

## **Need to Establish Long-Term Ecological Research Network in India**

R.K. KOHLI, D.R. BATISH AND H.P. SINGH

*Centre for Environment & Vocational Studies, Panjab University, Chandigarh 160014, India*

### **ABSTRACT**

The paper discusses the purpose, significance and need for establishing Long-Term Ecological Research in India. LTER was first established in 1980 by the National Science Foundation of USA. Its main mission was to understand ecological phenomena on long-term basis through cooperation and collaboration among scientists from different parts of the world. It also emphasizes on training, sharing research data and helping scientists to manage ecosystems throughout the world through personal visits and electronic linkages. Many countries have become member of the international LTER programme while many more are in the process of joining the network. In India, there is an urgent need of recognizing LTER sites as many ecosystems require long-term research and monitoring. A national meeting of ecologists held in December 2002 had discussed the objectives of LTER Network-India. Further, an ad-hoc Committee of ecologists was proposed under the leadership of Prof. J.S. Singh, during the national seminar at Kurukshetra in January 2004.

*Key Words:* LTER Network, Ecological Phenomena, Ecological Research, Exchange Programme

### **INTRODUCTION**

The purpose of this presentation is to initiate the process of establishing a National Network of Long-term Ecological Research among the interested scientists with an objective of sharing research data and information, and ultimately linking it with the international network on the similar theme and thrust in other countries. Let me first share about the LTER concept, its dimensions and the issues it is currently pursuing.

From the historical perspective, our understanding of the environmental changes and the resource management had been focused and based on short-term observations and interests, rather than on long-term studies. It had been more so because of compulsion rather than choice.

A survey of ecological journals shows that about 95% of the research papers are based on short-term studies. Tilman (1989) analyzed 623 experimental and 180 field studies in ecology in the USA and concluded that over 75% observations and interpretations were based on 1 to 2 years of study and hardly 1% could satisfy the long-term perspective. Although short-term research may be correct in all technical and scientific approach, yet attempting to relate the interpretations of those results to

long-term conclusions may be misleading. This is precisely so because the situations of a particular site do not remain static in a complex and dynamic environment.

The classical Haeckelian definition of ecology, in modern times, is not just interactions between the living and non-living components of natural world. It recognizes environment (Gosz 1998) as: Complex because many interacting factors are involved in its processes, Dynamic as these factors vary over time in complex ways, Spatially variable as they exhibit different patterns at different scales, Biologically diverse with assemblages of thousands of interacting species, and Controlled by physical, chemical, biological social and economical parameters

In spite of such a change exhibiting complexity and dynamism in time and space, short-term perspectives rule the stage of ecological understanding. Some of the reasons for such a compulsion include:

- (a) short-term studies are result oriented;
- (b) difficulty in maintaining the long-term study: Securing research grants for long-term study project is rather difficult vis-a-vis short-term programmes;
- (c) misconception that the long-term studies are merely monitoring in nature. The thrust and interest of scientists change with situation, priority compulsions, passage of time and human nature;
- (d) complexity and dynamism of environmental processes, anthropogenic impacts and ecological responses require additional research efforts that are often difficult to comprehend, and secure governmental support; and
- (e) long-term studies require large area that is often not in reach of a large section of scientists.

## BIRTH OF LTER

The need for initiating a programme in Long-term Ecological Research was first realized by the National Science Foundation of USA in 1980. Its mission (Waide et al. 1998) had been:

- To understand the general ecological phenomenon over a long temporal and broad spatial scale
- Creating legacy of defined and documented observations on long-term experiments for future generations
- Initiating major and complex experimental and theoretical research efforts
- Providing information on ecological questions to the society

Since the environment does not recognize political boundaries, in 1993, this effort was expanded and transformed into international LTER Network. It included multiple scale study and complex assemblage of species. It felt the need of cooperation and collaboration among the ecologists from different nations for recognizing, working on and developing a worldwide network of LTER sites and programmes. It set its following objectives:

- Promote and enlarge the scope and understanding of the general ecological phenomenon across national and regional boundaries
- Facilitate interaction, cooperation and collaboration among the participating scientists across sites and disciplines
- Enhance training and education
- Promote integration of research monitoring and data sharing and discussion on the observations
- Help fellow scientists in management and understanding the phenomenon through personal visits and electronic linkages.

