of Srinagar is expanding on the terrace land and hill slopes without any planning, (ii) the confluence towns of Rudraprayag and Karanprayag facing space, drainage, waste materials and pollution problems, (iii) the spur towns of Gopeshwar, Joshimath, Ukhimath, Guptkashi, are facing problems due to unplanned development of houses and roads, landuse changes, water pollution, deforestation and other social problems and (iv) the various developmental activities and population growth of the Alakananda Valley are responsible for polluting the holy rivers from Badrinath to Deoprayag. Keeping these problems in view some planning measres have been suggested.

SUSTAINABLE DEVELOPMENT IN ENVIRONMENTAL CONTEXT
THE CRISIS OF CONCEPT?

D.N.Singh
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The concept of 'development' has been undergoing changes with reference to its orientation and focus, obviously, for various political social and economic

situation reflecting categorically in socialist and capitalist approaches. There emerged different philosophies through time and space which were subjected to debate with definite conclusions hard to come by in terms of acceptability. Thus a crises of concept. However, it could be observed that of late, with stres on equilibirum and comprehensive integration of economic and ecological aspects in development definitions, the 'sustainability' became a key tenet. In view of above, the present paper attempts to review, precisely, the thrusts of development concepts through ages. The main discussion veers around the notion 'sustainable development' characterised by inherent constructions of social feasibility, economic viability and ecological soundness particularly in a democratic set-up. Contextually, the terms 'protected cultural landscape', 'biodiversity', 'ecobalance', etc., are perused. The study calls for analysis of biophysical impacts (in respect of pollution, resource degradation) and social impacts (social disruption). The economics of ecology in general and the cost of pollution control in particular is deemed as a vital issue to be broached. These underlined some pertinent questions that merit attention. These may precisely be put as: (i) Can sustainable development be realised in the existing policy frame? (ii) Can the concept of sustainability be applied to the development characterised by consumerism-oriented philosophy? (iii) Can we afford extinction of many species and biotype? (iv) Can there be constructed a model incorporating proportionately spatial, economic and ecological components and (v) can we pinpoint and take to task those to blame for failure of the system, etc.

NOISE POLLUTION IN AND AROUND OPENCAST COAL MINES
A CASE STUDY

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During mining operations noise of various

frequencies is generated by different machineries and blasting. High level noise is injurious to health and may cause impairment or even loss of hearing. The present paper discusses factors responsible to generate noise and consequent environmental and health hazards in and around an opencast mining project. The study is based on a detailed survey done in an opencast coal mining project in Singrauli coalfields in Madhya Pradesh. In this connection, 200 persons were interviewed including 100 mine professionals and 100 villagers residing in the surrounding villages of mining block. The problems faced by different groups have been highlighted in this paper. The present study also gives some suggestions to minimize noise level and to control this hazard.

IMPACT OF ENVIRONMENTAL HAZARDS
IN UPPER KULLU VALLEY

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In upper Kullu valley in Himachal Pradesh, physical environmental hazards like, landslides, snow avalanches, floods, rockfalls, land subsidence and other types of mass wasting, are very common. These natural hazards are threatening the ecological sustainability of the region. Further, due to loss of agricultural land, decline in forest cover and disruption by transportation lines, there is negative impact on environment here. Though various hazards mitigation initiatives are being taken by government, the problems are still persisting. The present paper besides highlighting the problems, gives some suggestions to reduce the negative impacts of some of the natural hazards.

IMPACT OF COAL COMBUSTION ON GREENHOUSE EFFECT

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Increasing exploitation and combustion of fossil fuels, mainly coal, has attracted the attention of environmentalists and engineers towards the role of coal combustion on the greenhouse effect. Combustion of coal is more or less responsible for global warming and greenhouse effect, which has put a question mark on the better survival of mankind. Greenhouse effect plays a significant role in the environmental degradation and existence of living beings throughout the biosphere. Coal combustion increases the concentration of carbon dioxide and other radiative gases in the atmosphere which are responsible for Greenhouse Effect. The present paper gives an account of the impact of coal mining and coal combustion on greenhouse effect and remedial measures to check and minimize the effects have been suggested.

LANDUSE AND NUTRITION INTAKE PATTERNS IN MOUNTAINS
A CASE STUDY

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The Himalayan region is in the grip of environmental degradation of one or other form. In the present study, cropping pattern and nutrition status in Uttarakhand Himalaya is presented. In this region, only 13 per cent of the area is under cultivation. Though the forest cover is reported to be 26.29 percent, in reality it is not so. The forest cover is very much reduced now because of population pressure. In the present paper, nutritional need versus population and nutritional need versus cultivated area are discussed.

IMPHAL CITY: A STUDY OF ITS URBAN ENVIRONMENT

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Imphal is spread over an area of about 30 sq. km. and has a population about 2 lakhs. Because of difficult terrain and situation of settlements on disadvantageous locations and due to high pressure of population on land, the city is facing a number of problems like floods, temperature rise and pollution etc. In this paper, an attempt has been made to present the extent and magnitude of such problems. The survey was conducted during 1991-92. Appropriate remedial measures have been suggested to maintain the urban environmental order of the city.

ENVIRONMENTAL AWARENESS AND SUSTAINABLE DEVELOPMENT

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Due to catastrophic population explosion and its subsequent effect there is degradation in the world environment. Thus, there is an urgency for universal awareness and self commitment among people towards environmental protection and sustainable development. The present paper deals with the environmental awareness and self commitment among post-graduate students for achieving environmentally sustainable society.

URBAN ENVIRONMENTAL CHANGES IN MUGHALSARAI

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The focus in the present paper is on the urbanisation of Mughalsarai, one of the largest railway junctions in India (situated 15 km.

southeast of Varanasi city). Within the period from 1961 to 1991 many morphological and socio-economic changes have taken place due to increasing population growth and industrial development. The study is based on field work as well as secondary data. The existing land use and proposed urban land use have been determined by comparing 1961 and 1991 data and maps. The population of Mughalsarai urban agglomeration rose from 21,086 (1961) to 91,505 (1991) recording more than four fold increase. The town has expanded into the countryside. Since 1961 eight villages have been incorporated in the urban agglomeration thereby converting the cultivated the land into residential colonies. This study focuses on urban problems including slums, sanitation, traffic and allied aspects.

ENVIRONMENTAL CONSEQUENCES OF INDUSTRIALIZATION
A CASE STUDY FROM THE UPPER GANGA-YAMUNA DOAB

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The paper examines the process of industrialisation and its environmental consequences in agruculturally advanced area of Upper Ganga-Yamuna Doab. Majority of the industrial units are concentrated in nodes and radial corridors as is evident from the case study of Muzaffarnagar district. Environmental consequences have been assessed along the Meerut road industrial corridor through field study conducted in January 1993. In addition 10 industrial enterprises of various kinds and scales and three industrial agglomerations (Industrial Estate, Industrial Area and Mansoorpur Mill Complex) have also been studied. Environmental impact of industries along this 12-kilometre Meerut road industrial corridor is characterized by dumps of solid wastes (ash, slag and cane residue). Drains are carrying industrial effluent through Kali river to the Yamuna in Bulandshahar district. Pollutants in the air (smoke, carbon flakes, flying ash, harmful gases and vapour) are less serious.

AWARENESS AMONG DIABETIC PATIENTS

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The present study is based on primary data collected from 115 patients suffering from diabetes. The environmental effects on diabetic patients was also observed. About 65 per cent of patients had knowledge of this disease. A positive correlation was observed between different education levels. About 44 per cent of patients recorded their negative views on the restricted diet causing irritation and less interest in these foods. On the other hand about 46 per cent of respondents accepted that the clean environment, fresh air, morning walk and exercises etc., played a positive role in their health. About 66 percent of patients were practising general and yogic exercises and reported significant positive results. The female patients were found to be less conscious of the disease and the dietary habits.

FLOOD HAZARD MAPPING OF BARAK BASIN (ASSAM) USING
SATELLITE REMOTE SENSING TECHNIQUE

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Flood hazard mapping constitutes an important aspect of environmental planning and resource management in flood prone riverine areas. Advent of satellite remote sensing technology with its unique capability for synoptic viewing and repetitive coverage of the earth surface in a cost-effective and time efficient manner has provided a great boost to hazard studies in recent times. These techniques are more effective and appropriate in areas like the Northeast where the existing database is extremely inadequate and outdated. The present study focuses on the Barak basin that covers an area of 41,700 sq.kms. in the states of Assam, Meghalaya, Manipur,

Mizoram, Nagaland and Tripura. The Barak is a major river carrying an average annual discharge of 1554 m³ s⁻¹. The river frequently brings disastrous flood to the valley causing immense loss of life and property. The present study is an attempt to identify and delineate the flood inundated as well as drainage congested areas of the valley based on visual interpretation of IRS LISS-II and Landsat TM data for the years 1986, 1987, 1988 and 1989 on 1:50,000 scale. Aerial photographs, Survey of India's topographical sheets and conventionally surveyed flood maps are also used as collateral database. Based on the interpretation of the satellite imagery, a flood hazard zonation map is prepared with two main categories, namely (i) chronically drainage congested areas and (ii) occasionally drainage congested areas. Areal coverage of each of these hazard zones is estimated with the help of a digital planimeter. A detailed flood map is prepared for the year 1989 when the valley was devastated by an exceptionally big flood event. Flood damage analysis is also carried out based on the recorded data since 1966.

CHANGES IN FAMILY SYSTEM: A PARADIGM OF DEVELOPMENT

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One of the best outcomes of development is a tremendous progress in medical technology thereby resulting into an improvement in human health in general, and more specifically an increase in expectation of life. Merely an increase in number of years is not appropriate unless the required facilities are provided in the advanced years of life. In this connection thus UN rightly states that the present task is "to add life to the years that have been added to life." In the less developed countries with increasing years of life, aged dependants are increasing at a much faster rate than in the developed countries. On the other hand the societal change has encouraged migration of

youngsters, and thereby disrupted the family system resulting into a break of the joint family to nuclear families. Unlike in the developed countries, where there is a provision of pension schemes for the aged and the state takes care of the aged to a large extent, in the less developed countries the absence of such schemes and decline in traditional old age support has made the problem important. Thus a debate arises on whether development has improved the quality of life of aged by postponing mortality or extended more dependable years of life. The present study analyses the above mentioned debate. It was carried out in two regions of Andhra Pradesh based on their level of development so as to understand whether development of a region has any influence on old age security. A related objective is to describe the nature and extent of traditional old age security, and analyse the factors that influence old age security. With the use of Logit regression technique, the findings have been inferred.

BIOTIC INTERACTION WITH FORESTS IN JAMMU SIWALIKS
A CASE STUDY OF VILLAGE JHAJJAR KOTLI

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Man in the ancient times had great and unbreakable ties with the forests provided him facilities for supplying water, food, shelter and fuel etc. It is because of these facilities that the primitive hunter and food gatherer could scarcely sever his ties with the forests. And, strangely enough it was only by loosening these ties that he began the slow and painful upward climb towards civilization. Each new idea, tool or cultural trait gave additional significance to the forest resources resulting in indiscriminate exploitation of the forests instead of their judicious use. Further, the rapid population growth exerted tremendous pressure on the forest resources as a result of which some of the rare species of fauna and flora became extinct

creating environmental and ecological problems almost everywhere in the world.

The plight of the Himalayas is serious in respect of its forest cover. Many species of important trees have already either been eliminated, replaced or in the process to reach this state soon. As a result of it, the Himalayas are experiencing serious ecological disorder viz., erratic river courses, rapid siltation of river beds, change in climate and hydrologic regimes and soil erosion etc. The Jammu and Kashmir state being situated in the Himalayas faces all these problems (with added severity). It is in this context that a village in the Siwaliks has been taken up as a case to study the biotic interaction with the forests. In the present study an attempt is being made to understand the intimate relationship that man has established with forests both directly and indirectly (through live-stock). The study is entirely based on primary data generated through intensive field work based on thoughtfully prepared questionnaire. The questions were so designed as to bring out clearly the interaction of man and animals with the forests. Attempt has also been made to estimate the biomass withdrawn from the forests in the form of fodder, fuel and timber. Further, the study also aims at working out the level of understanding the eco-friendly knowledge being diffused through extension services among the people of the study area and the consequences thereof.

