

## MONITORING OF NATURAL ENVIRONMENT, AND THE PROTECTED AREAS

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### INTRODUCTION:

Progressive degradation of the natural environment is a matter of global concern. Qualitative as well as quantitative changes in abiotic (land, air and water) and biotic (flora and fauna) components of the environment are being increasingly scrutinized especially for changes resulting from anthropogenic causes.

Some symptoms of environmental degradation like anthropogenic acidification of land and water, and constitutional changes in atmospheric air, have become apparent, but a holistic picture is yet to emerge for many recent climatic aberrations and biological responses to environmental degradation like *WALDSTERBEN* (forest decline) in Europe still baffle the concerned. A problem defined in totality is indeed half the problem solved. And the role of "Monitoring" in problem probing is vital.

Protected areas (PAs) were established worldwide, primarily as wildlife havens, following emotional as well as rational outcries from conservationists. Eighties saw a maturing of the conservation movement, with a change in emphasis to a sustainable utilisation from its earlier strict protectionism. Obviously the objectives of PAs must also enlarge its gamut to include environmental monitoring as a major activity.

### ENVIRONMENTAL MONITORING:

Environmental monitoring is primarily concerned with measurements of anthropogenic pollutants in air, water and soils. Also the dynamics of these pollutants through different biological systems, their rates of accumulation as well as concentration changes with change in season, latitude and the distance from the source, as also their effects on the health and behaviour of men, animals and plants and the quality and durability of materials, form a part of monitoring activities.

The United Nations Environmental Programme (UNEP) since its inception in 1972 has afforded top priority to the establishment of a "Global Environmental Monitoring System" (GEMS) to register ongoing changes, obtain an assessment, and to draw up forecasts of the state of the environment, based on comparable stationary information, and aided by a representative network of observation stations. GEMS became fully operational in 1976, and as on 1984 had 175 sites in 70 cities located in 42 countries.

Other agencies like the World Meteorological Organisation (WMO), Organisation for economic cooperation and Development (OECD) and the U.S. Environmental protection agency (EPA) have also been engaged in a regular and systematic monitoring of traditional pollutants like  $SO_2$ ,  $NO_x$ , CO, suspended particulates and lead (Pb). Other anthropogenic pollutants like Hg, Cd, As, tropospheric Ozone, CFC's, Benzopyrene and other polynuclear aromatic hydrocarbons (PAH). And several organo chlorine compounds (OCC), as also thermal pollution of water bodies and increasing acidity of precipitation, have gained monitoring recognition, based on the following criteria for pollutant monitoring, as agreed upon by an intergovernmental conference on monitoring held at Nairobi in 1974:-

- a) The anthropogenic flows of pollutants to the environment should be commensurable with or exceed, the natural geochemical flows,
- b) The listed pollutants should exercise the greatest impact on natural geophysical or ecological systems,
- c) They should include substances or the most stable and mobile products of their conversions, i.e. products capable of accumulating in the biosphere and of joining in natural cycles.

In India, a qualitative change in the natural environment consequent to a widespread industrialisation, has resulted in enactment of a spate of regulatory legislations like the water (Prevention and Control of Pollution) Act, 1974; The Forest Conservation Act, 1980; the Air (Prevention and Control of Pollution) Act, 1981 and the Environment (Protection) Act, 1986. Establishment of pollution control boards and insertion of Article 48-A and 51-A(g) into the constitution of India, highlights the Governmental concern. Also a number of institutions like the National Environmental Engineering Research Institute (NEERI), Nagpur, the School of Environmental Sciences of JNU, New Delhi, IIT's, National Physical and Chemical Research Laboratories, several Universities and other organisations like the Society for Clean Environment (SOCLEEN), Bombay, have been engaged in qualitative and quantitative investigations of different aspects of the natural environment. The publications of "the State of India's Environment", reports by the Centre for Science and Environment (CSE) New Delhi, in 1982 and 1985,

have been a landmark effort at highlighting the extent of environmental degradation in the country. And yet, a comprehensive and a concerted effort at a regular and systematic monitoring of the natural environment of the country to discern not only ongoing changes, therein, but also to gather baseline information thereof, is still a strong need, preferably under a central agency. Such monitoring is essential to enable decision makers to make conscious ameliorative decisions, well in time.

Moreover, for monitoring to be useful, it should not only be regular, systematic and universally standardised to facilitate national and international usage, but also take into consideration the vicissitudes of season, latitude, topography, and even abnormal acts of man and God, like war and earthquake.

#### PROTECTED AREAS (PAs):

As per "The World Charter for Nature", adopted and proclaimed by the U.N. General assembly on Oct. 29, 1982--

".....The status of natural processes, eco-system and species shall be closely monitored to enable early detection of degradation or threat, ensure timely intervention and facilitate the evaluation of conservation policies and methods".

Further, the action plan for Biosphere Reserves, formulated at the first international congress on Biosphere Reserves, organised at Minsk, USSR in 1983 has the following as one of the major objectives--

".....To develop monitoring activities in Biosphere Reserves, in order to provide for scientific research and management activities, and contribute to the understanding of environmental change".

Presently, in India, there are 66 national parks (NP) and 421 sanctuaries, covering about 4% of the geographical area of the country and located far and wide across the nation. Further, a countrywide network of at least 211 Zoological parks & Captive breeding centres and 71 Botanic gardens, may be considered protected areas in a monitoring sense.

So based on their location, these PAs may broadly be classified on monitoring requirements, as:-

#### a) Benchmark Monitoring Stations:

Collection of baseline information as reference data on the state of the natural environment, from areas still pristine enough, would be basic to any monitoring system.

Protected areas like Hemis N.P. in J&K, Nandadevi Sanctuary in UP, Namdapha NP in Arunachal Pradesh, Manas Sanctuary in Assam, Desert NP in Rajasthan, Kanha National Park in Madhya Pradesh, Srisailem Sanctuary in Andhra Pradesh, Silent Valley National Park in Kerala and Little Nicobar in Andaman & Nicobar Islands, could be cited as some of the prime candidates for establishing such benchmark monitoring stations.

#### b) Pollutant Monitoring Stations:

Being located close to an anthropogenic source of pollution, or downstream or downwind to pollutant disposal, would make a PA, suitable as a centre for measurements of current pollutant concentrations, trends and subsequent changes. Also how far does a PA mitigate the effects of environmental pollution, would be useful to record.

Protected areas like Borivali near Bombay, Bannerghata near Bangalore and Guindy near Madras may be cited as some of such suitable centres.

#### c) Biological Response Monitoring Stations:

It is well known that plants and animals are biological indicators of environmental pollution.

National Zoological Park at New Delhi, Allen Forest Zoo at Kanpur, Alipore Zoo at Calcutta, Nehru Zoological Park at Hyderabad and National Botanical Garden at Lucknow, Indian Botanic Garden at Sibpur (Howrah) and Rambagh Botanic garden at Bangalore, are some of the sites that may be considered as centre for monitoring biological responses of fauna and flora, to a change in the quality of the environment.

#### EPILOGUE:

In India, we are still in the *react and cure phase* as far as the State of the natural environment is concerned, whereas the need is clearly to enter the *anticipate and prevent phase*, which only a strong and ambient monitoring system can bring about.

So, let the nineties be a "*Decade of Monitoring*" to enable the country to know where it stands environmentally, at the turn of the century. And the vital role that the protected areas can play in it is, all but obvious.