The outline of the effort that was translated through first workshop at Estes Park, Colorado, USA in 1993. In this, 45 ecologists from 17 countries participated. By July, 2002, twenty-five countries had become members of the I-LTER: These were:

Australia, Brazil, Canada, China, China-Taipei, Costa Rica, Colombia, Czech Republic, France, Hungary, Israel, Mexico, Mongolia, Namibia, Poland, Slovakia, South Africa, South Korea, Switzerland, Ukraine, United Kingdom, United States, Uruguay, Venezuela and Zambia

The growth of the movement is steady. Seven countries (Argentina, Austria, Ireland, Italy, Japan, Tanzania and Vietnam) with their respective national networks are awaiting the formal recognition from their respective governments:

Scientists from another twelve countries (Chile, Croatia, Ecuador, India, Indonesia, Kenya, Norway, Portugal, Romania, Slovenia, Spain, Sweden) are in the process of establishing their respective national networks

The steering committee, since its inception in 1995, organizes annual meetings primarily to encourage collaboration and communication among different LTER Networks around the world. It also encourages regional LTER Networks. A bottom-up (rather than top down) approach is considered crucial for the success and sustainability of LTER programmes. The steering committee of the I-LTER has outlined the following 5 major objectives of the global long-term ecological research network (King et al 1997):

1. Improve communication and information access for long-term ecological research scientists worldwide;
2. Develop a world-wide directory of long-term ecological research sites;
3. Develop groups of sites that could be used for collaborative research;
4. Develop long-term ecological research programs world-wide; and
5. Communicate the value and results of long-term ecological research to resource managers and policy makers

The participating scientists through cooperation, coordination, collaboration, communication and unified vision are bound to generate data to serve as a strong base for the future generation to carry the theme and objective of understanding the long-term ecological changes. The I-LTER proposes to provide web server facilities to allow connectivity to servers for the LTER programmes of different countries. Easy access to

communication and information among scientist irrespective of the country or region is otherwise also very important.

#### LTER NETWORK –INDIA: INITIATIVE

In India except for the officially recognized biosphere reserves, wildlife sanctuaries and national parks, hardly any LTER site is recognized. However, these reserves, parks or sanctuaries, are established for meeting the conservation programmes rather than with emphasis on active long-term research activity. Although the country has a very strong ecological research base, yet collaborative, data-sharing research on long-term basis is inadequate.

The establishment of LTER Network-India, in addition to bilateral and multilateral ecological research activities shall care for mutual benefits like

- reciprocal site visits,
- student/scientist exchange programme,
- information transfer,
- cross-site and site comparisons,
- data sharing with the national, regional and international networks.

We need to identify the objectives and mission apart from the sites for long-term studies. In order to discuss the creation of LTER-India Network and give it a shape, a national meet of ecologists was organized in December 2002 in Chandigarh. As an initiative following objectives were identified in the meeting:

- Developing a national directory of workers interested in LTER.
- Developing a directory of LTER sites in India – existing, proposed and with potential
- Communicating information among LTER among scientists of the national, regional and international LTER Networks
- Standardizing LTER designs in terms of time, space and approach
- Addressing the local issues and transferring information to general public for expecting its support
- Guiding the government and the decision makers
- Extending help, in terms of sharing equipment, mankind and data of the research.
- Educating and training the young scientists for furthering the study;
- Generating funds for meeting the needs of the present and the future
- Interacting with the global terrestrial observing system

A better understanding of the principal environmental stresses and their ecological responses is critical in finding efficient ways to improve the management on sustainable basis. Such understanding requires long-term baseline information and strong reciprocal national and regional network.

