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## From Editor's Desk.....

Greetings!



### POP-ENVIS TEAM

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The warmth of the summer is too high to greet. Recent study of the Goa based National School of Oceanography predicted that in the next 100 years, many parts of the coastal India, big cities and agricultural land would go under water due to rising sea water level. Expansion of coastal saline aquifer may further lead to complicate the problem of drinking water, socio-cultural stability. India's initiative on Climate Change and Clean Energy is a welcome step. Research on climate - health interaction and associated illness is already in progress. We need to sustain the new initiatives that favours healthy development and safe environment.

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Current volume of Pop-Envis contains a research article on Ladakh's climate change, a review on different plan of actions related to environment, some interesting commentaries on pollution, activities and new initiatives of pop-envis.

Hope you will enjoy reading this issue.

  
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# ARTICLE: CLIMATE VARIABILITY, DEMOGRAPHIC CHANGE AND DEVELOPMENT IN TRANS HIMALAYA (LADAKH), INDIA: AN OVERVIEW

Rajesh Raushan<sup>1</sup> , Mayank Shekhar<sup>2</sup>

## Abstract

*Climate variability and assessment of spatio-temporal patterns of regional climate is vital for sustainable development. Spatio-temporal variability of Ladakh climate and its impact on temporal development needs much attention. For the variability in climatic conditions, temperature and precipitation data are used for the nearest grid of Ladakh. Trend analysis suggest that mean annual temperature and total annual percipitation have been increasing significantly. In coherence with changing climatic condition, overall development of regions shows much variability in switching from agricultural dominated occupation to market oriented economic development in the area that are adversely affecting the scanty natural resources and changing climate dynamics.*

## Introduction

Climate change is defined as a statistically significant variation in either the mean state of climate or in its variability, persisting for an extended period, typically a decade or longer than that; whereas climate variability depicts to the variation in the mean state of climatic conditions on all temporal and spatial scales beyond that of individual weather events. Accurately, it may be resulted from natural internal processes with the system of atmospheric climate or from the variation in natural or anthropogenic external forces (IPCC, 2001). Considering the anthropogenic external factors, increasing population and poor supply of resources resulted in uneven development which ultimately put additional burden on available natural resources and ecological imbalances. These ecological imbalances can be understood in the form of climate variability for short span of time and climate change on longer time periods. These climatic variability and climatic change is being experienced throughout the world and more in fragile region of the world. Among them, one is Himalayan region, where arrays of changes have been observed prominently due to rapid growth of population and change in resource utilization structure. It increased the demand for natural resources, ineffective technology transfer, faulty environmental conservation program, and increasing economic and political marginalisation during the recent decades (Tiwari and Joshi, 1997).

The faulty negative trends in the unbalanced socio economic and technological development results in rapid exploitation and transformation of land as well as other natural resources and ecological imbalance. This can be understood through changing climatic conditions mainly temperature and precipitation in the Himalayan ecosystem. Globally, studies have established the adverse effect of climate change on plains, coastal and glacial ecosystem (Scholze et al., 2005). In India, fragile Himalayan ecosystem still remains a major concern in global debate of climate change and vulnerability. The extensive use of natural resources in the Himalayan region have disrupted the fragile ecological imbalance of the watershed in the region through deforestation, erosion, landslides, hydrological disruption, depletion of natural resources and have also threatened the livelihood security and community sustainability in mountains as well as adjoining plain ecosystem (Tiwari and Joshi, 1995, 2000).

Among the Himalyan ecosystem, Ladakh is of strategic and cultural importance in international academia since the very beginning. In last two to three decades it has got much attention due to changing climatic dynamics, ecological imbalance (for example, 2010 cloud burst). Their adverse impact on livelihood of the people and depleting cultural values and changing means of livelihoods has drawn major attention in development policy arena. Topographically, the whole area of Ladakh is lying over the mountainous region with three parallel ranges of the Himalayas, the Zaskar, the Ladakh and the Karakoram. Climatically, this area lies in high altitude, well known as cold desert having a fragile ecosystem. It is characterized by the complex interplay of climatic and geomorphological processes resulted in adverse climatic situation



which leads to devastation of development. Availability of limited natural resources and changing bio-ecological dynamics in Ladakh areas have put additional burden on these resources which leads to imbalances and resulted in natural havoc and 2010 cloud burst is the living example in the area. The changing climate dynamics in the region is an influx of faster increasing population and unplanned economic development in the region after 1974 when it opened for tourism for the first time. Still the main occupation in Ladakh is agriculture; however in urban areas there are various other sources for livelihood which emerged in post 1980s. Rural livelihood is extremely vulnerable to climate change as high temperature and low precipitation reduces the yield of desirable crops. Studies postulates that increasing temperatures and water stress are expected to reduce by 30 percent in crop yields in Central and South Asia by the mid-21st Century (UNDP, 2006).

In this region, glaciers are the main sources of water. Recent studies reveal that glaciers in the region are shrinking at comparable rates with other parts of the Himalaya. A study of 10 sample glacier in the Ladakh range shows that during the last three decades these glaciers have shrunk 14.7 percent (Tahyyen and Gargan, 2010). Various studies on climate change in Himalayas depict that the annual temperature has increased in the Ladakh region (Bhutiyan et al, 2007; Dash et al, 2007). Whereas precipitation shows a decreasing trend with significant impact after 1990 (Bhutiyan et al, 2010). Change in land use pattern and unplanned exploitation of available natural resources has resulted in climate change and vulnerability. Climate change can influence the socioeconomic setting like economy, human well being and human health in various ways. The available scientific evidence suggests that climate change will place significant stress on the rural livelihoods of mountain people (Eriksson et al, 2009), health, and natural resource security, among other things (Sharma *et al.* 2009). But, specific knowledge, paucity of data and studies on human wellbeing and means of livelihood (apart from agriculture based economy) in Ladakh region is limited. The nexus of sustainable development and mitigating climate change demands for underpinning the issue to understand the nexus of changing demographic composition, means of livelihood under the framework of climate change and development paradigm. Hence, this study has tried to understand nexus of climate change variability, changing demographic scenario and means of livelihood change.

## **Materials and Methods**

To measure the climate variability in any region, temperature and precipitation data provides best insight. For the analysis of climate changes over the past 100 years, we have analyzed temperature and precipitation data, obtained from the Climate Research Unit (CRU TS3.10) (Mitchell and Jones, 2005). The temporal coverage of the dataset ranges from January to December for the period 1901-2009 of Ladakh were used (Table 3.1).

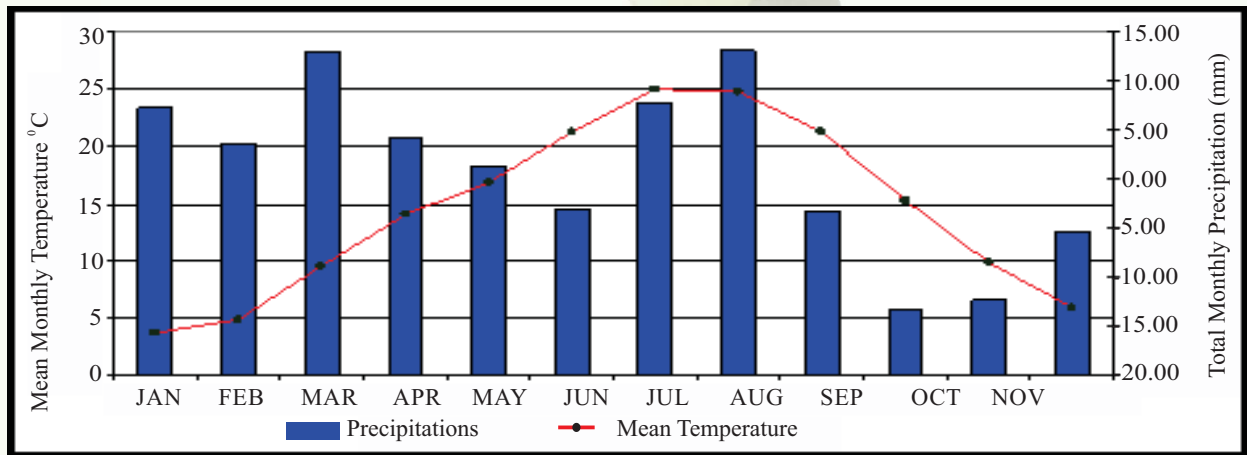
The annual and decadal variation in temperature and precipitation is explained by mean, minimum and maximum. Further, the insight on population and development in terms of economy and livelihood is depicted using data from census of India 1951-2011.