ANTHROPOGENIC MOISTURE PRODUCTION AND ITS EFFECT ON AIR MASSES OF HIGH HIMALAYAN GLACIERS

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The paper describes the distribution of some of the glaciers of northwestern Himalaya and examine the relationship of their distribution to the atmospheric circulation. Besides, the effect produced by the westerly trough, the local circulation also effects the development of

glaciers. Northwestern Himalayan peaks become 'warm island' and at the same time become centre of condensation to become 'moist island.' There exists second large rain zones at high elevation (3500-4000m). There are two zones of high precipitation having origin in two different air masses. High precipitation at higher altitudes is most favourable for the maintenance of the glaciers. The surface snow and accumulated ice samples (32) collected at various elevations in High Himalayan Glaciers (Harmukh, Kolahoi-Kashmir, Kol-Jammu and Naradu-Himachal) were chemically analysed for pH, nitrate, ammonia, sulphate and chloride. The variation in pH, nitrate and sulphate at two altitudinal levels (4850-5200 and 3500-4400m) show variation in aerosol particle over High Himalayan terrain. The presence of high concentration of chloride, sulphate and high pH reflect the influence of biogenic activity, use of fertilizers and weathering. The role of carbondioxide in the measurement of pH appears high in the samples located above 5000m, as the value (4.6) is appreciably low in the accumulation zone of the glaciers.

A STUDY OF THE ECOLOGICAL IMBALANCE OF THE ALLUVIAL
FANS IN THE FOOTHILLS OF THE DARJEELING HIMALAYAS

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Rivers debouching from the Darjeeling Himalayas onto the plains of North Bengal have developed a number of alluvial fans. Between the 300m contour in the north and the 75m contour in the south, these alluvial fans coalesce to form a piedmont zone. At the beginning of the 19th century, all these fans were covered with tropical forests, but with increasing prosperity and the population (327 persons per sq. km. in 1981), the pressure on land for cultivation of food and other crops has also increased. With gradual establishment of tea gardens after 1866, on the undulating terrain with suitable soils and adequate drainage, more and more

forests were cut. Unemployment generated by the decline of the tea industry in the recent years has further forced poor labourers to somehow maintain their livelihood by illegal felling of trees. Arable lands at present occupy about 11% of the territory and this is constantly increasing with the steady influx of settlers from the adjoining countries. Ever since border difficulties with the Chinese in 1962, military installations have also increased occupying more and more of forest lands and uneconomical tea gardens. Thus with the gradual reduction of forest and with the introduction of a totally different land use pattern, the natural environment of the fans has very much been disturbed. The removal of topsoil is so widespread that the present land use is often been carried out on former subsurface horizons. The braided rivers often become incapacitated by eroded materials from the adjoining lands and in times of high rainfall cause devastating floods. The present investigation has been oriented to study the above mentioned ecological imbalance of the alluvial fan area situated between the rivers Balason and Mahanadi in the Darjeeling district. The methodology includes quantitative determination of slope, analysis of geomorphological processes involved together with the study of the nature of existing land use.

CHANGING ECOLOGY OF SHIMLA, THE CAPITAL CITY OF
HIMACHAL PRADESH, INDIA

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The contemporary urban profile is, by and large, the product of the political economy of British Raj. Evidences exist in case of urban system of Himalayan region, where urban centres were especially created as tourist resorts in order to escape the hot tropical conditions prevailing in summer in major parts of India. The dominant morphological structure is basically the result of the decision making processes during the colonial rule.

Undoubtedly, the functional character of the hill towns has been changing with the passage of time, yet they continue to retain their basic character. Nevertheless, the significant change which is noticed is the phenomenal growth of population and consumer-oriented functional units. This has several ecological ramifications and policy implications. The purpose of this paper is to present an analysis of the commercial structure vis-a-vis growth and distribution of population in the city of Shimla which the capital of Himachal Pradesh, a Himalayan hill state and also one of the most important centres of India. Situated at 2233m from the mean sea level, Shimla plays a dominant role in the urban system of northwestern Himalayan region in general and Himachal Pradesh in particular. This was established as the first hill station by the British Raj for several strategic, commercial and ideological reasons. It served as the summer capital of India until 1947. Originally established to cater to the needs of British people and some elite Indian population, the town has now grown into a city touching a population of over 1,00,000. Although basically famous for its 'Mall' and 'Lower Bazar' it has been witnessing several changes in its commercial structure. This paper aims at analyzing these spatio-temporal changes and suggesting some policy implications for its sustainable development by testing a few hypotheses pertaining to growth of population and functional units, commercial linkages and levels of tertiarization.

A STUDY IN EVALUATION OF GROUND WATER RESOURCES OF SOUTH MIRZAPUR UPLAND

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In this study attempt has been made to evaluate the ground water condition in South Mirzapur using Landsat TM and IRS satellite imagery, Survey of India toposheets and ground checking. The analysis

shows that maximum area (about 65%) falls under moderate to poor ground water potential whereas area under poor to none category covers about 26 percent. It reveals that a large portion of the study area is under scarcity of water which is ultimately hindering the process of development. Appropriate measures have been suggested for sustainable development of the ground water resources in the study area.

POTENTIALS OF DECISION SUPPORT SYSTEMS FOR DISASTER PLANNING AND MANAGEMENT

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Planners give little or no thought to prior planning and management of disasters. However, a prior plan will not guarantee that disaster will not develop. Emergency situations especially those resulting from natural phenomena, usually cannot be prevented. Nevertheless, advance planning and management may prevent disasters turning into a catastrophe. The major assertion of this paper is that Computerized Decision Support System has potentials for application as a tool to support environmental planners in their planning and management task to prevent disasters turning into catastrophe more effectively. The paper presents a framework for the development of the Decision Support System which should be available to the environmental planners over a long period of time for predicting environmental disasters and to develop decision models to identify measures to prevent occurrence of environmental disasters.

ENVIRONMENTAL AWARENESS: A CASE STUDY

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During the past few years it has become a concern of

mankind to keep the environment free from pollution. A lot of research work and advertisement in this regard are being done. The urban areas are generating pollutants in the form of industrial gases and waste materials. Urbanisation is also responsible for destroying greeneries and spoiling water resources. Therefore it is necessary for urban population to be aware of environmental pollution. A case study has been carried out to evaluate awareness of people living in Indore city about environmental problems.

AIR POLLUTION DUE TO VEHICULAR TRAFFIC IN INDORE

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Govt. College, Patharia, Damoh

The number of automobiles and industries in every city are increasing along with commercial and domestic activities. Most of these activities add polluting substances to our atmosphere. So, it is necessary to control their activities without affecting development process such that the pollution load is minimised. Indore is a developing industrial and commercial city in Madhya Pradesh. The results of the study indicate that Indore has high concentration of suspended particulate matter mainly in the traffic area. However, gaseous pollutants like sulphur dioxide and nitrogen oxides are not in excess of tolerable limits.

GLOBAL ENVIRONMENT DEGRADATION AND INDIA'S POSITION

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Global environment is degrading fast due to human

interventions. Ozone depletion is one of the important problems. Emissions like carbon dioxide, methane, chlorofluorocarbons, nitrous oxide have really become a menace. There was undesirable greenhouse effect and the preceding decade was one of the warmest. To this state of affairs, the USA contributed 21% of the world's carbondioxide emission and India at 4% level. The contribution of other industrialised countries lie within these extremes. Forest depletion during the last decade is estimated to be maximum in Africa, South America and Asia. Tropical forests in Asia and African realms are cut unprudently, inspite of warning and laws. India's situation in this regard is precarious because more than 9000 sq. km. forest cover has been cut in the last decade alone. And, only 1% of new plantation/afforestation has been achieved during this period. It is one of the reasons in India the mean annual temperature has risen by 1 to 2 °C. This has directly affected the moisture content in the soils (during summer) of India. It is certain, if the trend continues, it will lead to seasonal dessication. On another count, due to industrial development around the megacities of India, the air pollution is maximum. This has been causing human health problems. The paper presents a model to view these problems in spatial situation.

AN OVERVIEW OF THE DEVASTATING FLOOD OF 1993 IN
PARTS OF NORTH BENGAL PLAINS

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People of the plains of North Bengal have become accustomed to floods during rainy seasons. Being rain-fed, the apparently small rivers in the foothills of the Himalaya (Terai Region) become furious with their increased volume of water which ultimately spill over the embankments and inundate the surrounding areas. In July 1993, such a

devastation took place when the two rivers--Torea and Kaljani--inundated many areas of Cooch Behar and Jalpaiguri districts. The present paper attempts to investigate the causes and consequences of the flood. While probing into the causes, this paper reveals that the flood of 1993 was primarily a result of excessive rainfall within a very short time on a particular day at one of two places. But, that excess rain water might have been accommodated within the channels, had the river beds would not have been overburdened with siltation. There are some reasons behind this heavy siltation. The sandy (loose) nature of the soil of the Eastern Himalayas (from where these rivers come down) which is easily erodible, is carried down by these rivers and dumped on the plains during floods. Deforestation in the upper reaches of the rivers is, of course, partly responsible for this soil erosion. Due to the order of Central Government which prohibits the collection of boulders and debris, this phenomenon has slackened the river waters to some extent. Moreover, the indiscriminate use of the flood-plains and embankments especially by settlements, are reducing the velocity of the rivers. It can therefore be inferred that human interference with nature has played a vital role in this context. This paper also gives some suggestions for reducing the effects of floods in this floodprone region.

ENVIRONMENTAL CHALLENGES AND IMPACTS: A STUDY OF
INDUSTRIALIZATION IN GUNA DISTRICT

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The present paper aims to study the environmental challenges faced by the industries established in Guna district of Madhya Pradesh and various steps taken by them for environmental protection, and also to evaluate the environmental impacts. A gas based fertilizer plant was established by NFL at Vijaipur in 1987. An LPG plant was commissioned by GAIL in 1991. Contrary to normal expectation (of

environmental degradation) after setting up of these industries, there is environmental improvement in the form of transformation of barren land into vast greeneries. For the effective control of water and air pollution, certain units are installed in NFL and GAIL premises. The treated effluent water from the factory is utilized for tree plantation. Environmental monitoring cell at NFL keeps vigil on environment round the clock. The Environmental Impact Analysis for NFL's expansion project has reported that it will have a favourable and positive impact on environment.

MEGA CITIES OF INDIA
THE QUESTION OF THEIR SUSTAINABILITY

Tara Devi Singh
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Third World urbanization, especially the metropolitanisation variant of it, has not been involved in the process of socio-economic transformation and scholars' have most often emphasized the need of pursuing a positive policy of urbanization and human settlement development in order to attenuate the process of polarisation and the resultant phenomenon of spatial dualism. The urban system of India lacks proper articulation and the cities have been growing faster than the towns and 23 metropolitan centres, standing as symbols of domination and exploitation contained in them about 51% of the national city population. Mega cities (Bombay, Calcutta, Delhi and Madras) claimed about 27% of the total city population and about 53% of the total metropolitan population. However, they have not been able to sustain their population growth rate during the last decade. Their mean growth declined from 39.81 percent during 1971-81 to 30.83 per cent during 1981-91.

The mega cities are characterised by an exceptionally high population density and heavy influx of new migrants. Consequently, drinking

water supply is inadequate and of doubtful quality. In some of these cities less than one third of the population is connected to the sewerage system while in some mega cities the system is heavily overloaded and untreated sewage flows into the nearby water bodies. The garbage collection is far from total. Sanitation leaves much to be desired. A large majority of slum dwellers defecate in the open spaces and drains. Vehicular traffic is responsible for 40-50 per cent of the air pollution. The level of sulphur dioxide is the highest in Bombay, of carbon monoxide in Delhi and of nitrogen oxides and SPM in Calcutta. Delhi and Calcutta claim the distinction of being the most polluted metropolitan cities. Housing condition is deplorable. Transport system presents a dismal scenario. Water supply is overstrained. Social facilities show signs of collapse. Land prices have sky-rocketed.

An attempt has been made in this paper to examine some of these aspects of the urban environment of 4 mega cities of India and to evaluate the sustainability of these urban habitats with reference to national economy, weak urban system and the most vulnerable conditions of their own creation.

ANTHROPOGENIC TRANSFORMATION AND ITS CONSEQUENCES
IN THE FLUVIAL PROCESSES OF THE BALASAN BASIN IN THE
DARJEELING HIMALAYA

Sunil Kumar De
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Landslides and floods are two important natural problems which affect the economic and cultural development of the Balasan basin covering an area of 352 sq.km. in the district of Darjeeling. The natural equilibrium of the steep slopes of the basin composed mainly of semi-crushed phillites has been so seriously disturbed by unscientific and unplanned usage of land that during heavy rains innumerable landslips are caused transporting huge amount of

debris to the channel of the river Balasan. This not only reduces its depth but also causes devastating flood in its lower reaches (below 200m) endangering the fate of the local inhabitants. The present study conducted during 1989-1993 tries to depict the actual sequence of changes in the physical and hydraulic characteristics of its lower course in combating the increasing supply of loads from several landslides that occur in the upper catchment.