## FUNDING OPPORTUNITIES

Instead of recognizing political boundaries, ecological challenges require a triangular support (Chang 1997):

- a. Baseline data and information input,
- b. Concerted efforts and cooperation among scientists, and
- c. Support and encouragement of respective governments

There exist no boundaries for securing funds to meet the needs of the LTER programme. However, several agencies / organizations could help the LTER Network-India (but not the individuals), if established and recognized by the government.

1. National Science Foundation of USA: It encourages US participation in international science and development programmes which benefit research and education. It can even part with the equipment, manpower and fiscal help, if needed. Its priorities are:
  - i. The programme should result in mutually beneficial partnership between US and foreign collaborating scientists
  - ii. Provide international research experience to scientists at their early stage of career
  - iii. Help US scientist to understand scientific problem outside US

For LTER Network-India, the National Science Foundation could possibly help in cooperative and collaborative research, joint seminars and workshops, exchange of scientific visits, data sharing, scientific awards at junior and senior levels, and organizing summer institutes for the newcomers

2. International Development Agencies and Banks such as the Asian Development Bank and the World Bank's Global Environmental Facility Fund
3. UNESCO and WHO

## PROPOSED ACTION PLAN

Discussions during the national seminar on Environmental Management, held at Kurukshetra, reiterated the need and an adhoc committee was proposed under the leadership of Prof J.S. Singh, a senior ecologist of the country, to help and guide the creation of the network. The following action plan was also proposed:

- To prepare a directory of the Indian Ecologists interested in LTER
- To hold regular meetings of the LTER Network
- To encourage scientific exchanges for better understanding of the issues
- To expand participation at the regional and international level by associating with the regional and I-LTER networks

- To explore possibility of collaboration with I-LTER on issues of broad and common ecological concern
- To encourage collaboration and coordination among the ecologists
- To publish observations on the activities of LTER Network India and the directory of publications on Indian Ecology
- To train, help and encourage young ecologists
- To identify LTER sites in India
- To prepare inventory of plants, animals and microorganisms

As a coordinator of the network, I request all Indian ecologists who agree with the concept of LTER, to communicate their interest and provide feedback. Following sites have so far been proposed: Shiwaliks, Aravallis, Sunderbans, Lahul-Spiti, Jaisalmer, Inter-tidal ecosystems, Urban ecosystems and Khasi hills. The parameters for which data need to be collected include: Biodiversity, Climate, Populations of human, plants, animals, microbes, Ecosystems, Soil, Tree diversity, Urban vegetation structure, Wildlife, Forests and plantations, Native community, Invasive flora and fauna, Water quality, Nitrogen use efficiency, Residence time, Pesticide use, etc.

#### REFERENCES:

- Chang, W.Y.B. 1997. East Asia regional LTER network and funding opportunities. Pages 13-17, In: King, hen-biau, Hamburg, S.P. and Yue-joe Hsia (Editors). Long-term Ecological Research –East Asia Pacific Region.
- Gosz, J.R. 1998. International long term ecological research: Collaboration among national networks of research sites for a global understanding. In: Eun-Shik Kim and Jeong Soo Oh (Editors) Proceedings of an International Workshop on Long-Term Ecological Research (LTER) and Biodiversity Conservation in East Asia and Pacific Region.
- Tilman, D. 1989. Ecological experimentation: strengths and conceptual problem. Pages 136-157. In: Likens, G.E. (Editor) Long-Term Studies in Ecology. Springer-Verlag, New York.
- King, hen-biau, Hamburg, S.P. and Yue-joe Hsia. 1997. Long-term Ecological Research –East Asia Pacific Region.
- Waide, R. , French, C., Sprott, P. and Williams, L. (Compilers) 1998. The International Long Term Ecological Research Network. US LTER Network, National Science Foundation, Washington, D.C.