## **Results and Discussions**

### **Climate Variability in Ladkah**

Ladakh's climate is referred as a cold desert due to its combined features of arctic and desert climates. These include wide diurnal and seasonal fluctuations in temperature. Temperature varies from -40°C in winter to +35°C in summer, and extremely low precipitation, 10cm to 30cm primarily from snow (Ladakh Autonomous Hill Development Council, 2005). Due to high altitude and low humidity, the radiation level is amongst the highest in the world (up to 6-7 Kwh/mm). Finally, the soil is thin, sandy and porous. These combined factors explain poor of vegetation, with the exception of valley floors and irrigated areas. The region has been historically vulnerable to climatic extremes and the vulnerability is increasing due to climate change. The impacts of climate change in these high altitude terrains could be far-reaching. Climate change may induce disturbances and shift hazard zones beyond the known extent of occurrences.

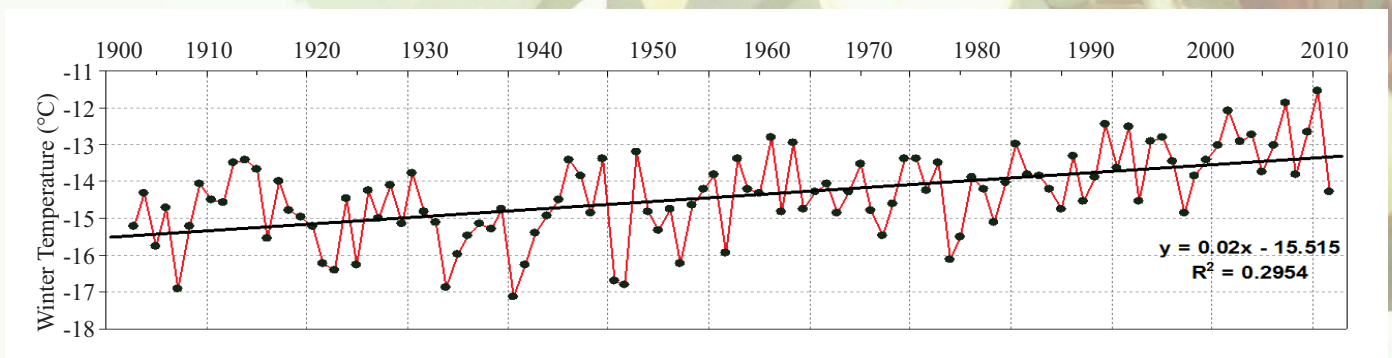
**Figure. 1: Monthly variation of Mean Temperature and Precipitations in Ladakh region**



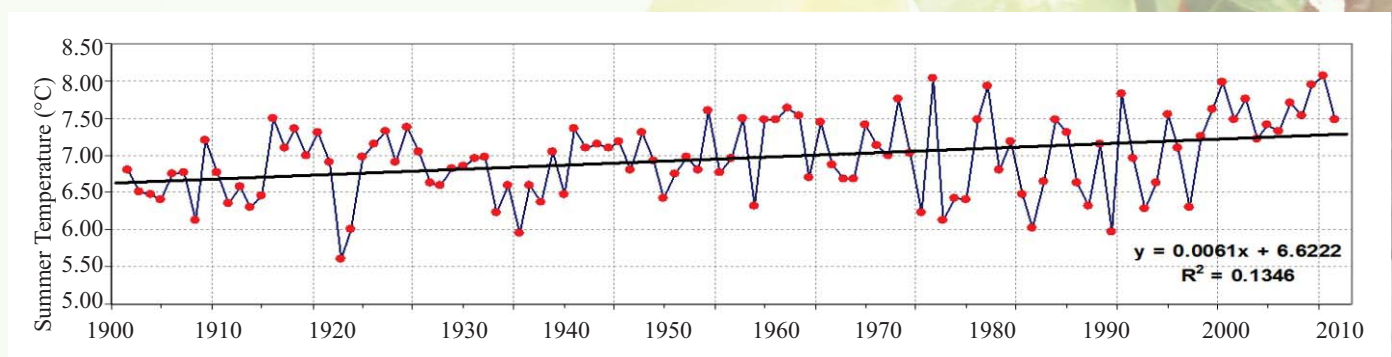
*Source:* CRU Grid TS3.1 data for Ladakh region

Within the dynamics of climatic change and variability, temperature is one of the most frequently used indicators. Changes in temperature affect numerous aspects of our daily lives and economy, including industry, tourism, transportation, agriculture, emergency management and health. Temperature is the determinant factor in the length of the growing season; it influences the amount of winter snowfall, and the comfort of a summer afternoon. Annual mean temperature in the study area shows considerable variability on longer time scales. Annual mean temperature is considered to be low during January-February and high during July-August (Fig. 1).

**Figure. 2: Trend of Mean Temperature during Winter in Ladakh (1900 - 2010)**



**Figure. 3: Trend of Mean Temperature during Summer in Ladakh**



*Source:* CRU Grid data of Ladakh

The variation in monthly temperature allows for investigation of seasonal trends of temperature. Over the last 100 years, winter (December to February) temperature is increasing (Fig. 2) and summer (June-September) is found to be warmer (Fig. 3). The mean annual air temperature for the period 1966-2009 is observed as  $-3.2^{\circ}\text{C}$ , mean maximum of  $9.2^{\circ}\text{C}$  in July and a minimum of  $-15.6^{\circ}\text{C}$  in the month of January. Despite the variability of weather in Ladakh, all the indicators

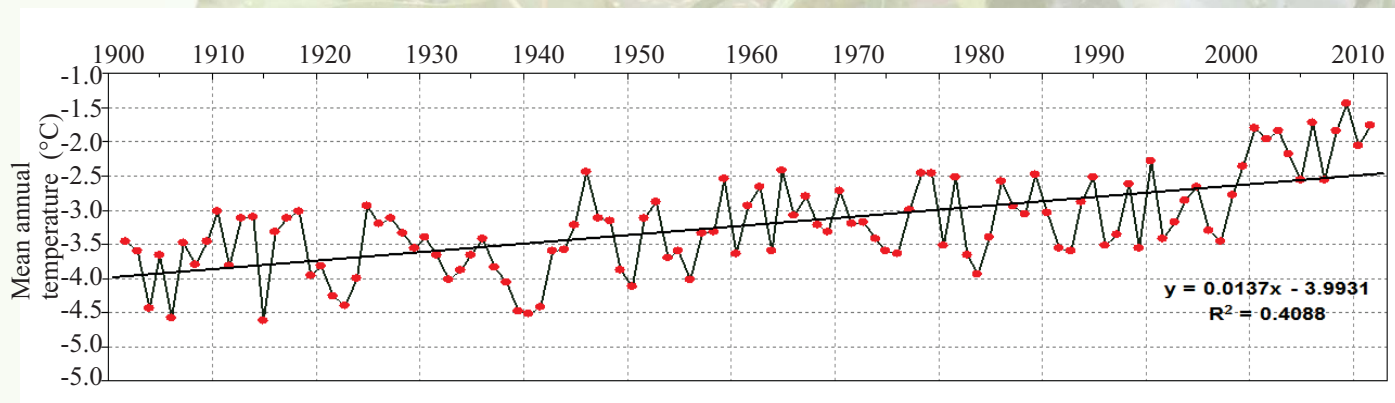


show that the region has been warming over the last century. Mean annual precipitation in Ladakh is 217.34 mm, which is maximum during the month of August (28.43 mm) and is minimum in the month of October (5.88mm) (Fig.1).