CHANGING CONCEPT OF SUSTAINABILITY AND DEVELOPMENT

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Management of human activities has been guided by two objective functions: development with emphasis on each person's right to a standard of living adequate for health and well-being; and sustainability with concern about the ability of future generations to meet their own. During the 1960s and early 70s the clamour for higher economic growth and the crusade for environmental preservation were looked upon as separate entities. The emotion laden polarities yielded place to rational discussions during the late 1970s. There was growing awareness during the 1980s that maintaining the quality of environment (sustainability) and improving the quality of life (development) are intricately linked components. Issues of poverty, population, development, environment and technology needed synoptic and simultaneous consideration. The gains have been further consolidated since then. The environmental crisis has become a poverty problem and 'eradicating poverty through enhancing and protecting livelihood strategies is as much an environmental sustainability issue as a resource endowment question!

During 1950s sustainability was concerned with the extinction of species and natural communities

because of excessive destruction of their habitats. During the 1960s there was growing concern about the environmental implications of human activities in terms of depletion of 'planetary capital' and the vulnerability of the environment was emphasized. Environment-development linkages were examined and the question of sustainability became inseparable from appropriate technology, local resources, equity and social justice, participation and decision making during the 1970s. there has been much increased concern about impending global ecological crises, eradicating poverty through accelerated economic growth in developing countries and examining population size and resource use linkages since 1980s. Sustainability is presently being interpreted in terms of maintaining a constant stock of environmental assets for use by future generations and avoid irreversible damage to any significant single asset.

During 1950s and early 1960s development was considered as maximization of aggregate economic growth and economic accounting was the paradigm. Development was defined as ensuring a fair distribution of available wealth and social accounting became the paradigm during late 1960s and early 1970s. Development was interpreted in ecological terms with emphasis on minimizing the negative effects on the environment accepting environmental accounting as the paradigm during the late 1970s and 1980s. A consensus has now emerged that development is concerned with improvement in the quality of life and maintaining the same over a longer period.

An attempt has been made in this paper to examine the changing views on sustainability and development and the resultant shift in paradigm along the above strands of thoughts.

INCREASING CARBON DIOXIDE AND THE GLOBAL CLIMATE

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Due to a number of man-made perturbations such as

burning of fossil fuels and deforestation, there is rise in atmospheric carbon dioxide. These anthropogenic emissions of carbon dioxide with other greenhouse gases would warm the earth's average surface temperature by 3.0-5.5 °C. The global warming debate has fostered two diametrically opposed views on the subject, which Stephan Schneider has referred to as the "end of the world" and "nothing to worry about" scenarios. The purpose of this paper is to provide a brief scientific and comprehensive overview of such a crucial environmental problem of the current century.

GREENHOUSE GASES AND GLOBAL WARMING MYTH OR REALITY?

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The greenhouse effect and associated global warming is one of the very serious environmental concerns. The most abundant constituents of the atmosphere (nitrogen and oxygen) are transparent to the infra-red spectral region while other less abundant gases (carbon dioxide, ozone, methane, nitrous oxide and CFCs) play an important role in driving climate but also in its variability over space and time. Three hundred scientists on the International Panel on Climate Change (IPCC), established in 1988, have now concluded in no uncertain terms that global warming is now real. A growing disequilibrium exists between society's production of carbon dioxide and the nature's capability for fixation of the same by photosynthesis. In general, the problem of greenhouse effect is associated with the burning of fossil fuels and irrational use and over-exploitation of natural resources. In this paper an attempt has been made to provide a brief realistic assessment of the problem of greenhouse effect and global warming which is likely to effect the world in the next century.

IMPACT OF INTENSIFICATION OF GROUND WATER IRRIGATION
ON HYDROGEOLOGICAL ENVIRONMENT
IN GANGA-GHAGHARA DOAB EAST

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There is tremendous increase in ground water exploitation to meet human needs such as irrigation, domestic and livestock consumption, industrial requirements. Recent developments in ground water pumping technology have resulted in the intensification of ground water tapping. The present paper deals with the impact of over crowding of ground water irrigation means on hydrogeological environment in Ganga-Ghaghara Doab East in Uttar Pradesh covering districts Ballia, Mau and parts of Ghazipur and Varanasi. There is overcrowding of ground water irrigation means in an aquifer and year to year increase in ground water irrigation in some areas without considering as to what spacing should be maintained between two tubewells. Unplanned growth in the number of groundwater means is responsible for minimising the area under irrigation (falling under a particular borewell)! Thus the overcrowding of wells is affecting the hydrogeological environment in many ways. It has been a common observaion that groundwater table is going down year after year in some parts of Varanasi and Ballia district and withdrawal of excess water from a single point is affecting the withdrawal of water in another neighbouring point. Besides (overpumping) the number of 'dark' development blocks i.e. where further development of ground water is not allowed by 'NABARD' are increasing year after year. The 'grey' category i.e. where there is limited scope of ground water exploitation has been identified in 15 development blocks in April 1993. Thus for preventing these adverse effects on hydrogeological environment and to ensure sustained and successful use of groundwater reservoir for irrigation and other purposes, there is urgent need to prevent unplanned rapid growth of ground water irrigation means for reducing over exploitation of ground water and, to develop surface water irrigation in the areas where ground water

utilization is more than 65% of the potential, for natural recharging to ground water overexploitation areas.

SUSTAINABILITY IN RURAL CONTEXT: A CASE STUDY

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With the onset of western mode of development, traditional resource use systems have fallen apart. The present paper examines the existing condition of rural people of Deoria district in Eastern Uttar Pradesh. It deals with the degradation of rural environment. A few suggestion to restore and resurrect the resource pool meant to be utilised by the rural people of a particular territory, are put forth.

AGRO-ECOLOGY OF BUNDELKHAND REGION

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The present study is an analytical explanation of the changing agro-ecological situation in the Bundelkhand Region. Major emphasis is given on factors of physical environment, biogeography, socio-economic practices and cultural constraints etc. An effort has been made to identify the eco-farming sites in respect of plant growth factors, biomass, diversification of crops, cropping patterns and farming systems and types. Besides highlighting the problems of changing agricultural scenario, this short exercise will provide the scientific basis for the sustainable farming eco-system, different from the existing one i.e. physical regions and cropping regions.

THE SYNDROME OF POVERTY AND HIGH FERTILITY IN INDIA:
PROGRAMMES NEEDED FOR POVERTY ERADICATION AND
IMPROVED HEALTH SERVICES

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Bombay

Unlike conventional studies, this paper emphasises upon the basic fact that the syndrome of poverty, inadequate and ineffective health and family planning services, and the situation of very high fertility and high infant mortality behaviour are very much causally linked. The study also reiterates that desirable demographic transition will not set in, especially in Uttar Pradesh, West Bengal, Bihar and similarly placed poverty-stricken states of India, unless and until we soulfully realize this fundamental truth and urgently take immediate actions for poverty eradication and for alleviating the oppressive condition of the poor people, especially of the downtrodden women in U.P., Bihar, M.P., West Bengal and India as a whole.

The central contention of the paper is that fertility reduction and infant mortality decline cannot be effectively actualised unless widespread poverty prevailing in Northern India, especially in U.P., Bihar, West Bengal etc. is not drastically reduced, and given a final burial. To substantiate the thoughts, the summary findings of surveys are presented.

The study also highlights some crucial findings of a demographic-cum-health survey conducted over entire Varanasi district, Uttar Pradesh, covering 6255 eligible women in their reproductive period, and who lived in 40 randomly sampled villages of 8 randomly selected blocks of the entire district. Total fertility rate was very high, 6.24 children per mother at the district level (1986-87), rising to 8.2 children in remoter blocks. Infant mortality rate was 107 deaths per 1000 live born infants for the district; rising to 270 deaths in remoter villages. Findings of these rates are very much substantiated by recent NFHS survey in U.P., done in 1992-93.

Fine-grained data reveal essential health services of PHC/SCs (like ante-natal care, post-natal care, child immunization and child-care services, as well as family planning services) are available only to a few privileged groups who live very close to the PHCs, and those facilities are not made available to the larger communities who unfortunately live at remoter parts of community development blocks. Thus, a distance-decay function of health services operates in such underdeveloped regions, where poverty is very high and regional development is at the lowest ebb. Such a pitiable situation is all the more alarming when a very high rate of infant mortality (140 infant deaths per 1000 live born infants) and under-five child mortality are recorded in the same blocks. So, one of the central tenets of this paper is that much greater efforts are now urgently required to provide health services to hitherto neglected and remoter blocks and villages, and especially among downtrodden women.

Data also unfold that utilisation rates of health and family planning services are very low in this district. However, the point of departure of this paper lies in the truth as it further unfolds that these utilisation rates are very low specially in those CD blocks which are plagued by widespread illiteracy, rampant unemployment, very low occupational status, and lower castes of women. These are, indeed, manifestations of the syndrome of poverty. Thus, it is strongly emphasised that programmes for eradication of poverty and massive education and employment generation programmes for the women are very urgently necessary; if we are soulfully concerned with the task of improving utilisation rates of health/family planning services in rural areas, and consequently, for on-setting fertility transition and mortality reduction in Uttar Pradesh. Similar findings also strongly emerge from survey findings of 7 villages of West Bengal. Finally some concrete planning strategies are spelt out for implementing poverty eradication programmes and for improving reproductive health and family planning services in India.

VISAKHAPATNAM CITY: A STUDY IN ENVIRONMENTAL POLLUTION

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Visakhapatnam is a multifunctional port city. It has grown into an urban agglomeration of more than one million population. It is witnessing rapid urbanisation leading to an increase in environmental pollution. An attempt is made in the present paper to examine the hazardous levels of some gaseous contaminants in the air and their effect on the health and comfort of the residents. The percentages of air pollutants like sulphur dioxide and nitrous oxide are quite high and have even crossed the optimum level of $80\mu\text{g}/\text{m}^3$ at many places within the city. The increasing concentrations of these pollutants in the air is resulting in acid rains at several places. The pH value of rainwater samples ranging between 5 to 6 were observed in the city especially in the industrial zone. Formation of smog is a common phenomenon, especially conspicuous in winter during the calm weather condition. Besides this, due to increase in the traffic density from year to year, the traffic noise and exhaust pollution are going up. The noise levels in almost all parts of the city are found to exceed the permissible limits of 55 dB.

INFLUENCE OF LAND APPLICATION OF SEWAGE ON SOIL MICROFLORA IN RELATION TO CROP DISEASES

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The effects of land application of partly treated sewage, released from Bhagwanpur Sewage Treatment Plant, situated near BHU campus, Varanasi, on soil microflora and the wilt diseases of chickpea caused by Fusarium oxysporum f.sp. ciceri and linseed caused by F. oxysporum f.sp. lini have been studied. Untreated sewage showed higher alkalinity, acidity,

electrical conductivity, BOD, COD, and chloride, nitrate, phosphate and heavy metals contents than treated sewage. The number of fungal species were recorded higher in control than the treated soil and sewage samples. The total number of fungi g dry soil was higher in control than treated soil. However, the number of bacteria g⁻¹ dry soil was higher in treated soil than the control. The number of actinomycetes g⁻¹ dry soil was higher in control than treated soil. The population of bacteria in sewage was higher than the fungi and actinomycetes. The population of the pathogens, *F. oxysporum* f.sp. *ciceri* and *F. oxysporum* f.sp. *lini*, were recorded in high per cent frequency than other fungi. A greater incidence of wilting of chickpea and linseed was recorded in control field. The per cent incidence of wilting increased as the time progressed. Colony interactions between the test pathogens and some dominant micro-organisms, isolated from sewage, control and treated soil samples, were studied in dual cultures. The volatile metabolites, emanating from the cultures of the test micro-organisms, inhibited the radial growth of both the pathogens. The heavy metals (Cd, Cr, Pb, Ni and Zn) inhibited the radial growth of both the pathogens as well as of other test micro-organisms. None of the heavy metals caused complete inhibition of radial growth of any micro-organism at any used concentration. Cadmium was found to be most effective against both the pathogens whereas Zn was found to be least effective.

IMPACT OF INDUSTRIALIZATION ON ENVIRONMENT
A CASE STUDY OF VISAKHAPATNAM

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An attempt is made in this paper to assess the impact of industrialization on the environment of Visakhapatnam. With growing population there is demand for housing and other community facilities. Unplanned spread of suburbs and increasing number of slums create many social as well as environmental

problems. Less privileged people who cannot afford to build a house in the city occupy hill slopes and national highway margins thereby disturbing the physical environment. Several such aspects are dealt within this paper.