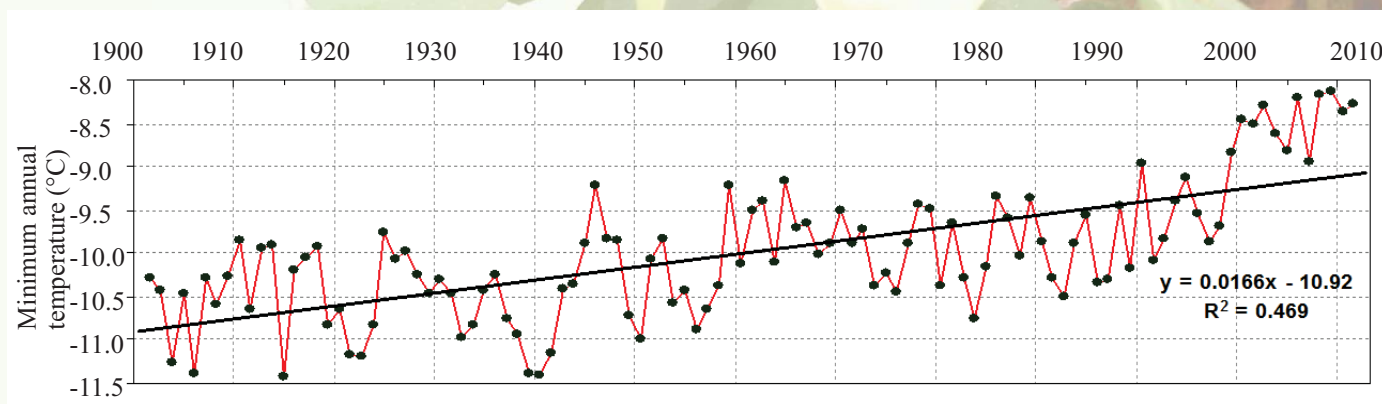
### Annual Variability in Temperature and Precipitation in Ladakh

Analysis indicates the historical climatic variability in the region. The trend analysis of CRU grid data for Ladakh shows a significant change and support the evidences of climate change in the region. The mean annual temperature has been found significantly increasing over the periods with  $R^2=0.408$  (Fig. 4). A significant increasing trend of minimum annual temperature with  $R^2=0.469$  (Fig. 5) and  $R^2=0.292$  with maximum annual temperature is found (Fig. 6). The minimum annual temperature in Ladakh has been increased considerably resulting in melting of glaciers there by posing adverse impact on people and their livelihood.

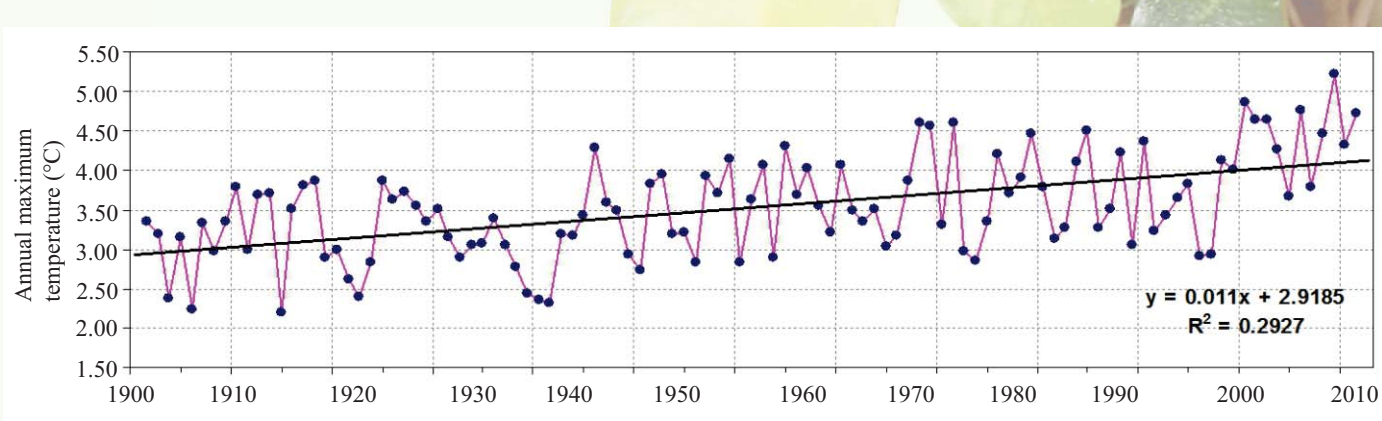
**Figure 4: Variation in Mean Annual Temperature (1901-2009) in Ladakh**



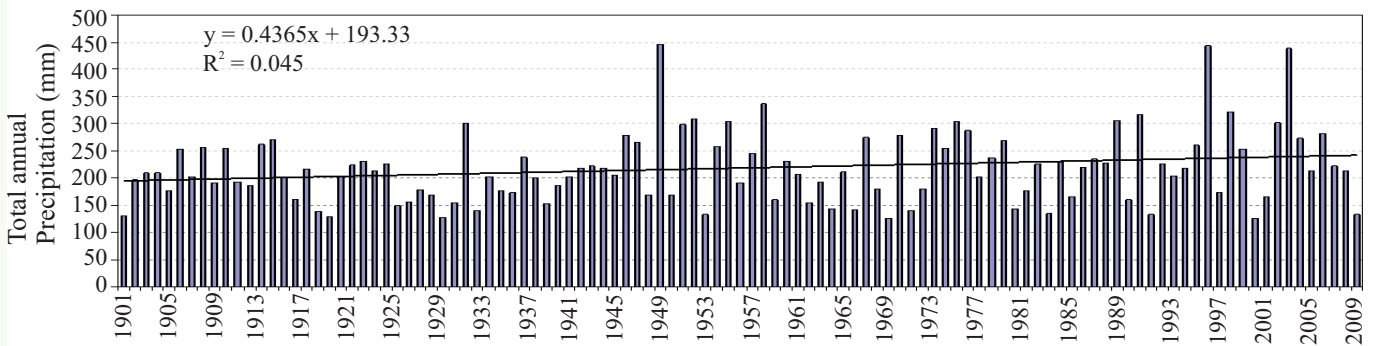
**Figure 5: Variation in Minimum Annual Temperature (1901-2009) in Ladakh**



**Figure 6: Variation in Maximum Annual Temperature (1901-2009) in Ladakh**



**Figure. 7: Mean Annual Variation of Precipitation in Ladakh**

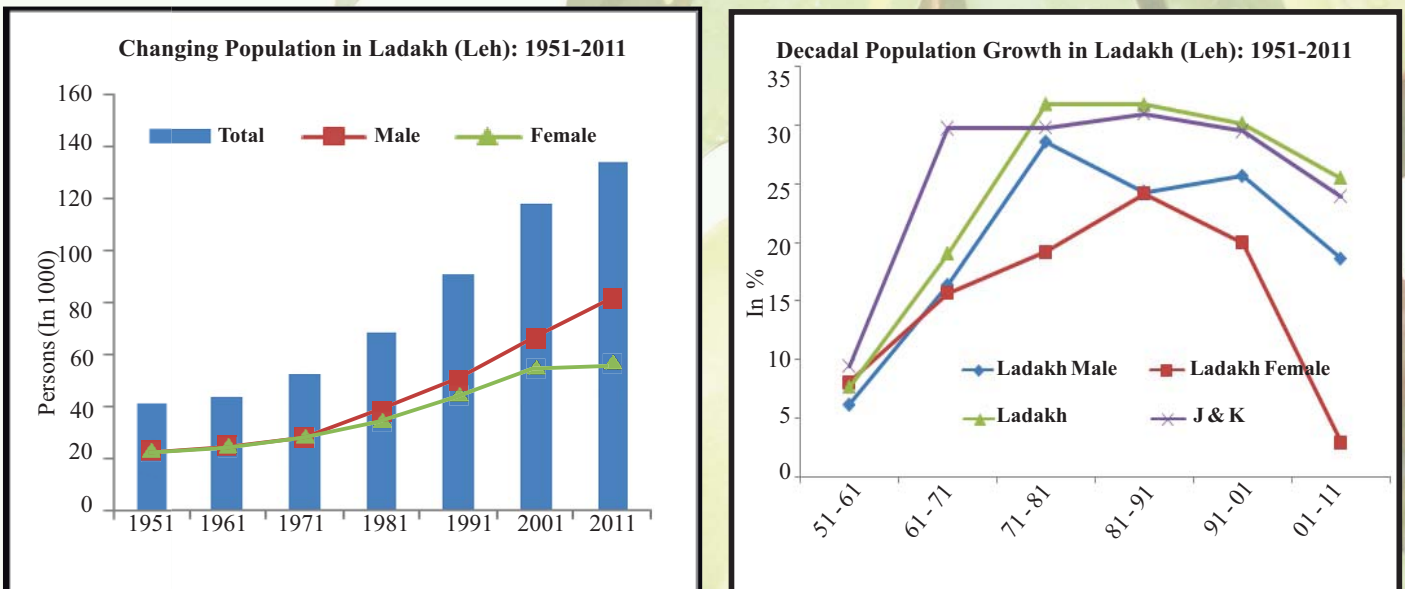


Source: CRU Grid data of Ladakh

**Altering Demographic Change over the Period in Ladakh**

In previous section variability in climatic dynamics is explained and increase in temperature and variability in precipitation has been observed significantly in the region. Directly or indirectly, the changing climatic conditions have affected rapidly due to population growth in the region. The adverse physiographic and orographic location on one hand and fragile climatic condition on the other hand made Ladakh a very sparsely populated and most elevated inhabitant in the world having 112 habited and one inhabited villages. Ethnically, Ladakh is the land of Buddhist having 77.3 percent of population followed by Muslims (13.8 percent) and Hindus (8.9 percent) lying over the valleys of Shayok, Indus and Zaskar rivers. Only 3 persons live per square km (Census of India, 2011). Demographically, as per census, 2011, Ladakh is having a total population of 1, 33, 487 persons, out of which 78971 were males and 54561 were females. Interesting to mention here that Ladakh's population has crossed one lakh (2001 census). However, it can't be denied that population continues to increase in the region (Fig. 8).

**Figure. 8: Changing Demographics in Ladakh over the Periods**



Source: Census of India

It is well known that Ladakh was unexplored till 70s and various changes took place after mid 70s when the government declared for tourism development. Population has considerably increased within 10 years. During 1971-81 it was a total of around 16.5 thousand persons as against only 11.5 thousand persons in earlier 20 years of 1951-71. Sex composition of Ladakh shows both male and female are growing in number but with different pace. Till 70s the growth of



both the sexes was almost same. Even at 1961 and 1971 census, female population was higher than male population (215 population female at 1961 and 53 female at 1971 census) but after 70s the trend is reversed (Fig. 8). For the first time at 1981 census, around four thousand male than female was noticed but surprisingly at 2011 census, this gap has increased to around 25 thousands and sex ratio reduced to 583 females for every 1000 male against 823/1000 of 2001 census.

Figure 8 depicts the trend of decadal population growth over the period in the region. It clearly shows that till 1970s, the state growth rate was much higher than Ladakh but thereafter, Ladakh overtook the state decadal growth rate and still this trend is persisting. It is also worthful to add here that during 1971-81 Ladakh district had gained maximum decadal growth rate of 31.8 percent within the state. At 2011, the district decadal growth rate was found 25 percent as against of 24 percent of the state. Sex wise decadal growth rate reveals that the changing demographics is widening the sex wise decadal growth rate (19 percent female decadal growth rate as against of 28 percent for male) during 1971-81. Female decadal growth rate has found to be very low, only 2 percent, as against 19 percent for males. The latest census numbers are raising the eyes and it demands for drilling the issue with gender lens to understand the issue of climate change, coping mechanism and socio economic development in Ladakh.

### Livelihood and Development in Ladakh

Over the period, share of urban population in Ladakh has reached to 34 percent as against 24 percent in 2001 and it shows around 160 percent growth over the last ten years. Increasing population in urban part of any area is a good sign for increasing standard of living. But, scanty and poor infrastructural services & amenities with unplanned exploitation of natural resources is an important reason for the emergence of slum in urban locality. Overwhelmingly, it is important to add here that for the first time in Ladakh, part of urban area has been notified as slum. Around 26 percent of urban households and 17 percent of urban population were found as slum dwellers in urban Ladakh (Census, 2011).

**Table 1: Changing Nature of Livelihood and Development in Ladakh over the Periods**

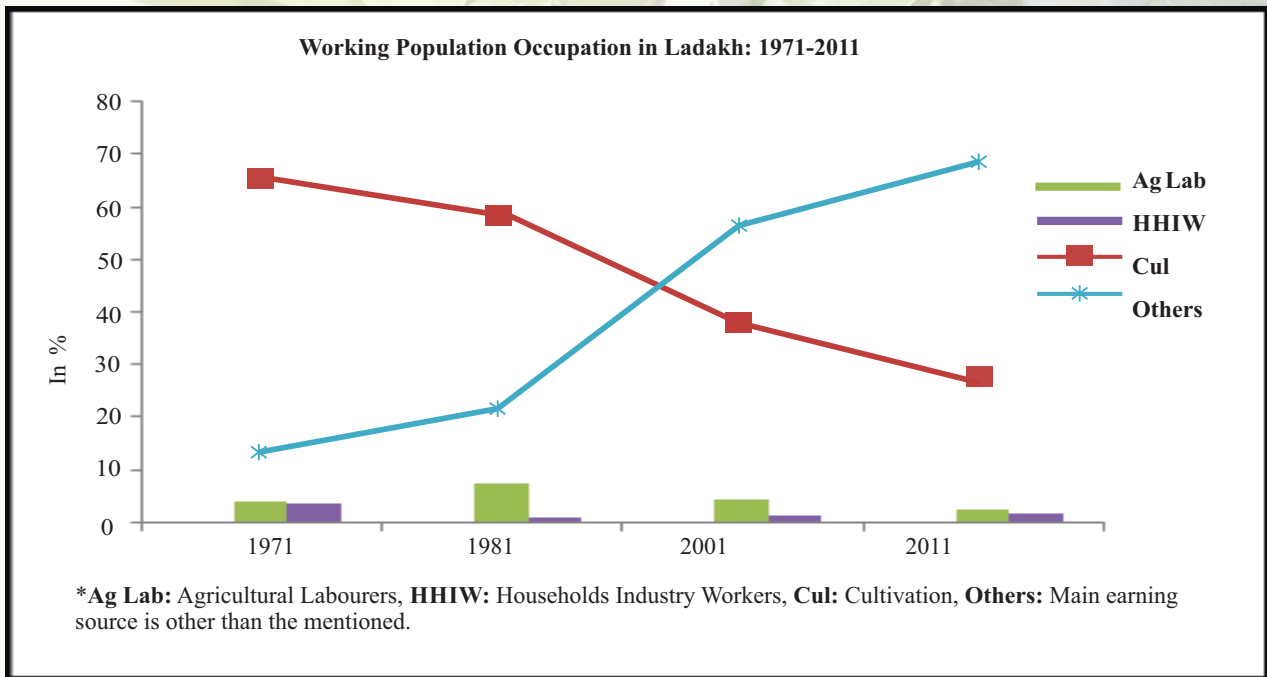
Livelihood	Year	Factors	Nature of Change
Trade	Pre 1947	Trade	Exchange of local items like wool, hides, yak tails, salt with sugar, tea, cloth etc
	1950s	Restriction on trade	Interaction was more with rest of India
Conflict and Strategic Development	1962	India-China dispute	Strategic significance, Army, Market at Leh, Enhanced interaction
	1965	Indo pak Conflict	
	1971	Indo pak Conflict	
	1999	Kargil Conflict	
Infrastructure	1966	Completion of Srinagar- Leh Highway	Infrastructure development, connectivity with rest of India
	1980	Construction of Manali- Leh Road	
Tourism	1974	Tourism	Hotel, Restaurants, guest houses, taxi services, enhanced commercial economy

Historically, agriculture has remained the backbone of Ladakhi economy (Sheikh, 2002) through very specific agricultural adaptations in order to sustain their livelihood. Despite the increase in possible sources of income from other sources today, primarily through government employment, military service and the growing tourism industry, the centrality of agriculture in Ladakh is still persisting. But, the share of population engaged in agriculture has reduced due to fragile and changing climatic conditions. Increasing temperature and decreasing precipitation has turned the Ladakhi population to switch over to the other means of livelihood. However, over the period the nature of means of livelihood

has been changed.

From table 1, it can easily be observed that over the period, the nature of livelihood has been changed with changing nature of development in the region along with substance agricultue. Construction of Srinagar-Leh, Manali-Leh road, and opening of Ladakh for tourism have led Ladakhi people on commercial economy for means of livelihood. Occupational means of livelihood in the region provides better insight on climate change and coping mechanism because increasing temperature and reducing precipitation in the region have affected agriculture tremendously and is much debated over the years and have found attention of scientist, internationally.

**Figure. 9: Occupational Structure in Ladakh over the Periods**



From figure 9, it can be understood that occupational structure in Ladakh responses in two ways- first, developmental aspect of people residing over there, and second, underlying causal mechanism responsible for shifting in main livelihood activities. As it is well known that most of the population in Ladakh is spread over the beds of river valley which provides a fertile soil for agriculture and habitations. It is also found in the literature that main occupation for livelihood had remained agriculture for Ladakhi people, with some inclination to trade and commerce for the last four to five decades.