POTENTIAL OF REMOTE SENSING AND GIS IN LANDSLIDE
INVENTORY AND HAZARD ZONATION: A STUDY ALONG
TEHRI RESERVOIR RIM

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Most of the landslide hazard detection and susceptibility to slope instability use the concept of superposing and integrating spatial data or maps of various geo-environmental factors like geology/geologic units based on lithology, geomorphology, vegetation (land use/land cover) and hydrology. Satellite remote sensing with improved spatial resolution in recent years has made it possible to map these factors and thus help in understanding the mechanism of landslides. In this paper an attempt has been made to detect landslides in the Tehri Reservoir Rim using high resolution, IRS and SPOT data in conjunction with ancillary data on slopes and lithology. A total of 36 landslides were identified in field and was used to identify another 39 as 'probable' based on signature on satellite imagery and converging evidences like river convexity, tone, texture and association. Of these only 3 turned out to be road cuttings and 1 a barren rock outcrop. In all, 71 slides were mapped, 50 in the Bhagirathi valley and 21 in the Bhilanganga valley. A GIS based approach has been used to integrate various geoenvironmental factors and existing slides to generate a hazard zone map based on numerical ranking vis-a-vis occurrence of slides among these factors. A reference has also been made

on the work carried out world-wide, methods used both empirical as well as quantitative. The paper also identified thrust areas with special reference to the sustainable development in the hilly regions of India.

URBAN THERMAL ENVIRONMENTAL STUDIES IN VISAKHAPATNAM

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Of the many climatic parameters, temperature is the most affected one due to urbanisation and industrialisation. The thermal characteristics of urban areas are in marked contrast to those of surrounding countryside. In the present paper an attempt has been made to study the impact of urbanisation on thermal structure of Visakhapatnam, a rapidly growing (east) coastal city in Andhra Pradesh. The analysis of temperature data for a period of 44 years i.e. from 1951 to 1994 reveals that there is an increase of 0.7 °C in the winter minimum temperature and 1.4 °C in the summer maximum temperature. The study of heat islands shows that the intensity of heat islands varies from 2 to 4 °C. Surveys of surface temperatures over Visakhapatnam during winter season for thirteen years from 1981 to 1993 reveals that heat islands were invariably formed over closely packed building complexes and industrial areas. Vertical temperature profiles were also examined to know the frequency of inversions which increase pollution hazards. The study reveals that December month experiences maximum number of inversions followed by February. The departure of maximum temperatures from normal are also worked out to identify heat wave conditions.

FAT ACCUMULATIVE PESTICIDE RESIDUE IN GANGA RIVER WATER

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Ganga water samples (2.5 L) were collected in Banaras from eastern and western bank of 10 km stretch, i.e. from Ramnagar to Rajghat region, for the analysis of runoff contamination of long persistence fat accumulative organochlorine pesticides viz., BHC, DDT and endosulfan which are generally used for both agricultural and public health programmes. DDT and endosulfan were found in all the samples whereas BHC in thirty samples out of thirty four samples. Most of the data has crossed the safe limit recommended by W.H.O.

SUSTAINABILITY OF UPLAND AGRICULTURE IN THE DRY ZONE OF SRI LANKA

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Sri Lanka is broadly divided into three climatic regions. Dry zone occupies two-thirds of the land and the farming systems are mostly rain-fed. The farming consists of shifting cultivation (Chena), small scale reservoir based rice farming and home gardening. The major (Maha) cultivation season spreads from October to January while minor season prevails from April to June. Farmers use the rainfall and surface water for their cultivation during the major season. Cultivation is very rare during the minor season. Major season is getting shorter and drier. Frequent paddy crop losses due to insufficient rainfall even in wet/maha season, is a serious problem faced by many farmers in the Dry Zone of Sri Lanka. Therefore finding the reasons and solutions for this problem was a major concern among many scientists. From 1960 to 1987, rainfall, cultivated area and crop damaged area, were analysed. In addition, an investigation was carried

out by pump test, to check ground water availability, variability and recharge. This study reveals that rainfall and cultivated area are highly related (1% level). During the shorter major rainy season ten per cent crop damages are highly significant (1% level). Pump-test revealed that ample shallow ground water in Dry Januaris and Feburaris that can be used to save 10% crop losses by giving life saving irrigation. In addition, it was found that there is a possibility to cultivate another crop during dry season by utilizing this ground water.

GEOGRAPHICAL APPROACH IN ECO-SYSTEM STUDIES

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Magadh University, Bodh-Gaya

Man being an active agent of environmental change, modifies the ecosystem through the exploitation of natural resources. He reduces the ecological diversities and complexities of ecosystem by removing a host of biotic communities for different purposes. There are two models of ecosystem equilibrium--(i) the equilibrium model and (ii) the non-equilibrium model. The present paper presents an account of these two models.

ENVIRONMENTAL PROBLEMS AND PLANNING STRATEGY FOR SUSTAINABLE DEVELOPMENT IN MANIPUR

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In Manipur, a small border state in North East India, the undulating serrated hill ranges, comprising over nine-tenths of the total geographical area, encircle its fertile and highly developed central valley. The hilly terrain of the state is highly exposed to environmental degradation causing much concern amongst developmental agencies

engaged in the socio-economic upliftment of the region and its people. The environmental problems in the state emanate from the defective utilisation of natural resources--land and water, unscrupulous deforestation, shifting cultivation, rapid urbanisation, floods in the valley, etc. A long-term developmental approach for the restoration of ecological balance is to be envisaged through measures aimed not only at optimum utilisation but at development of natural resources such as land, water, vegetation and manpower also. In the light of ecological problems faced by the state, an alternative environmental development strategy comprising watershed based farming system, appropriate soil conservation measures, mixed landuse of agri-horti-silvi-pastoral system, creating subsidiary source of income through livestock rearing, creation of water harvesting and silt retention structures at lower reaches, gradual replacement of jhuming by terrace cultivation, massive afforestation to check the soil erosion in the hills and siltation of lakes in the valley, etc., has been suggested in the paper.

ENVIRONMENT, HEALTH, POPULATION DISPLACEMENT
AND SUSTAINABLE DEVELOPMENT:
THE CASE OF CHOLERA AND DYSENTERY

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Interrelationships between the environment, health and population displacement have implications for issues of sustainability and development. Changing physical, social and demographic environments influence the disease ecology of cholera and bacillary dysentery. Pathogen virulence and host susceptibility are affected by movement of people between disease zones and by local changes to the environment. Some of these processes may be accelerated in situations of forced displacement and are modified by structural change. Three themes concerning the health effects of environmental change and population displacement, are suggested as

being relevant to sustainable development and important in prevention of cholera and dysentery, namely changes to local ecosystems, loss of diversity, and a rate of change beyond the adaptive capability of people.

EFFECT OF METEOROLOGY ON INHALABLE PARTICULATES
IN THE CITY OF VARANASI, INDIA

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A detailed investigation on fine, coarse and total particulates (fine plus coarse) was done at commercial, residential and industrial sites in metropolitan Varanasi, India. Sampling was carried out for a period of one year, during 1993 with the help of an automatic dichotomous sampler. During the sampling process meteorological variables were also recorded. All the metal samples i.e. Cu, Zn, Fe, Pb, Ca, K and Mg were analysed by Atomic Absorption Spectrophotometer and statistical analysis was done to show the correlation between particulate matter and meteorological variables. The highest concentration of IP was recorded at the Andhrapul, a busy crossing in the city centre and the lowest at Saranath located about 10 km away from the city centre. The concentration of total inhalable particulate matter were found to be very high compared to accepted standards. Two meteorological characteristics i.e. wind speed and atmospheric pressure could be used to predict the concentration of Ca, Fe and Pb particulates while wind speed, relative humidity and atmospheric pressure could be used to predict the concentration of Ca, K and Mg. From the regression analysis it was clear that the highest correlation coefficient was obtained for Fe and Pb and low for Ca, K and Mg.

MONITORING OF NOISE-INTENSITY WITH SPECIAL REFERENCE
TO AUTOMOBILES IN VARANASI

Manisha Shukla
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While the general public has become much more aware of the hazards of water and air pollution, attention of people towards noise-pollution is a recent phenomenon. The paper is devoted to an empirical survey of 64 monitoring stations covering practically the whole corporation area of Varanasi. The selection of these sites was determined by the level of traffic noise, specially at peak hours. This survey revealed significant modification in the zonal structure of noise (recorded during earlier surveys), suggesting that the noise level was rising very fast. Some zones which were classified in the previous survey as 'risk-free', or 'moderate risk zones' have changed and can now be classified as 'moderate risk zones' or high risk zones respectively. The survey also revealed that the number of risk-free zones has dwindled almost to nil.

SOME PERSPECTIVES ON SUSTAINABLE DEVELOPMENT

Gopal S.Kulkarni

The main objective of this paper is to examine the concept of 'Sustainable Development' with special reference to Indian ethos and values. During the last decade an increasingly wide use of this term is made by various U.N. agencies, especially in case of the Developing world. Many even feel that it is 'the answer' to all our problems. However recently there have been political overtones and serious perceptual differences in interpreting the implications of this term.

Evolutionary changes in the concept of Development have been briefly traced. Then the recent U.N. definition of sustainable development and its

application to India are discussed using a schematic framework based on the classical perspectives of the pioneer political economist, Kautilya.

Recent explicit emphasis on 'people-centric' and 'natural environment' in 'Sustainable development' concept is considered a much needed improvement in the U.N. approach to development. In this process people participation takes the center stage. This is possible when Development is perceived as Empowerment of people to seek information resulting in judicious action to achieve sustained results.

In the terminology of ancient Indian thought, it is not the theoretical knowledge (Shastra) but discriminative wisdom (Vidya) that makes the final and sustained impact.

LAND DEGRADATION: A MENACE THAT HAUNTS HUMANITY

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Land degradation/desertification, now threatening nearly one third of the earth's surface affecting the lives of at least 850 million people, is a global problem. This problem is becoming acute in the developing world where population pressure and inappropriate farming practices contribute to soil impoverishment and erosion, deforestation, overgrazing of common lands and misuse of agrochemicals. The paper deals with the various aspects of land degradation and to face and overcome this menace, a few suggestions have been made in the paper.

ENVIRONMENTAL CONSTRAINTS IN THE DEVELOPMENT OF DEHRA DUN DISTRICT

M.P.Singh
D.A.V., P.G.College, Dehra Dun

The development achievements in agriculture,

transport and communication, industrialization and urbanisation etc., in Dehradun district, have been well-marked. These developmental achievements have almost invariably tended to be exploitative (of natural and human resources) without being protective and have posed environmental problems in the district. The paper highlights these problems and gives some suggestions to reduce the same.

KENYA'S EFFORTS TO CONSERVE SOIL, WATER AND FORESTS

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There is a 'war' being fought in Kenyas rural areas. It is a battle to ensure a greater and more sustainable food production. The battle ground is mostly the arid and semi-arid areas of Kenya and other parts where the land has been degraded leading to massive soil erosion with torrential rains rendering the land unfit for sustained agricultural production. Efficient widespread and fast action is needed to overcome the soil erosion in the affected part. This is not possible without the support of local people and their leaders. This is so because the concept of land husbandry must be accepted by the people. Water conservation activities aim at having systematic catchment development from the upper part of the catchment to the lower part. Starting high up in a catchment area and proceeding downstream, various structures are constructed for water conservation for the crop production, human and livestock consumption and for recharging ground water aquifers. The paper presents the various measures the Government of Kenya is taking to conserve the country's soil, water and forests.

ENVIRONMENTAL PLAN FOR MINE AREAS NEAR MUSSOORIE

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University of Gorakhpur, Gorakhpur

The Himalayan foothills near Mussoorie which

contains a prominent limestone belt is one of the important mining spots of the region. During the last two decades, more than 100 leases have been sanctioned for mining the limestone on the slopes of these hills. This paved way for degradation of vegetation and soil. With its natural cover gone, the terrain is turning into a wasteland. The paper presents an environmental plan to reclaim the degraded land in these mining areas.

ENVIRONMENTAL CHANGE ANALYSIS OF DESERTIFICATION

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The man and nature induced environmental change of desertification has been studied through satellite data (Landsat MSS), meteorological and land statistical data. Indicators have been established for effective monitoring of the environmental change and to mitigate the adverse effects of the change, water harvesting structures have been proposed.

GAZIABAD CITY: A STUDY OF MUNICIPAL SOLID WASTES MANAGEMENT

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Ghaziabad is an important industrial city of Uttar Pradesh, contiguous to Delhi, the national capital. There is rapid population growth due to industrialisation in and around the city. One of the major ill effects of industrialisation this city is facing, is the unabated rise in solid, liquid and gaseous pollution. The urban solid waste having 60 to 85% decomposable organic matter starts decomposing causing not only air but also severe water pollution. It has been estimated that the wastes generated by the city is about 0.59 kg per capita in 1992-93. The paper highlights the problem

of municipal solid wastes generation in the city due to rapid growth of population, various constituents in the solid wastes, their treatment and disposal options. Also, the paper discusses the strategy for the proper waste management including waste minimisation, recovery, recycling and reuse.