Considering the occupational structure of working population in Ladakh, there is a stark feature of continuous declining share of agriculture. Ladakh was opened to the outer world for tourism purpose and infrastructural development 1962. It is surprising that in 1971 around two-third of working population was engaged into agriculture which has sharply fallen to one-fourth in 2011. On the other way, *Others* occupational activities in 1971 was accounted for only 13 percent which had increased to 21 percent at 1981 census but thereafter its share increased to around 70 percent as per 2011 census. Moving on the rest of the occupational activities household industry works revolves around one to two percent and agricultural labourers account for three percent. The *Other* occupations includes commercial activities such as tourism. Ladakh opens tourism for a maximum of six to seven months in a year.

## Conclusions

Monthly climate CRU grid data for more than one hundred years suggest that temperature and precipitation in the region has been increasing. Since, 1975 onward a rapid increase in minimum temperature has also been noticed. Mean annual temperature and maximum temperature has been increased. Overall maximum increasing trend has been noticed in case of



minimum temperature. In economic development, Ladakh has integrated with rest of the world with the opening up of tourism, building of infrastructure and a network of road connectivity leading to radical change in the tradition, internal dynamics and culture. With the initiation of these changes a rise in population took place rapidly and put additional burden on available limited natural resources. The increasing demands gave rise to need for higher production and income to improve the livelihoods.

Historically, agriculture was the basis of the traditional subsistence economy. But increasing demands for market economy to meet the needs and expectations of the people in earning their livelihood and achieving a higher level of living standard in the region is changing the population dynamics. It can easily be understood from the study that at present around 70 percent of Ladakh working population is engaged in activities other than agriculture, animal husbandry and household industries. At the same time increasing temperature, reducing productivity, additional burden on available land for use and changing land use pattern have given rise the voice of changing climatic dynamics in Ladakh. The climatic variability, population change and livelihood need more attention to mitigate and to protect the environment and culture of Ladakh against the adverse effects of economic transformation and vulnerable livelihood mainly in rural Ladakh. As in urban Ladakh, the market or commercial economy provides the opportunity for livelihood but in rural Ladakh, there is no other means of livelihood other than agriculture which is a major constraint for sustainable development.

### **Acknowledgement**

Authors are heartily thankful to the organisers of a workshop in Ladakh (Leh) on “*Climate Change, Cryosphere, Habitat and Changing Livelihood Pattern of Ladakh Region: An Interdisciplinary approach towards Developing Adaptive Strategies*” jointly organised by National Institute of Hydrology and University of Jammu, for providing the opportunity to attend the workshop and understand the issue in Ladakh region.

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IIPS



*Women, you are as delicate as a flower as well as can be a fierce lioness; a warrior and a nurturer; a dancer and a fighter; you are everything, from elegant to magnificent.*



# REVIEW: HISTORICAL TIMELINE ON INITIATION OF COMPULSORY TERTIARY LEVEL 'ENVIRONMENTAL STUDIES' IN INDIAN UNIVERSITIES.

Soma Bhattacharjee (Biswas)<sup>1</sup>, Debabrata Dasgupta<sup>2</sup>

From the childhood of our existence our mother earth has nurtured us with food, air, water, shelter everything we need for our life. But, today our environment is in the brink of destruction because of various environmental issues like climate change, pollution, global warming, ozone layer depletion, etc. Mahatma Gandhi truly said “In nature there is enough for everyone's need, but too little for everyone's greed.” It is well said that the reasons for these environmental issues are due to anthropogenic activities. Many projects, awareness campaign etc. have been arranged but those attempts hardly could touch the big mass. As we know that only “Education leads us from darkness to light” (Plato), “Education is the manifestation of perfection already in man” (Swami Vivekananda). Jawaharlal Nehru very significantly said, “No subject is of greater importance than that of education. It is the men and women in a country that make and build a nation and it is education that is supposed to build those men and women”. As environmental education brings about desirable changes in human behaviour, positive attitude towards nature and finally environment friendly citizen towards sustainable development, so incorporation of environmental education in our education system is really very much important today. According to the directives of the Hon'ble Supreme Court, UGC has introduced a basic six months compulsory course on environment for all the students of undergraduate courses of all the branches of Higher Education. This paper documents how the compulsory environmental studies introduced at tertiary level in Indian universities.

India has a long tradition of using environment as the source of learning. Rabindranath Tagore and Mahatma Gandhi both emphasized on the study of environment. Gandhi believed in simple living to save our Earth's resources and Tagore's philosophy of education focused upon the need for a harmonious association between human beings and their environment. To achieve this, he relied on exposing young people to nature which is still practiced in Visva-Bharati, Santiniketan. However, compulsory environmental education at tertiary level in our country is not introduced in one day; it took several years to come into the system. Not only the inland incidents but also some international incidents/events have some direct/indirect role towards the introduction of the concept and implementation of the programme which are documented below-

## **Kothari Commission, 1964-1966**

The Kothari Commission (1964-66) suggested that basic education had to offer Environmental Education (EE) and relate it to the life needs and aspirations of the people and the nation. At the primary stage, the report recommended that “*the aim of teaching science in the primary schools should be to develop proper understanding of the main facts, concepts, principles and processes in physical and biological environment*”. Environmental education at primary, secondary & higher secondary levels was treated in a different way. Environmental education is an essential part of every pupil's learning. It helps to encourage awareness of the environment, leading to informed concern for active participation in resolving environmental problems. It should be introduced without any delay from class –1 as EVS, as a subject so that right from their childhood, the right attitudes towards environment will be nurtured in the young minds.

## **The United Nations Conference on Environment, Stockholm, June 1972**

The UN conference was a major event for those who were concerned for the quality of the environment of the world. The output of this conference was the 'United Nations Environment Programme (UNEP)'; the UNEP was founded with the following objectives:

1. To provide leadership in caring for the environment.
2. To encourage partnership in caring for the environment.
3. To enable nations and people to improve their quality of life without compromising the interests of the future

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2. Ex. Vice Chancellor, Bidhan Chandra Krishi Viswavidyalaya, West Bengal

generations.

4. To promote implementation of the environmental dimension of sustainable development.
5. To serve as an authoritative advocate of the global environment.

### **Formation of National Committee on Environmental Planning and Coordination, 1972**

In the same year i.e., in 1972, a National Committee on the Environmental Planning and Coordination was set up by our late Prime Minister Mrs. Indira Gandhi. The objective of the committee was in line with the recommendations of the Stockholm Conference i.e., to identify and investigate the problems of conserving and improving the human environment in India specially in the context of excessive population growth and its effect on the economic development and society.

### **International Workshop on Environmental Education, Belgrade, 1975**

Stockholm Conference on Environment was followed by International Workshop on Environmental Education at Belgrade, Yugoslavia in 1975 organized by UNESCO. This workshop listed environmental education goals.

The ultimate goals of environmental education is to develop a world population that is aware of and concerned about, total environment and its associated problems, and commitment to work individually and collectively towards solution of current problems and the prevention from new ones (UNESCO, 1975).

### **The Constitution of India (42<sup>nd</sup> Amendment) Act, 1976**

The Constitution of India (Forty second Amendment) Act 1976, led to the insertion of *Article 48A*—“*Protection and improvement of environment and safeguarding of forest and wildlife*” - The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country.”

Apart from this, a new provision in the form of “*fundamental duties*” as *Article 51A* was also incorporated by the 42<sup>nd</sup> Constitutional Amendment, sub clause(g) which states, “It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures.”

### **Intergovernmental Conference on Environmental Education at Tbilisi, USSR, 1977**

The first Intergovernmental conference on Environmental Education organized by UNESCO in cooperation with the United Nation Environmental Programme (UNEP) was held at Tbilisi, USSR from 14 to 26 October 1977, considered as a landmark in the field of Environmental Education. The conference made important recommendations on the following:

1. Role of Environmental Education.
2. Objectives of Environmental Education.
3. Guiding principles of Environmental Education.

### **National Seminar, New Delhi, 1979**

National Seminar, New Delhi organized by Indian Environmental Society and International Programme on Environmental Management at National Science Academy, New Delhi in 1979. Emphasis was given to incorporate Gandhian thought and values as a part of environmental education.

### **1<sup>st</sup> International Conference on EE, New Delhi, 1980**

On the occasion of the First International Conference on Environmental Education held in New Delhi, in 1980, late Mrs.



Indira Gandhi observed that environmental education (EE) is to help arouse social consciousness and make community aware of the fact that the good of the individual and that of the community are both harmed by ecological disruptions.