INDONESIAN FOREST MANAGEMENT

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Faced with the economic crises in the late 1960s and the early 1970, the Indonesian government chose to exploit the most liquid assets, including forest. Beginning with the first exploitation in 1966, the deforestation in Indonesia has devastated the world's second largest forest. The massive deforestation in Indonesia is caused by the Indonesian government's perception that it has to choose to use forest either as an economic asset (and therefore should be exploited in order to pursue the economic demands) or as an environmental asset that has to be preserved in order to pursue the environmental demands. Perceiving economic and environmental demands as an "either-or" choice, the government has chosen to pursue the economic demands. As a result, the deforestation rate in Indonesia has exceeded the forest's Maximum Sustainable Yield (MSY). However, from economic point of view, when the exploitation of renewable resources--like forest--exceeds its MSY, it is not an economically efficient exploitation rate. This paper proposes an adjustment that will bring the Indonesian forest management to the economic exploitation rate (below the forest's MSY) by imposing tax and tradeable permit. By applying an economically efficient exploitation rate, the forest management will fulfill both economic and environmental demands.

BIOFEEDBACK TRAINING IN URBAN PRIMARY HEALTH CARE

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The primary health care in conventional sense, is essentially a concept developed in consideration of rural health. With the growing urban population and its unique health hazards it seems reasonable to redefine primary health care separately for the urban population. The urban population, specially in big industrialised cities, is susceptible to psycho-social conflicts and stress. So, elimination of psycho-social stressors and stress management should form an essential component of urban primary health care. Such an attempt is necessary to prevent a large number of stress disorders like anxiety disorders, hypertension, coronary heart disease, diabetes, peptic ulcer etc.

Biofeedback is the fundamental phenomenon coordinating the entire physiological system of the living organism. The knowledge of biofeedback phenomenon provides an opportunity to develop disorders induced by unwholesome lifestyle. It may be useful to launch small functional biofeedback training centres proportionately (to the size of the population) spread. Such centres can also provide services of yoga therapy and similar other practices capable of preventing stress.

ENVIRONMENTAL CONCERNS: THE GEOGRAPHER'S PERSPECTIVE

Ravi S. Singh
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The paper discusses (i) the fundamental elements of environmental concern, (ii) various expressions, which have found place in the environmental debates, (iii) the geographer's response to the environmental issues, and (iv) critically assesses the extent of success in various environmental programmes.

**ENVIRONMENTAL HAZARDS AND THEIR IMPACT ON REGIONAL
DEVELOPMENT: A CASE STUDY OF LALMATIA MINING AREA**

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Interruption in the morphoclimatic equilibrium of the region is responsible for originating hazards. It may be geologic, geomorphic processes or anthropic interruptions. In this paper, an attempt has been made to identify the types of environmental hazards and to assess their impact on development in the Lalmatia Mining Area which forms a part of the Godda district of Santhal Parganas in Bihar. The environmental hazards are grouped into four groups--geomorphic, pollution, mining and health.

ENVIRONMENTAL PARADIGMS IN ANCIENT INDIA

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The present paper deals with certain environmental hazards and measures and methods to remove the same as based on the interpretations of Karma and their consequences which are discussed in the Puranic and other religious scriptures. The paper also discusses various aspects of Karma, which may remove the environmental hazards.

**ASSESSMENT OF GROUND WATER POLLUTION IN AND AROUND
NAINI INDUSTRIAL AREA, ALLAHABAD DISTRICT, U.P.**

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National Institute of Oceanography, Goa

Narayan Chopra
Banaras Hindu University, Varanasi

The present study is an attempt to assess the ground water pollution in and around the Naini industrial area near Allahabad city. Sixty six samples of

ground water from as many wells were collected and chemical analysis was done for major cations of Ca, Mg, Na, K and anions of Cl, SO₄, CO₃, HCO₃. The sampling area is under cultivation and gets irrigation from these wells. Of course, it is close to the Naini industrial area. The heavy metals analysis revealed very high levels of Iron (6.414 ppm), lead (0.923 ppm) and Cadmium (0.083 ppm). It is quite obvious, this heavy metals presence in the water is due to the area's close proximity to the industries.

CITIES, SUSTAINABLE RURAL DEVELOPMENT AND QUALITY OF LIFE

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This study makes an attempt to enquire in what manner a settlement/habitat may be redesigned to provide the best possible quality of life to any given population with least possible affect on environment. Suitable policy frameworks including the full involvement of community groups (for sustainable development) has been emphasized taking Bareilly and Gorakhpur urban agglomeration as a case study.

HOLISTIC APPROACH FOR SUSTAINABLE DEVELOPMENT IN ANCIENT INDIAN LIFE

Sunil Kumar Tripathi
Allahabad Degree College, Allahabad

In the present paper an attempt has been made to highlight the ancient Indian methods and approaches which are holistic in nature to sustain the environment. The paper also deals with the beneficial aspects of various ancient traditions, yoga, yaga, niyam etc. which help in purifying the mind and matter.

STRATEGIES FOR SUSTAINABLE FOREST UTILIZATION
A REMOTE SENSING APPROACH

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Forest being the major biological investment of the earth system, its management has all pervasive ramifications. The satellite based remote sensing is a sustainable information system. The periodic and synoptic coverage which this system provides is the unique characteristic of this information system. The present study deals with the generation of Forest Resource Management Plan of Thandla block of Jhabua district, Madhya Pradesh. It is based on an analysis of remote sensing data and Survey of India's toposheets, forest compartment maps, soil and hydrogeological and various socio-economic data including demand-supply activities etc. Suitable plant species are suggested for some specific areas.

CULTURAL ENVIRONMENT HAZARDS: ANCIENT INDIAN VIEWS

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The ancient Indians were conscious about purity in life and nature. It is discussed in the scriptures that 'Dharma' should be the motto with everybody to have peace and order in life. The present Yuga (Kali) is dominated by Artha and Kama, causing damage to socio-cultural spheres. Various measures to remove the evils in the world have been suggested in ancient literary sources. Nine evils are identified which are the roots of mental pollution which in turn is responsible for all other types of pollutions. The present paper gives an account of ancient Indian thoughts and practices to remove the cultural and environmental hazards.

CHALLENGES IN WATER POLLUTION CONTROL AT VARANASI GHATS

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Among Indian rivers, the Ganga is considered as the most sacred and millions of people take a dip in the river and drink its water, despite the fact that at most of the places it is polluted and not fit for direct consumption. The problem of controlling the entry of waste water into the river is multi-dimensional and very complex. An attempt has been made in the paper to evaluate the problem of waste water disposal (into Ganga) in Varanasi. Open defecation, cattle cleaning and disposal dead bodies in the river are some other factors that increase the pollution load in the Ganga at Varanasi. The water quality near the ghats of Varanasi can be improved by construction of a parallel channel along the left bank of the Ganga to collect all waste water originating from the city and to discharge the same downstream after treatment.

PROBLEM OF AIR POLLUTION AND ITS IMPACT ON HUMAN HEALTH IN BOKARO STEEL CITY

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Bokaro Steel City, a township of the Steel Authority of India (SAIL) is faced with serious problem of air pollution particularly due to excess presence of suspended particulate matter (SPM) and carbon monoxide in the ambient air. The levels of oxides of nitrogen and Sulphur dioxide though within the permissible limits, are also not insignificant. The present paper attempts to analyse and interpret the relevant monthly data (1992) for different residential and industrial locations. The city has been divided into various intensity zones (with respect to pollution). The impact of air pollution on human health has been assessed with the help of disease incidence information collected through field survey.

ENVIRONMENTAL AND HUMAN HEALTH-MINING SCENARIO

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Although the entire population of any industrial belt is liable to be affected by pollutants, inhabitants near to the industrial complex experience the maximum ill effects. Mining activities generate solid, liquid and gaseous effluents which always create pollution in the environment. Mining being site and resource specific, people involved and working in this industry are subjected to maximum ill effects. Even those residing in the mining complex are not spared of the meance. Large scale sample survey of morbidity and socio-economics have revealed that the ill effects of pollution is much greater on the residents and workers of the mining industrial complex.

CARRYING CAPACITY APPROACHES TO
SUSTAINABLE DEVELOPMENT

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In recent years, the large scale use of natural resources without proper environmental planning and management has caused land degradation, deforestation, disturbance in biodiversity and quality of life. To sustain the development process and environment simultaneously, the carrying capacity based planning is necessary. The paper discusses various aspects of carrying capacity of the natural environment vis-a-vis societal expectations.

**SURVEY OF THE INDIAN ENVIRONMENTAL LAW: A JOURNEY
FROM BRITISHRAJ TO SWARAJ**

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The History of the Indian environmental law goes back to the ancient period where the Dharma of Environment played an important role in the protection of environment. A specific written environmental law emerged in 1860 when the Indian Penal Code made fouling of water and making the atmosphere noxious as offences attracting penalties. The subsequent exercises in the British Raj side tracked the environmental issues and unfortunately these issues also did not attract attention of the Constituent Assembly leaving the Indian Constitution at its initial start environmentally poor.

The credit goes to some of the State Legislatures who made piecemeal attempts from 1966 to 1970 in this connection and in order to bring uniformity Parliament in the year 1974 enacted the Water (Prevention and Control of Pollution) Act, providing for the definition of pollution, infrastructure of the controlling authorities and penalties for polluting water.

The period from 1976 to 1978 is an important period in the history of the Indian environmental law when the Constitution of India saw three important developments: the fundamental duty of every citizen to protect and improve the environment; the Constitutional obligation of the State to protect and improve the natural environment, and the fundamental right of every person of India to live in a clean environment. These achievements have put the Indian Constitution to a new height of the world constitutions.

The Stockholm Conference of 1972 on Human environment, where India played a key role, resulted in the important legislations in India. The Air (Prevention and Control Pollution) Act, 1981 provided for the prevention and control of air pollution through the same machineries and sanction under the Act of 1974. The second attempt was the Environment (Protection) Act, 1986 which made certain changes in the definition of pollution, machinery and punishments to further protect and improve the environment.

The Bhopal mass disaster, led to two important legislative exercises: The Bhopal Gas Leak Disaster (Processing of Claims) 1985 which authorised the Government of India to represent the victims of Bhopal mass disaster and move the court on their behalf. The Public Liability Insurance Act, 1991 takes care of the victims from further victimisation and makes it mandatory on all the hazardous industries to take out adequate insurance policy so that the victims of hazardous accident could be compensated.

At the last leg of the legislative Padyatra (Journey), Parliament has in its docket two Bills to establish new forums to settle environmental disputes: The Environmental court Bill, 1990 and the Environment Tribunal Bill, 1992. The common point in both the Bills is that experts in environment find a place in the dispute settlement machinery.

So what are the broad directions of the legislative exercises. In the Indian federal structure, Centre dominated in the environmental issues and Parliament from time to time also reformed the existing law with the changing needs. Before 1974, the vision of the Central Legislature was confined to the economic development but the last two decades witnessed a gradual change from liberal to rigid control of environmental pollution. The question remains: Have these exercises reached to the desired goal? The environmental law illiteracy, the competition to change India from the developing to developed State and the governmental inaction have allowed the "richly watered, rickly fruited", Motherland to survive in the polluted environment. In this sad scenario the need of the day is to put the legislative exercises in action so as to save the environment from further degradation.

HEALTH SERVICES IN INDIA-A SPATIAL ANALYSIS

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Health of any living organism is directly under the control of its surrounding environment. Deviation from the environment results into causation of diseases and disease ecology is the basis of planning for better health care in

the terms of health services. Health services generally include hospitals, dispensaries, clinics and primary health centres and spatial analysis of health services deals with location of such centres showing ratio of population with hospital beds, doctors, nurses and other paramedical staff as village health guides, multipurpose workers etc. The present paper deals with ratio of population per hospital bed at district, town and rural hospital level, the ratio of population for doctor is analysed and depicted in the inset map at state level. The study reveals that in most of the rural hospitals the bed population ratio seems satisfactory but in most of the states, districts and towns, the availability of doctors and Hospital beds as per population is not satisfactory. For planning of better health care specially in terms of health services, the spatial perspectives of bed population and doctor population ratio as shown on these maps will definitely help the health planners and if similar studies are made at grassroot level i.e. upto PHC level, such studies may provide new dimensions of proper health care planning.