### **Formation of Tewari Committee and Department of Environment, 1980**

In February 1980, the Tewari Committee was set up to review and recommend legislative and administrative measures for ensuring environmental protection. On the recommendations of this committee the Department of Environment was set up in November 1980 which in January 1985 became Ministry of Environment and Forest. Its objective covers the following:

1. Environmental laws and policy.
2. Pollution monitoring and control.
3. Survey and conservation of natural resources.
4. Management and conservation of forests and wildlife.
5. Promotion of environmental research.
6. Environmental Education, awareness and information.
7. International cooperation

### **The sixth five-year plan, 1980-1985**

For the first time there was specific environmental objective in five-year plan, which was expressed in the following words-“Brining about harmony between the short and long term goals of development by promoting the protection and improvement of ecological and environmental assets”.

### **Second International Conference on EE, New Delhi, 1985**

The Second International Conference on Environmental Education was held in New Delhi and attracted some 200 participants from 25 nations. It was sponsored by Indian Environmental Society, Indian Department of Environment, the New Delhi School of Planning and Architecture and the Committee on Science and Technology for Developing Countries. One of the central assumptions of the conference was the belief that requirements of culture, economics and environment, can be satisfied compatibly to promote ecologically sustainable development. The conference concluded by agreeing on a comprehensive series of recommendations entitled the “New Delhi Declaration on Environmental Education-1985” for local and global action.

This report describes briefly the major goals and highlights of the conference, at which discussions were intended to further four primary aims for biosphere preservation:

1. Promoting sustainable development
2. Strengthening environmental education
3. Increasing local to global action and
4. Targeting special emphasis on environmental education for youths.

### **National Policy on Education, 1986**

National Policy on Education in part VIII entitled 'Reorienting the content and process of education', in para 8.15 states, “There is a paramount need to create a consciousness of the environment. It must permeate all ages and all sections of society, beginning with the child. Environmental consciousness should inform teaching in schools and colleges. This aspect will be integrated in the entire educational process.”

## **Brundtland Report - World Commission on Environment and Development, 1987**

The World Commission on Environment and Development publishes the Brundtland Report. Also known as *Our Common Future*, this report introduced the idea of sustainable development in which environmental protection and economic growth are viewed as interdependent concepts.

### **The seventh five-year plan, 1985-1990**

The approach of the Seventh Plan 1985-1990, also recognizes the ecological and environmental conservation as one of its principle objectives. In terms of integrating environmental considerations with national economic planning, the plan emphasizes that “The environment must not be considered as just another section of national development. It should form a crucial guiding dimension for plans and programmes in each sector. This becomes clear only if the concern for environmental protection is understood in proper context. Environmental problems in India can be classified into two broad categories:

- (a) Those arising from conditions of poverty and under-development.
- (b) Those arising as negative effects of the very process of development.

The first category has to do with the impact on the health and integrity of natural resources (land, soil, water, wildlife, etc.) as a result of poverty and the inadequate availability, for a large section of the population to fulfill basic human needs. The second category has to do with the unintended side effects of efforts to achieve rapid economic growth and development. Thus it is clear that the concern for the environment is essentially a desire to see that national development proceeds along rational sustainable lines. Environmental conservation is in fact, the very basis for all development.”

### **Supreme Court order to enforce compulsory Environmental Education, 1991**

In 1991, Shri M. C. Mehta filed an application in the public interest, asking the Supreme Court to:

1. Issue direction to cinema halls that they show slides with information on the environment;
2. Issue direction for the spread of information relating to the environment on All India Radio; and
3. Issue direction that the study of the environment become a compulsory subject in schools and colleges.

On this public litigation petition, the Supreme Court of India to entreat the NCERT and other concerned authorities to take steps to enforce compulsory environmental education from academic session 1992-1993.

### **United Nations Conference on Environment and Development, Rio De Janeiro, 1992**

The United Nations Conference on Environment and Development (UNCED) held at Rio De Janeiro in 1992 agreed to a global environment and development agenda for 21<sup>st</sup> century called Agenda 21. The agenda recognizes education as an important instrument of solving environmental problems. Chapter 36 of Agenda 21 emphasizes the role of education in protecting environment and promoting sustainable development. Following programmes were included in agenda 21.

1. Reorienting education towards sustainable development.
2. Increasing public awareness.
3. Promoting training.

### **M. C. Mehta again filed a PIL, 2003**

In July 2003, Magsaysay Award winner environmental lawyer Mr. M. C. Mehta again filed Public Interest Litigation (PIL)



which highlighted the issue of non-compliance of the 1991 court order by the states in which a series of directions were given about maintaining the ecological balance and launching a sustainable campaign on protection of the environment. The apex court took a serious view over the non-compliance of 12 years-old directive by various educational bodies. The Supreme Court issued notice to the country's key educational bodies like NCERT, AICTE, UGC and State Government to seek information on whether the state had included Environment studies in the school and college curriculum as directed by it, and if not ask them for an explanation. Finally, in September 2003, the Supreme Court then imposed a fine of Rs.15000 each to 10 states including West Bengal (Times of India, 24.09.2003).

### **Implementation of compulsory environmental education, 2004**

Since the order about the compulsory environmental education was not implemented even after twelve years, the Supreme Court passed the order on 22<sup>nd</sup> April, 2004 for compliance.

The Supreme Court issued a notice on 13<sup>th</sup> July, 2004 to the concerned authorities to inform whether they had implemented the order for inclusion of environmental education in the institutions under their court. Keeping in view the 1991 judgment, for the college level, UGC and AICTE were asked to coordinate and bring out a uniform syllabus on “Environmental Studies” for the undergraduate course for all the branches of higher education.

### **Expert Committee on Environmental Studies appointed by UGC, 2005**

UGC had appointed a Committee of Experts to advice on the curriculum for Environmental Studies at the undergraduate level, and the Committee was also requested to produce a textbook on Environmental Studies for such an undergraduate course. The Committee was headed by Dr. Erach Bharucha, a well-known environmental scientist of Bharati Vidyapeeth, Pune. The Committee had come out with a common core module syllabus for Environmental Studies at the undergraduate level and a very comprehensive textbook on this multidisciplinary subject, to be used by every university in the country.

### **Conclusion**

However, it is now up to the universities to ensure the implementation of this common compulsory course by getting it passed through their Academic Councils or other bodies. Unless and until “Environmental Studies” supplemented with ethical values, get a right place in various cultures and societies through different educational system, neither mass media nor other informal educational activities can become the instruments of environmental sensitivity. So incorporation of compulsory environmental studies at tertiary level of education will certainly add the momentum towards environmental sustainability.

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## COMMENTARY: WHAT I CAN DO FOR REDUCING POLLUTION?

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**Abstract:** *Content analysis of the subject environmental science collection for last 15 years will be helpful to discover untouched areas, proliferated authors, organisations & their ranking. It provides guideline for research in future and is a possible solution to environmental pollution problems.*

*The study on environment science has gained tremendous importance due to dangerous dimensions of environmental pollution which occurs largely due to the disruption of the natural ecosystem of the world due to the activities of men. In fact, environmental disharmonies are the impact of the interaction between human and natural world. Moreover, only human being can find the solution to reduce the disharmonies.*

**Concept of Environmental Science:** People use resources from the natural environment and deposit wastes back into the same. Materials and energy that people draw from nature are known as “sources” and environmental reservoirs that receive the products of human society are known as “sinks”. Environmental problem arise from resource depletion and pollution of sinks. Controlling consumption (population control) and reducing the flow of material through society (saving of energy) can alleviate the environmental issues.

In Indian context, India is the second largest population in the world after China. With reference to the last century, Census of India 1901, Indian population was 238 million and Census of India 2011 it has reached to 1210 million, which is more than 5 times in 110 years. With reference to National Commission on Population, in the year 2026 the Indian population will reach to 1399 million which will be around six times more than the year 1901. This shows that, how the resource consumption and sink pollution is going to increase with time?

The Government of India has set up the administrative structure, Ministry of Environment & Forest, concerns for implementation of policies and programs related to conservation of the countries natural resources like lakes & rivers, its biodiversity, forests and wildlife ensuring the welfare of wild life, prevention and abatement of pollution including sustainable development and enhancement of human well-being. Realising the importance of environmental information, the Ministry has established Environmental Information System (ENVIS) as a plan program. The focus of ENVIS is to provide environmental information to all over the country. ENVIS has its own network of 78 institutions/organizations (28 Union Government, 27 State Government and 14 NGOs) as a nodes, known as ENVIS Centres.

There is a close relationship between the environmental pollution and public health. Each type of pollution has unique group of diseases. The types of environmental pollutions are

- (1) Air Pollution
- (2) Water Pollution
- (3) Soil Pollution
- (4) Noise Pollution and
- (5) Nuclear Wastes

Brief introduction of type of pollutions, diseases to understand the seriousness are given below:

**Air pollution:** In the process of socio-economic development, industrialization and its growth is indispensable part, resulting to air pollution. Polluted air unlike other wastes cannot be reprocessed (Gaur, 1997 Vol. 1). Large scale deforestation apart from creating an imbalance in the oxygen proportion of the atmosphere, affects weather as well as rain patterns. The environmental pulmonary diseases are the impact of inhalation of dusts, allergens, chemicals, gases, and environmental pollutants. The air pollution increases morbidity and mortality especially, Asthama, Cardiovascular events, Coronary artery, Respiratory illness, Decreasing lung function, Chronic Bronchitis (Newman, 2014). The air pollution episodes like London smog of 1952 and Bhopal gas tragedy of 1984 are the typical examples of air pollution. The evidence shows that, “the more industrialized country is, more likely it will devote resources to environmental research, but also the more threatening its environmental activity is likely to be (Bertrand 2006)”.



**Water pollution:** Water is the main source for survival. No life exist without water. But disastrous floods kills thousands of people in the world every year in one hand and around 900 million people lacks reliable access to safe water on the other. Forty percent world population do not have access to adequate sanitation facilities, resulting 'total deaths from water and sanitary related diseases for children under 14 is more than the toll from the HIV/AIDS, malaria and tuberculosis (WHO, 2010) i.e. 4500 children die every day due to waterborne diseases'. Diseases such as cholera, diarrhoea, malaria, typhoid, filariasis spreads in the society due to water pollution.

**Soil & soil wastes pollution:** Soil pollution arises due to addition of chemical fertilisers such as herbicides, fungicides and insecticides to the soil. It degrades the soil and observed that, crop consumers produced on this soil suffer from very painful and often fatal diseases (Gaur, 1997 vol.3). Further, pesticide residues on crops and food products bring about long-term health hazards.

**Noise pollution:** Unwanted sound can be called as noise pollution. Types of noise are: (i) Industrial noise (ii) Non-industrial noise, "There is enough evidence that, the noise pollution causes permanent hearing loss, neural-humeral stress response, and destruction of artefacts" (Gaur, 1997 Vol. 4).

**Nuclear Waste Pollution:** Nuclear wastes usually contain one or more highly radioactive substances. Radioactive nuclear wastes pollute the earth to a dangerous level of toxicity. If the nuclear wastes are exposed to underground water, the radiations get absorbed in water and then enter in living beings through food chains. The nuclear wastes radiations can cause diseases like cancer, leukemia, etc. Radioactive waste also spreads through water that is used in nuclear reactors. This has a huge effect on the surrounding aquatic life. Waste products from nuclear power stations etc. are becoming a serious problem. ([http://www.answers.com/Q/Harmful\\_effect\\_of\\_nuclear\\_waste](http://www.answers.com/Q/Harmful_effect_of_nuclear_waste)).

Looking the seriousness of the problem, quantification of available scientific research on environmental pollution, its assessment and the analysis based on scientometric indicators will throw the light, in which area the resources have been used and which is the thirst area for research? The public health approach will be followed for analysis so that the importance of the work will be ultimately enhanced.

The literature shows that, in the year 1990 only one research paper has been published by Karki (Bibliometric analysis of environmental science in India) based on Paryavaran Abstract Journal for the duration of 1984-1986 data. Rest of the articles are available only on sub-categories of the environmental science.

The Canadian Government has prepared report (Bertrand, 2006) on similar line for implementation in Canada based on last 25 years literature on environmental science.

**Method:** The source of data is SCOPUS online database. It is the largest abstract and citation online database of research literature and quality web sources which covers more than 21000 titles from more than 5000 publishers. According to the scholars, "Since coverage of the database is wider than any other database, it goes back to the year 1823. So it can give clear picture of the research productivity than any other online database" (Majhi & Maharana). According to I. K. Ravichandra Rao, 'if sufficient data is collected from machine readable database, results are much more reliable than otherwise'.

The SCOPUS database has a collection on the subject of environmental science. The study will be proposed, 'to analyse the literature on environmental science published during 1999-2013 on India based on the collection of SCOPUS database'. The Advance Search option will be used in URL [www.scopus.com](http://www.scopus.com) using Boolean principle for desired data collection on Environmental Science, published during the period of 1999-2013, the following search string will be given: SUBJAREA (ENVI) AND PUBYEAR > 1998 AND PUBYEAR < 2014 for world level data. From the result of global level collection, country (India) level data will be filtered. The following fields will be selected (i) Author (ii) Title (iii) Year (iv) Affiliation (v) Author's Keywords (vi) Indexed Keywords for downloading in excel sheet for analysis.

**Result:** The result shows that, there are 51382 records as on date in SCOPUS on the given query. The keywords per record will be indentified as; on which area of the environmental science the keyword belong to and which health related keywords have been used along with the area? The area and health related keywords will be distributed based on the five main areas (1) Air (2) Water (3) Soil (4) Noise and (5) Nuclear Waste and rest of the keywords will be grouped in 6<sup>th</sup> area which will be called as (6) Others. The trend for 15 years will be presented to understand the ups and downs, stronger and weaker areas.



Further, based on the distribution of health related keywords it will be helpful to understand whether environmentalists have performed any health related research as a part of environmental science? If yes, which are them? And if not it will be gap of the research.

The study proposed to prepare the list of top authors of scientific papers with numbers, their ranking in India and in the world (if applicable). Further, the work will be extended to find out the quality of work in terms of 'h' index. The above work will be discovered the proliferated Indian authors. Since this is the important subject, the government would motivate to the researchers to do the work on the untouched area once they have the list of untouched area and the list of researchers. Karki (1990) has stated that, "More than 530 organizations have engaged in taking the projects on environmental science in India". He has performed the study almost 30 years back. The researcher would like to know, what is the current position? To discover leading affiliated institutions, their credits and ranking. Which organisations are doing better in India? What is the quality of research ('h' index)? Whether educational institutions are maintaining their quality? Is there any organisation got the position in top international ranking? Which are they? The contributing organizations will be divided into three groups (i) Academic institutes (ii) Research institutes and (iii) others (Karki, 1990). The researcher has proposed to assess the academic level institute's productivity of India to find out academic standard in the subject. Further, the work will be extended to find out which are the ENVIS Centres (if any) among them as contributors? Building capacity development of the Indian Institutes working for Environmental Science is the main intention to take this objective. The top organisations contributing for 15 years will be presented in the work.

Environmental pollution is due to depletion of there source and pollution of the sink and it is the effect of over population. Human population control is the major factor which has to be given priority for environmental pollution control. Human population studies should be an indispensable part of the environmental science subject. It will be useful to prepare and implement integrated plan to get the effective result on environmental pollution control. Environmental pollution and the public health (including natural calamities like flood, gas tragedies etc.) research should be categorised based on the keywords appeared in title, abstract, author's keywords and indexed keywords. For public health (diseases, illness, death) relevant keywords will be distributed within all the areas. As a result, the publications on certain type of pollutions and the relevant health related will be grouped together because of their uniqueness. The Ministry of Environment & Forest has assigned the task to ENVIS Centres to prepare the Indian literature database on India. But due to limitation of guidelines of standardisation (metrics) assessment of the literature is not possible. Hence, from the world known online database (SCOPUS) collection on environmental science published on India during last 15 years and its analysis will be helpful to prepare a meaningful conclusion for the benefit of the society. Such databases have policies to include the literature and they used relevant metrics to assess or rank the document, author, organisation and country. There were 530 organisations in India (Karki, 1990) performing research in environmental science but we don't have current position. The SCOPUS online database can provide this information. Further, the role of ENVIS Centres can be found out from the analysis. Categorisation of organisations working for environmental science will throw light on their research productivity, so that which organisations are doing better and which organisations can take rest of the responsibility of research can be find out. Academic institutions were doing better (Karki, 1990) work than organisations is the statement of 25 years back. This is time to check the present situation for solution of environmental pollution problem.

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Our Mother earth has gifted us with natural air, water and land for our survival. It is our privilege to prevent / preserve our mother earth from threat for sustainable future.