THE WATER CYCLE, MAN AND ENVIRONMENTAL POLLUTION

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Man has been using various natural resources for his sustenance since the very beginning of his existence on this planet. Fresh water has always been the most important of all such resources for mankind. It has been the basis of all life forms on the earth and is a precondition as well as a limiting factor for any social and technological development. It acts as a constraint to the quality of life that the people of water scarce countries can attain and enjoy. As an effective solvent for the residues of human activities, it has been the receptor and transporter of the waste generated by man. It transports pollutants from air and land to ground water, surface water bodies and coastal waters. Through water cycle it propagates atmospheric and global warming and affects human life and aquatic and terrestrial ecosystem. Continued abuse of such a precious resource through the sociotechnological developmental processes has caused serious problems of water quality degradation, shortage of

fresh and clean water and general environmental pollution threatening the future of mankind.

In spite of this deep involvement of water in causing a broad set of environmental problems through man's developmental activities, there is wide-spread lack of water awareness in the people involved in policy planning and decision making. Water and water cycle must receive due recognition and should be properly understood to mitigate or minimize the related adverse environmental effects. This calls for a new water awareness in societal planning and decision making for developing new strategies and statesmanship capable of handling complex situations and addressing long term objectives. Only knowledgeable public can help the statesmen taking and implementing decisions with long term goals. Further, the knowledgeable people will be able to discuss their environmental problems and develop their own solutions. This will also help in fostering development without destruction. Such a situation could be developed only through well conceived and well planned methodologies for environmental awareness and education.

**WATERSHED APPROACH FOR WASTELAND DEVELOPMENT USING
REMOTE SENSING TECHNIQUES IN KATHUA DISTRICT, JAMMU
AND KASHMIR, INDIA**

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National Remote Sensing Agency, Hyderabad

Development of Land and Water resources primarily form important component for better management of natural resources in hilly areas. Landuse planning involving integration of various resources on Watershed basis has not been put to practice on large scale. Therefore, it is imperative to create a strategy for improving the existing available resources on Watershed basis in hilly areas. Remote Sensing techniques have provided a new dimension in the field of resources management, because of its synoptic coverage and repetitivity.

An area of about 900 sq km comprising 15 micro-watersheds have been mapped using IRS LISS-II satellite imagery of

1992-93 on 1:50,000 scale in conjunction with Survey of India topographical maps. The various Wasteland categories identified include Gullied/Ravinous land (1.89%), upland with or without scrub (12.32%), degraded forest land (3.74%), degraded pasture land (0.37%) and snow clad areas (0.26%).

Due to population pressure, most of the forest areas have been disturbed pushing agriculture within the Notified forest boundary (0.40%), aggravating the problem of soil erosion. Moreover the area is studded with broken land relief with varying water table. In addition, the soil exhibits low moisture holding capacity on account of sandy granular nature. Further, the cultivated land is not well developed due to non-availability of irrigation facilities causing acute shortage of water.

Sites for construction of small check dams/percolation tanks have been demarcated micro-watershedwise, for optimal conservation of water resources. Prioritization of Wasteland categories have been suggested for augmenting food, fuel and fodder for overall eco-management of the region.

ENVIRONMENTAL DISASTERS IN INDIA AND THEIR MANAGEMENT

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India is a major disaster-prone country. On account of its geographical character and environmental conditions, it is exposed to various natural-environmental disasters like droughts, floods, cyclones earthquakes, and landslides. Disasters occur at the interface of extreme physical, biological, and social phenomenon and human vulnerability. However, disasters are no longer considered to be incomprehensible and uncontrollable, in the light of growing knowledge and understanding.

Disasters cause immense losses. Deaths, injuries and damage to property from environmental disasters continue to rise. Floods are the most destructive causing an estimated loss of over Rs.21,00 million and suffering to more than 50 million persons. While floods are at the one end, the droughts are at the other end of the hydrological cycle.

About 20 percent of the country is drought-prone. Cyclones are notable disasters in the coastal and adjoining areas. Landslides occur in the hilly and mountainous regions, more so where the vegetation cover has been removed. Earthquakes occur both in the extra-peninsular and peninsular India, the most recent visitation was that of Latur Earthquake of 1993. The Bhopal Technological Disaster of 3rd December, 1984, added another dimension to the socio-economic disasters. Several industrial establishments in India do not meet the Industrial-safety standards of the U.N.E.P. and pose a hazard to the environment and the population.

The environmental disasters offer a challenge for their study and management. Much can be done through scientific monitoring, preparedness measures, and the cooperation of the government, the voluntary agencies, and the people. In this way, the management and mitigation of the environmental disasters in India can be organised as best as possible to reduce loss and suffering. It is very necessary to do so, as a measure of national endeavour to reduce the impact of disasters, and also ensures international cooperation and contribution during the 1990s U.N. International Decade for Natural Disaster Reduction.

GREENHOUSE EFFECT—THE CLIMATIC CHANGE

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Looking back into the past, we find that our planet has passed through several warm and cold spells. If the climate cycle were to follow its natural course, in a few thousand years the Earth will start sliding into another ice-age. But the current anthropogenic activities threaten to send the climate in another direction—towards a greenhouse warming. When we look at the temperature records taken over the last century, we find that the Earth's surface has warmed by a significant amount over that period.

About 30 percent of the Sun's radiation reaching our Earth gets reflected immediately back into space. The solar energy that does not reflect off clouds and snow, is absorbed by the atmosphere and Earth's surface. As the

surface warms, it sends infrared radiation or heat back towards space to reach a steady state (Black body radiation). Had there been no trace gas in the Earth's atmosphere with absorption bands in the region of Earth's thermal radiation, this steady state temperature would have been about 32K lower than its average temperature (288K). But due to the presence of radiatively active trace gases like water vapour, carbon dioxide, methane, nitrous oxide, ozone and chlorofluorocarbons, having absorption bands in the wavelength region of the Earth's thermal emission, a good part of the heat energy emitted by the Earth is trapped from being freely transmitted to the outer space. The trapping of the Earth's thermal radiation by atmospheric trace gases and the consequent heating of its surface and surrounding is commonly known as the "greenhouse effect" and these gases to be the greenhouse gases.

Our industry, agriculture and daily living cause the greenhouse gases to accumulate in our atmosphere. Their tropospheric concentrations have considerably increased with respect to their preindustrial values. The volume mixing ratios have gone up from 280 ppmv to 355 ppmv in the case of carbon dioxide; 800 ppbv to 1750 ppbv for methane; 285 ppbv to 312 ppbv for nitrous oxide; and zero to 420 pptv; and zero to 255 pptv, respectively for CFC-12 and CFC-11. Further, a lot of other anthropogenic CFCs and halons have been injected into our atmosphere.

From the preindustrial era till late 1950s, atmospheric carbon dioxide was identified as the only source of anthropogenic global warming. But the picture began to change since the beginning of 1960. Currently about 50% of the greenhouse forcing is estimated to be caused due to trace gases other than carbon dioxide.

In the last three decades, the annual global release of carbon dioxide has doubled reflecting a climb in the rate of fossil fuel burning and deforestation. Its current growth rate is 15 ppbv per decade. As human population and economic activities continue to grow, carbon dioxide emissions could again double in the next three decades unless the nations of the world limit their carbon dioxide emission in accordance with the Earth's summit's recommendations and the regulations suggested in several followup meetings.

It has been established beyond doubt that our planet is sure to have some degree of warming even if we could instantly stop the buildup of greenhouse gases in our atmosphere. Thus, the greatest challenge being faced presently by the humankind is to anticipate future climate change and to find ways and means to halt it.

TRENDS IN GLOBAL DEGRADATION OF ATMOSPHERIC, AQUATIC AND EDAPHIC ENVIRONMENT

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The atmosphere, consists of nitrogen (78.084%), oxygen (20.964%), argon (0.934%), carbon dioxide (0.0314%) and other trace gases including methane. There are water vapour, dust, pollen grains, viruses and bacteria, fungal spores and gaseous emissions from industries and automobiles, like oxides of carbon, nitrogen, sulphur, hydrogen fluoride, lead fumes, hydrocarbons and secondary products. Many of the substances added by anthropogenic or man-made sources are harmful to life and therefore grouped as pollutants. Between about 20-30 km zone of atmosphere ozone gas forms a broad layer. The harmful and lethal ultra-violet-B (280-320nm) rays coming from Sun is prevented from passing down to earth's surface. In the atmosphere a gradual increase of greenhouse gases like carbon dioxide, methane, chlorofluorocarbons (CFCs), and nitrous oxides are causing warming effects. This has very serious implications towards global climatic changes leading to far reaching consequences of snow melts, rise in sea level, drowning of coastal low-lands and islands, altered rainfall and evaporation patterns, creation of new plant diseases and pest problems. Carbon dioxide, exchanges otherwise balanced by natural processes, is increasing in the air by 5×10^9 tons per year by the burning of coal and petrol. CFCs, besides having warming effects have assumed notoriety for eroding the ozone shield leading to enhanced input of UV-B (280-320nm) radiations. This has many harmful effects on plants, animals and man, including skin cancer. CFCs such as freon is very widely used in refrigeration and air conditioning. Methane gas which has been produced all along in the past in small quantities has assumed such importance and the present level of 1680 ppbv methane in air is almost twice to the level that existed a few

hundreds of years back. The oxides of sulphur, nitrogen and chlorine are increasing very rapidly causing direct damage as well as indirectly through acid rains.

Water is abundantly stored in the oceans (97%) (13700 Geograms i.e. 10^{20} grams) in saline forms (about 35g of salt per litre of sea water) and on land (3%) in freshwater in form of ice (167 Geog) on poles and mountain tops constituting 75% of the freshwater, and in underground portion (24.9%), lakes (0.3%), rivers (0.03%). A fraction of water is constantly cycling through evaporation (oceans 84%, land 16%) and precipitation (77% oceans, 23% land), cloud movement, river flows, etc. Freshwaters among all natural resources are most important and precious compound and it easily gets contaminated and polluted. The degradation in water environment is alarming due to excessive discharge of wastes such as dead organic matter, municipal sewage, toxic and not easily degradable synthetic chemicals, pesticides and heavy metals leading to spread of water borne diseases, explosive growth of water weeds, and biological magnification of toxic chemicals. Soil environment is under great stress due to dumping of solid wastes, mining operations, accelerated erosion, contamination by chemicals and radioactive wastes, accumulation of certain nutrients and deposition of salts, i.e. creation of usar or alkali lands and soil salinity.

Soil is also vital for anchorage, nutrient and water supply for all land plants. Soil formation takes place very slowly by natural processes of physical, chemical and biological weathering of rock material. Its formation is very slow, and its stabilization is delicately regulated by plant growth, which is getting damaged or degraded. Plantation of shelter belts, wind breaks and forest trees have reduced soil erosion. Solid waste treatment devices are also available.

**WOMEN'S STATUS AND SUSTAINABLE DEVELOPMENT IN EASTERN
UTTAR PRADESH, INDIA: A DEMOGRAPHIC APPROACH**

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Sustainable development is a holistic approach of

development and can be defined as "development that meets the needs of present without compromising the ability of future generations to meet their own needs". It emphasizes that over-riding priority should be given to the essential needs of the poor and it acknowledges the limitations imposed by the state of technology and social organization on the environment's ability to meet those needs. Having a close examination of its demographic dimensions, it is found that though, unfavourable values of different demographic parameters accelerating the rate of population growth are serious threat to sustainable development, the inter-linkages between population growth and resource degradation are too complex and not properly explored. In fact, population control is not a panacea for sustainable development but failure to do so will foreclose future development options. An effective strategy for tackling problems emanating from population growth must be confronted in the broader context of development. Providing improved means to limit births, by itself will not be sufficient in spite of its critical importance. Unless and until the socio-economic constraints on motivation to limit births, health services, family planning programme, female literacy, adult literacy, female work participation rate, gender bias, nuptiality pattern, etc., are rectified, an escape from the threat posed by rapid population growth seems illusory and sustainable development will remain a distant dream.

Women's status is an important concept which through its multi-dimensional approach affects most of the demographic parameters which in turn influence the pace of population growth. Although women's status is defined theoretically as women's access to material and social resources but its operational definitions vary according to the context and different social milieus. Though, it is a concept with vague operational definition, its relationship with different components of demographic process has received a considerable deal of attention and the increase in status of women has been considered as an important tool to restrict the unfavourable limits of various demographic parameters. The impact of women's status on fertility can be examined by the extent to which the status of women affects the demand for and supply of children and fertility regulation. While, its impact on mortality, particularly maternal and child mortality can be looked in contexts of improvement in nutritional status, better utilization of available health services, increased level of modernization,

increase in exposure of accessibility to developmental efforts, etc. Thus, at the both ends, resulting pace of demographic transition in any society, increasing status of women can be considered as a means to raise the quality of life, which ultimately affects the reproductive behaviour in the way most suited to the women's needs.

This paper aims to examine the status of women in different phases of development and its impact on sustainable development as a result of de-acceleration in tempo and quantum of population growth. It is divided into three sections. The first section deals with determination of status of women, by taking an unorthodox set of scores consistent with local and regional population characteristics. The impact of socio-economic and cultural factors on different dimensions on status of women is explained in the second section. While the third section is devoted in exploring the mechanism through which different dimensions of status of women affects the pace of population growth. The basic data used for this study have been taken from a sample survey entitled **Women's Status and Fertility in Rural Eastern Uttar Pradesh** conducted in 1991, under auspices of Centre of Population Studies, Banaras Hindu University, Varanasi.

SOME QUESTIONS OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT IN EAST-CENTRAL EUROPE

Jozsef Toth

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The problems of environment, possible development and human wealth occurring in a strange way in such a continental region where fundamental political changes took place not so far in the past. These changes, of course, significantly transformed the boundaries of the social-economical-infrastructure development and modified the relation of the society towards nature.

East Central Europe mostly can be characterised by the following:

- medium level development
- unstable geostrategic position
- mixed ethnic picture

- presence of many small countries
- numerous changes in the frontiers, tension between countries coming from historic grieves
- standstill in the quantitative growth, coming to surface of the structural problems
- the neglected status of environment.

The countries of the region in different scale are now in social, econimical, infrastructural and environmental crisis. The development, which can provide the necessary pace of closing up too cannot be realised because of structural reasons and the quality of environment is also a retarding factor. We must forecast that the working out of the condition-system which is harmonising with both the needs and possibilities can be a result of only a long period of time. In this historic time we have to establish the possibilities of international and international-regional co-operation which can provide a more favourable surrounding for the future evolution of development.

THE INTERACTION OF SOCIAL-ECONOMIC DEVELOPMENT AND ENVIRONMENTAL ECONOMY

Jozsef Toth

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The existence of mankind has always been dependant on natural environment, since, in the process of satisfying needs, people have had no other choice than rely on their natural surroundings, use what it offers. In the course of history, while societies gained shape, the relation between people and natural environment gradually turned into a relation between society and nature. The more advanced the forces of production are—including both their objective and subjective sides—the more intensely society is able to utilise sources provided by natural environment.

Thus, it is obvious that according to this approach, as forces of production develop, society takes possession of greater and greater proportion of its natural environment, in a sense that it is in permanent interaction with nature, also using it. This process can be interpreted in two ways—(i) the proportion of natural environment, being possessed as described above, becomes larger and larger

horizontally, (ii) the interaction gradually becomes deeper. Certainly, these two aspects turn up together and lead to the situation when the society takes possession of practically all its natural environment, resulting in the establishment of the interaction between society and the whole natural surrounding. The sphere of interactions, which earlier has only been an overlapping "slice" of society and nature, will eventually become in this phase general and complete, as well as the new quality: natural surroundings turn into a geographic environment.

EFFECT OF WATER POLLUTION: A CASE ANALYSIS OF SOME WATER BORNE DISEASES

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Water pollution problem is more significant than any other kind of pollution in Sagar district. It is evident from the fact that about two-third diseases of Sagar district, are caused by drinking polluted water. As a result inhabitants of this district constantly face a lot of health problems due to non-availability of pure drinking water. In the study area water pollution is the main reason behind the spread of many diseases. The present paper on water pollution effects in study area mainly depends on field observations help provided by both private and government doctors as well as news paper reports.

CONSERVATION OF FOREST RESOURCES IN SARYUPAR PLAIN UTTAR PRADESH

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Saryupar plain including the eight districts of U.P. in the north of the Ghaghra river comprising an area of 33,236 sq km displays the physical and climatic characteristics of the Middle Ganga Valley. The region was predominantly forested during pre-historic times. At present the area has a total forest area of 238,753 hectares which forms about 7.18% of the total geographical area. The area

under forest in the region (7.18%) is less in comparison to U.P. (17.24%) and India (22.75%). The distribution of forest area differs from 0.21% in Deoria to 14.79% in Bahraich district. Rapidly increasing population and heavy demand of timber have played a significant role in deforestation in the area. Illicit felling, logging and unrestricted heavy grazing adversely affected the quality and density of forests all over. The history of forest conservation goes back to the time of Vedas, Puranas and Upanishads, Emperors like Chandra Gupta, Ashoka and Shershah Suri gave much attention towards the preservation of forests and afforestation. Modern forest conservation in U.P. began in the mid-19th century. In 1865 forest rules were formed and applied. During 1879-95 forests were divided into blocks, compartments and new divisions. Measures for the control of insects and diseases in the moist deciduous forests in the northern terai and control of fires in the Southern dry deciduous forest are being affected rapidly.

Saryupar plain has been divided into 8 divisions, 47 ranges and 235 beats for successful preservation of forest areas. Each division provides employment to a number of persons and looks after the forest areas and makes use of afforestation practices through planting trees. Plantation and afforestation is taking place on new lands. Although the forest department is pacing towards forest development through various conservation practices, yet, some of the vices have to be remedied by rotational cutting practices afforestation of bad lands farm-cum-forestry, social forestry and awakening of moral and social consciousness.

ECOLOGY OF WATER POLLUTION: A STUDY IN GEOGRAPHY OF ENVIRONMENT

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Water is the main limiting factor of human activities in more than one-third of the land area of the earth. In this paper an attempt has been made to study the problem of water pollution in the study area. A general survey of water resources in Bina Town reveals that rivers, tanks, and wells in this area are highly polluted. Bina an important railway junction, has been selected for a detailed analysis of sources of water pollution. Data was

obtained from primary sources as well as secondary sources. The typical examples have been presented with the help of maps and diagrams.

ENVIRONMENTAL CHALLENGE ALONG VARANASI FRINGE

Sarvesh Singh

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The development-environment conflict is not new, but its impact is now being more marked than what it was earlier along the rural urban margins. In urban areas, it is particularly marked because of various limitations and is seen in various forms like brick kilns, derelict lands, degraded groves and gardens, open waste lands, etc; which are either due to urban sprawl or urban encroachment on rural space.

In the present study, an attempt has been made to highlight these aspects in the fringe of Varanasi city. The rapid pace of urbanisation in and around Varanasi city has led to construction of buildings on all most all vacant spaces. To cope with the ever increasing demand for bricks and other building materials, about 107 brick kilns have come up in the vicinity of Varanasi city, which on an average consume 2737 tonnes of coal annually, thereby leading to reduction of land available for agriculture and the degradation of environment to a large extent due to emission from burning of poor quality of coal. The land under deserted brick kilns is degraded so badly that it cannot be used again for agriculture. This process leads to degradation of 2.9 M cubic feet of good and fertile top soil of agricultural land annually. It generally remains waterlogged and becomes breeding ground for insects and mosquitoes which lead to health hazards and sanitation problem. The mango groves, for which Varanasi was once famous, have almost vanished from the landscape as a consequence of the damaging effect of brick kiln smoke on the mango crop as well as on trees which are gradually drying up.

AIR POLLUTION: A CASE STUDY OF VARANASI CITY, U.P.

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In this paper an attempt has been made to examine the causes and consequences of air pollution in Varanasi city

Varanasi (74 sq km and population 9,55,860 in 1991) daily adds a good number of people from nearby villages as well as other districts and states of the country making the problem of environmental pollution extremely acute. Exhaust from automobiles, industrial and domestic wastes are causing enormous environmental pollution. Water pollution along the Ghats is such that taking even a dip may cause serious skin problems. The present paper deals with various pollutants and their quantities in Varanasi and their impact on the environment and health of people of the city.

PROBLEMS IN THE DISPOSAL AND UTILIZATION OF RED MUDS

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RED MUD, the caustic insoluble waste residue from bauxite processing, is generated at an estimated annual rate of 50 and 1.7 million tons, respectively, in the World and India. Endowed with one tenth of the bauxite reserves, India has recently emerged as one of the leading producers of alumina and aluminium metal. Several plans are on the anvil to expand these industries and the quantity of the red muds to be disposed off is expected to touch 4 million tons by the turn of the century. On account of its complex composition, fineness, thixotropic nature, poor setting properties, residual caustic and some undesirable rare metal associations, the disposal of red mud causes problems of land, water and air pollution.

The most popular method of red mud DISPOSAL viz., slurry impoundment in mud lakes near alumina plants (Closed Circuit Disposal methods), poses problems of increasing land cost, storage, seepage into sub-soil water and neighbouring water streams and also formation of air borne dust and aerosols during summer seasons. There is an omnipresent hazard of dyke burst/cracking due to rains or seismic activity. During the past two decades several new methods have emerged and dry stacking in ponds (Thickened Tailing Disposal methods) has come to be accepted as a viable new technology for disposal of the muds. The other methods such as disposal into nearby sea or rivers are increasingly being rejected on account of

immense damage caused to fish, plankton and other aquatic life and also aesthetic damage to the beach areas affecting tourism, etc.

Since the UTILIZATION of any waste by its conversion to value-added products will be an asset that helps in environmental preservation and material/mineral conservation, numerous attempts have been made during the past four decades to develop a large number of applications for the red muds. These include (i) production of building materials (constructional bricks, light weight aggregates, special cements, additive to cement, construction of pavements/dykes), (ii) production of reinforced products (red mud as filler in plastics/rubber), (iii) treatment of industrial and municipal effluent, as adsorbent for toxic elements, and waste gases, (iv) special ceramics, sanitary ware and refractories, (v) recovery of metal values (eg. iron, alumina, titania, vanadium), (vi) miscellaneous uses like preparation of paints/pigments, inorganic chemicals, land fill, catalyst, micronutrient to soils, etc. Despite some 700 papers on the subject and great deal of efforts the quantity of red muds actually used commercially is insignificant.

In this paper the characteristics of Indian red muds, their disposal as practised at major alumina plants, R & D efforts on utilization of different red muds will be discussed vis-a-vis the world situation. The problems that have impeded better (safe or economical) disposal and large scale utilization of red muds will be highlighted.

CHANGING ENVIRONMENTAL SCENARIO AND SUSTAINABILITY OF RURAL SYSTEM IN GARHWAL HIMALAYA

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The environment of Himalayas is being damaged with the digging of tops and slopes for erecting concrete construction and installing high power poles, impounding the river channels here and there and making giant dams. The cruellest of the acts that the civilized man has done to make the holy Himalaya truly naked, is to render it treeless. Forests have been felled down without any serious thought to further implications or fallouts. The

vast outstripped sloping terrain ultimately leads to multivariate process of erosion. Landslides, creeps and falls have been the order of the day. Besides natural vagaries, human errors further added to the existing degradation. Unchecked and overgrazing of animals, frequent firing of vegetative cover, primitive practice of shifting (jhooming) cultivation, hapahazardly purchased and borrowed alien tourism, abuse of sloping marginal land, uprooting the rare species of plants and herbs, endangering the fresh water aquatic life—all these and many other factors have robbed the region of its natural ecology of Himalayas. The paper under discussion basically focusses its attention on the very issue of sustainability of rural life system in Garhwal Himalayan region.

**INDUSTRIES, POPULATION AND ENVIRONMENTAL DEGRADATION:
A CASE STUDY OF BHILAI INDUSTRIAL COMPLEX**

R.C.Singh & L.K.Tiwari
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Bhilai Industrial Complex is located in the central plain of Chattisgarh in Durg district of Madhya Pradesh. The issue of the present paper is to study the relationships among industries, growth of population and its environmental consequences. Bhilai Steel Plant, established in late fifties resulted in the growth of a large number of small and medium scale industries providing settlement to several people. There is a prevalent scars of the slum settlement. Here more than half of the total population of the city is residing in slums. There is no provision for sewage and water disposal of more than four lakh population in the complex. The water effluents from the Bhilai Steel Plant are discharged through three outlets into the nearby rivers. The presents presents details of the effects of industrial and population growth on the environment of Bhilai Steel City.

**INCREASING XERIC SPECIES IN KUMAUN HIMALAYA:
AN ENVIRONMENTAL DISASTER**

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Kumaun Himalaya enjoys a unique phytogeographical

transition of two distinct Himalayan realms: the wet eastern and the dry western Himalayas. Due to the disastrous anthropogenic modifications and rapidly increasing biotic pressure on vegetal habitat, a new kind of ecological problem has emerged. By a thorough survey of the area by the authors it appears that large number of xerophytic species such as Agave Spp., Opuntia dillenii, Asparagus Spp., Euphorbia royleana etc., are gradually invading disturbed forest areas and barren lands and their number is also gradually increasing. The present paper explains the causes and consequences of increasing xeric population in relation to the environment. It has been observed that the rapidly increasing xeric species in this region has entered in a serious phase and causing various ecological problems of different scale varying from place to place. Further, it has also been observed that not only the earlier reported xerophytic species are increasing and spreading rapidly but a large number of new species of xeric group also are invading and spreading swiftly.

NEGLECT OF ENVIRONMENTAL FACTOR IN DEVELOPMENTAL PROCESS: A CASE STUDY OF UTTAR PRADESH, INDIA

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Water exploitation and its demand is constantly rising by leaps and bounds. After 50s the fast growth of population, urbanization, industrialization, deforestation, agricultural encroachment on open lands and irrigation needs are together threatening the environment and sustainable supply of required water. Presently the most important sources of water are--canals, tubewells, dug-wells, ponds and tanks. Upto 1960s the use of dug-wells and ponds was as important as canals and they were environment friendly and use of tubewells was hardly popular. During seventies the introduction of H.Y.V., industrialization and western sanitary system in fast growing cities combinedly demanded the bulk water supply. Dug wells became practically ineffective, therefore, tubewells became the alternative, which virtually flushed the ground water and threatened the environment of specially scanty rainfall areas in absence of water

recharge. Such is the situation in the districts of Agra, Mathura (western region), Dehradun (hill region) and entire Bundelkhand. There are about 8759 industries in U.P. (including small, medium and large industries) where more than 5 lakh workers are engaged. In western region along 61.6 per cent industries of the state are concentrated. Among them 62.7 per cent industries are small; whereas 49.8 per cent industries are medium to large. The quantity of water consumption can be assumed according to their concentration in different regions. Western region consumes maximum water in comparatively least water potential area of U.P. Also, the paper deals with the cropping area in different regions of U.P. and water sources and need. The paper presents various environmental parameters and their deterioration due to developmental process.

RESOURCES AND LEVELS OF DEVELOPMENT IN RAJASTHAN

R.B.Singh

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Levels of development in Rajasthan has been examined with the help of 56 indicators related to general ecology, agriculture, infrastructure and potential of Human resources in this context. The area under study has been chosen to unravel macro and micro level tendency of the patterns of levels of development in relation to spatial interaction. Rajasthan is a land full of rolling sand dunes and sunbaked rocks. Its economy is based on agriculture and animal husbandry. Rajasthan is divided into five units and on the basis of resources and levels of development it is divisible into ten regions. These regions are carved out in the broad physiographic background of Rajasthan.

STUDY OF EFFECT OF AIR POLLUTION ON HEALTH IN VARANASI CITY

Laxmi Narayan, I.S.Gambhir, V.K.Kumra & J.S.Singh
Banaras Hindu University, Varanasi

This study was carried out to assess impact of pollution

on health and awareness about air pollution. We carried out a household survey of local population to gauge the extent of pollution in house outdoor, work place and effect of pollution on their health, particularly respiratory problems. To know the effect of pollution on respiratory system, peak Expiratory flow metering was done for 500 samples including 50 controls. The detailed findings will be discussed.

INDIGENOUS RESOURCE MANAGEMENT AND RURAL SUSTAINABILITY

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Rural sustainability has close link with indigenous resource management which is in complete contrast of the hitherto belief that technology and capital intensive resource management is only way to sustain life in long run. There is growing awareness about marginalised or forgotten resource use system of local communities which are carving their niche in terms of simple technology suitable to local ecology, social organisation and cultural belief thereby binding flora and fauna, local population, ecology and land use in one fabric. Here, author has made an humble attempt to examine the viability, efficiency and applicability of traditional resource use system in order to sustain the rural areas of world.

HEALTH DAMAGES CAUSED BY ENVIRONMENTAL POLLUTION IN HUNGARY

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This study analyzes the economic value of health damages caused by environmental pollution in Hungary. The author's starting point is the parallel between the deterioration of Hungary's natural environment and the deterioration of her people's health. On grounds of empirical and statistical data, he has attempted to define how much health damages caused by environmental pollution can be measured. Health damages of this kind

can only partly be evaluated for the value of man's health cannot be assessed. Also, it is hard to define the genetical harm caused by environmental pollution.

This study has taken into account health damages caused by environmental pollution that can be stated in monetary terms (hospital treatment, disability pension, medicine consumption, ambulance car maintenance costs, the costs of consultations by specialists, costs of sick pay, and other medical services) and the losses (reduced production on account of early deaths, or disability, or sick pay leave of workers).

What proves that health damages are underestimated and miscalculated is the fact the health damages of children housewives, old age pensioners and unemployed people, who all together take no part in production, cannot be matched with the figures of calculated losses.

Health damages in the years examined amounted to at least 4.5% of the gross national income and to 4.5-5.0% of the GDP which sum represents three times the amount devoted to the protection of the environment. It can be regarded as a bad proportion for to stop further environmental deterioration needs at least as much money as is spent on treating health damages caused by environmental pollution.

ENVIRONMENTAL RESOURCES, CONSERVATION AND UTILIZATION IN U.P.HIMALAYA

D.D.Maithani & Kamlesh Maithani
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The Uttar Pradesh Himalaya is a vast and dissected mountainous terrain and includes a variety of environmental resources. Depletion of these resource due to ill planned scheme can deprive the people of this region of most of its wealth in the name of preserving a small quantum. The complex interrelatedness needs a multidisciplinary approach to cover the various facets of the ecosystem which has been too rudely dismantled. This can be retrieved only through such steps of eco development which are socially desirable, economically viable, and ecologically sound incorporating and active

role for the man by laying stress on planned transformation of the landscape. This is bound to bring out a true symbiosis between the mankind in the ecosystem and the bio-geochemical cycles of the biosphere, coupled with the renewal of energy and resources. The U.P.Himalaya is facing growing poverty alongwith the shrinking biological productivity and diversity as well as instability in the ecosystem, evidenced by the frequent and severe landslides and soil erosion. There is a need to make special allocation and call for new environmental planning approach for the development of this hill areas.

POLLUTION MONITORING IN DAL LAKE THROUGH REMOTE SENSING TECHNIQUE

Hanifa Bano

State Remote Sensing Centre, J & K

Dal Lake is situated in the heart of Srinagar city and has been a great attraction right from the time of Zainul Abi din (1420-70 AD) the king of Kashmir. This lake, has seen a complete destruction of the once beautiful and clean urban lake into a shrunken, morbid and stagnant pool of water. The present paper is an attempt to study the impact of human settlement, agriculture activities in and around the lake, siltation, and untrient imbalance in the lake. The work is mainly based on primary data sources and the data in terms of slide films will reveal the major factors that have created problems in the lake's eco-system. To highlight main constituents of pollutants with a broad coverage of field data along with Satellite Remote Sensing which has provided a significant base data for the areal location, turbidity and vegetation cover which has made this study very comprehensive and useful in monitoring the lake pollution.

ENVIRONMENTAL DEGRADATION IN KUMAUN HIMALAYA CAN WE STOP IT?

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Kumaun Himalaya, comprising three hill districts—Nainital, Almora and Pithoragarh of Uttar Pradesh with great variation in landforms, rich in natural resources as well as cultural resources of folk traditions, ethnicity and broader land communities. the natural ecosystem has already been degraded by human interference, traditional

agricultural practices, deforestation and construction of roads. Kumaun Himalaya has paid heavily for the mistakes committed in planning strategy. Besides, water resources are depleted significantly which caused scarcity of water during summer season. Keeping these facts in view, an attempt has been made in the present paper to evaluate problems of environmental degradation. Field studies have also been carried out to know the severity of water crisis in the region. Greater employment opportunities for people is essential which will help in reducing the rate of environmental degradation. Developmental activities should be implemented only after environmental impact assessment of the project.

**MAN-ENVIRONMENT INTERACTION: AN ENVIRONMENTAL CRISIS
A CASE STUDY OF SOUTHERN MHOW TAHSIL**

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G.A.C.C., Indore

Rajesh Awasthi
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Man-environment interaction always remained a focal theme in geographical analysis. Since environmental degradation has assumed global dimensions and has threatened the very existence of life it is pertinent to examine man-environment interaction, which is two dimensional and symbiotic. The Southern Mhow tahsil is characterized by continuous and uninterrupted hill series running almost in east-west direction. The terrain is hilly and dotted with steep and precipitous slopes. The study is based on primary as well as secondary data and personal observations of the study area. Dispersion index suggesting the intensity of soil erosion has been worked out and it has been superimposed on slope map of the study area to measure soil erosion on different slopes.

**WATER POLLUTION AND ITS CONTROL
A LEGAL APPROACH IN MADHYA PRADESH**

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Water has always been considered to be an important

requirement for human welfare and economic development. This paper identifies the problem of water pollution in the context of various types of pollutants their nature and sources. The special attention has been paid on the legislative provisions to control water pollution in the form of various acts enforced time to time by the Central and State Government. At the state level, it is the sole responsibility of the Madhya Pradesh Pradushan Niwaran Mandal to monitor the quality of water and find out the causes and effects of the pollution. But it has been observed that they are mainly confined to industrial pollution only. No efforts have been made to control the water pollution due to agriculture, mining activities or domestic waste. The paper also emphasises on the sound management of water pollution due to uses of pesticides, waste water released without treatment and low cost sanitation schemes including land filling by solid waste disposal without taking into consideration of water table in an area. As a result the possibilities of polluting the ground water is increasing day by day. The present paper discusses the problem of water pollution and the legal remedies available to check the problem with special reference to the State of Madhya Pradesh.

ENVIRONMENT-POLLUTION CAUSED BY AGRICULTURAL INDUSTRIES IN MORADABAD REGION

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Sanjay Kumar Sharma

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The chemicals used in agricultural sectors and the industries which process agriculture products in the region create the problems of environmental pollution due to use of fertilizers, biocides and machines to produce the yields and make work easier has not always produced the beneficial results in, either ecological or social terms. The sugar industries are dominating agriculture industries in the region. Besides flour mills, pulse mills, oil mills, rice mills are found in the region. In the region there are ten large scale sugar industries, twenty rice mills, five flour mills, three small scale industries are established in the region and create the air, water pollution. With the introduction of large scale industrial plants (high capacity mill, extraction, plants, abattoirs,

EFFECTS OF PESTICIDES ON RURAL ENVIRONMENT IN BADAUN DISTRICT, UTTAR PRADESH

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Rural environment consists of the features of agro-economic landscapes with rural settlements and the socio-economic activities mainly of the rural agriculture are considered. About 71% population of the district is rural which depends on agricultural activities directly and indirectly. The pesticides are used mainly in agriculture and to a certain extent for maintaining public health. Very small quantity of pesticides is used in the field of veterinary, forestry and for household purposes including the safe storage of food grains, which cause imbalance in ecosystem. Pesticides pollutes the rural environment through air, water and land. The region has been taken as survey unit. The causes effects and the problems of pollution caused by the pesticides have been analysed. The increasing use of pesticides in farming has proved hazardous in the rural environment of the Badaun District. A few suggestions for the balanced agro-economic development have been proposed.

IMPACT OF ENVIRONMENTAL DEGRADATION ON GAYA CITY

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Gaya city is girdled by a chain of low, steep-sided hills of Archean rocks. The physical landscape around the Gaya city causes the mercury of thermometer to rise high in summer and fall low in winter resulting in high daily as well as annual range of temperature. A comparison of the various attributes of weather phenomena of Patna and Gaya vividly display the role of physiographic configuration of the saucer shaped Gaya city in determining the climatic conditions. The present paper deals with with various aspects of environmental degradation and consequent health problems.

RECENT CHANGES AND ENVIRONMENTAL PROBLEMS IN RURAL URBAN FRINGE IN THE GREAT HUNGARIAN PLAIN

Judit Timar & Imre Nagy

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The 1990 change in the political system in Hungary created new conditions for spatial processes. Privatization, the rehabilitation of market mechanisms, the large-scale differentiation in prices of sites, the expansion of local governments jurisdiction, altogether with economic changes like the growth of tertiary sector play an important role in urban restructuring.

One of the main scenes of rapid changes are at urban-rural fringes. In these zones the most significant spatial processes are industrial, commercial, recreational and residential suburbanization. These factors, along with extended urban land-use, growing population number and intensifying traffic, increase and modify the strain of the environment. The Great Hungarian Plain is a region where there are a large number of farmstead settlements in the outskirts of the towns, therefore an especially large mixture of native rural and new urban population exists and social conflicts arise in the fringes.

As a consequence of the political-social metamorphosis, some of the environmental problems are fading away, while others are emerging. This paper tries to reveal the main types of new conflicts. The creators and the sufferers of air, water pollution, etc. in fringe areas are altering. The paper shows the changing system of rights and responsibilities of central, local government and citizens, state firms, cooperatives and private enterprises. The apparently simple way of a paternalistic system to handle the tensions of different interests in environmental issues must be followed by new methods. But the laws of environmental protection, settlement development and physical planning that take into consideration the new spatial processes have not been passed yet. The techniques applicable in the social circumstances of the transformation of rural-urban fringes have also not evolved. Sustainable development as a new idea and strategy has not emerged in local policies.

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