We always feel that our house should be neat and clean and we forget about our surroundings. Ever increasing amounts of domestic rubbish cannot last forever...and nobody wants such a site on their backyard. Nobody likes incinerators though; they offer a possible solution to the question, what do we do with all this household rubbish? Imagine how much rubbish your household / street / city produces a week. Imagine the extent of this problem. It's good to know that the wastes are collected and taken away, but still it doesn't disappear. Solid waste followed by liquid wastes is a serious problem in recent years. Mumbai is not an exception for the same. Analysis shows that smoke from vehicles and emissions generated during production of fuels and electricity are the major cause for increasing pollution. For example, Ethanol, smoke released from Tractors' increases air pollution.

*“Our work highlights the importance of looking at the full life cycle of energy production and use, not just as what comes out of tailpipes,”* said Bio products and Bio systems Engineering Professor Jason Hill, co-author of the study. *“We greatly underestimate transportation impacts on air quality if we ignore the upstream emissions from producing fuels or electricity.”*

The researchers focused on life cycle environmental impacts of transportation on greenhouse gas emissions. Hence, there is an urgent need to consider air pollution and health.

Pollution causes unexpected and sometimes serious and devastating changes in our Environment. Air pollution has enormous health impacts such as, respiratory illness which leads to death. It also causes Global warming and acid rain due to combustion of fossil fuels. Polluting is not a good option when we have other alternatives available these days.

Below are few interesting things which can be followed in our day to day life to prevent from pollution.

- Reuse things which are reusable.
- Things which are recyclable can be used by recycling - keep a separate bin for recyclable and non – recyclable wastes. We feel inconvenient to separate wastes but still, practising is a better solution.
- Avoid materials which are harmful for environment such as crackers during festivals and plastic products.
- Avoid using own vehicles which harms environment. Instead, try to use eco-friendly vehicles such as Bicycle (at least on Holidays).
- Printer ink cartridges can be used by refilling. Throwing it can cause environmental consequences such as ink leakage has the capability to contaminate ground water. Recycled cartridges are available in the market which is highly cheaper and environment friendly. Using this will encourage other businesses to provide better recycling programmes and ensure less unnecessary waste.
- Materials such as plastics, glass, aluminium, tin, other metals, clothes, newspapers, magazines, cardboard, even your organic peelings from your vegetables can go on a compost heap. Check out the recycling guide for more information on what you can recycle and how exactly you can do it. It's actually very easy to recycle a lot of stuff these days and sometimes you can receive incentives to do so.
- Start using recycled paper, electrical goods and clothes from charity shops. This is only an example; There are many other things which we can think for recycling products. When the demand for such products increases, it is a way forward for us in reducing wastes and pollution.
- Sign up to a renewable energy supplier. Clean energy is the future, not just to stop pollution of our local and global environments, but also to help guarantee our future energy security and make the world a more sustainable place to live

in. We recommend Good Energy in INDIA. “We like them because they source 100% of their energy from renewable resources such as solar energy and minimum use of water”.

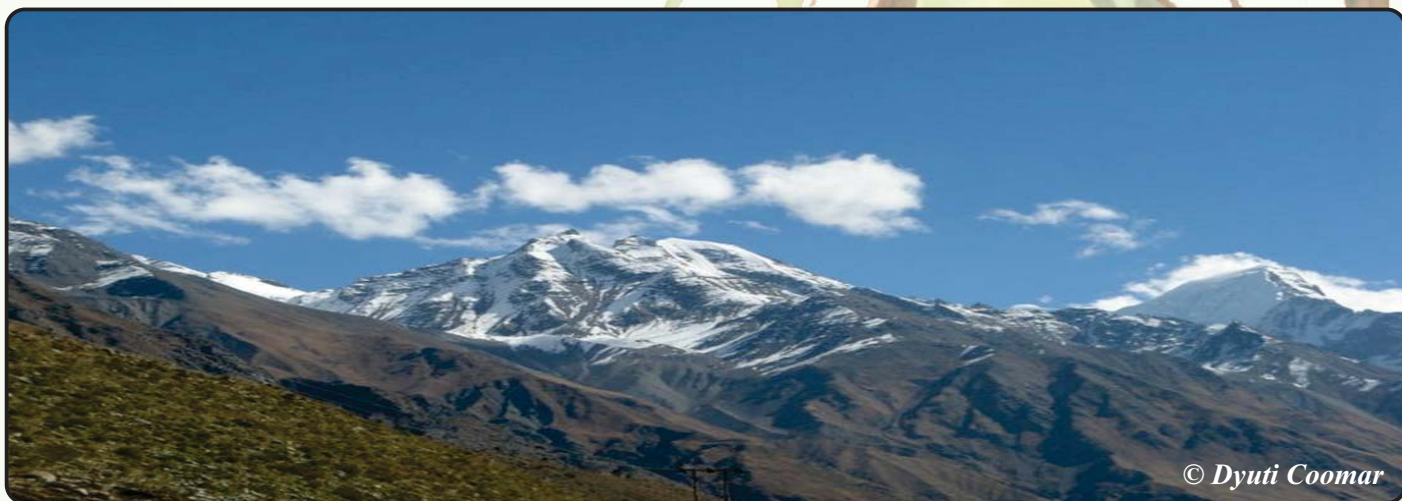
- Avoid using harmful detergents at home and at work place as they damage the environment. For example, use Ecover detergents which is of good quality and has the capability to protect environment from pollution.
- Consume only organic food. Though, expensive it is good for health and also the cultivable land has no added chemical fertilizers.
- Use cotton products such as Bags, Clothes and shoes, an eco – friendly approach for environment sustainability.
- Buy products with biodegradable packaging (or packaging that you will actively recycle). Look out for those in the shops where you buy from, it should be clearly labeled. If it is not available then write to your supermarket and ask them to start using it. In the meantime look out for products that use the minimum amount of packaging.
- Use refill pens and products that allow refills. This will reduce packaging and waste.
- Use rechargeable batteries and electronic items. While charging ensure not charging overnight (especially rechargeable batteries and mobile phones). Recharge and unplug them so as not to waste energy. The life of the batteries will become low if the batteries are charged even after fully charged.
- Manage your bank, credit card and utility accounts online and use paperless banking. It's a lot easier and it saves paper which saves waste, natural resources and energy.

Few things mentioned above can be followed in our day to day life to save our mother earth. It is very difficult for us to follow daily. When practised it gives us a better picture and also a way forward for our future generations.

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Since time immemorial, Mother Earth has provided in abundance for the needs of those who call it their home. There once existed a time when one could wake up to the cool scent of the early morning air and breathe in the earthy freshness. He could feel the wind in his hair while running through open fields of grass, and drink water off a narrow mountain stream, without second thought. At such a time, mankind coexisted harmoniously with nature.



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**Nature at its best (Himachal Pradesh, 2010)**

However, around two hundred years ago, with the advent of industrialization, a monster reared its head in the name of progress. Trees were mercilessly cut down, and in their place, factories grew. Their chimneys coughed out thick dark smoke, and their drains spurted out green toxic wastes. The people suffered too. They hunched and coughed, felt their eyes



With nearly seven billion people living on the face of the Earth, and each person producing 4.4 pounds of waste each day on an average, and around a ton of waste every year, pollution is rapidly intensifying into a huge problem (Recycling Revolution, 2010). Even everyday necessities like fresh air and water are fast turning into luxury. However, rather than concentrating on the management of the wastes generated, our focus should now be on preventing the creation of further pollution, so that someday, in the near future, the Earth's natural balance will be restored.

One school of thought says that the ever increasing population is to be blamed for this situation. According to them, the human population first needs to stabilize in order to arrest the growing levels of pollution. However, even though this might be the situation in the developing countries to a large extent, how can we use the same argument for the developed nations that already have a stable population?

Rather, if one were to look for a solution, a much simpler answer would present itself. One would realize, that the power lies, not with the government agencies, or the environmental organizations, but within us. Each one of us, We hold the tremendous potential to walk towards a better and greener tomorrow – one step at a time.

Am I being naive to make such a proclamation? Surely, I must have lost touch with reality! Or maybe, failed to understand the true enormity of the problem! At times of such self doubt, it can be inspiring to remember these beautiful words spoken by Eckhart Tolle, in his book 'The Power of Now' – “The pollution of the planet is only an outside reflection of an inner psychic pollution: millions of unconscious individuals not taking responsibility for their inner space.” Thus, the environmental pollution can be eliminated, if only we agree to purge ourselves from within, and join hands to save Mother Earth from dying. And even at that, the benefit is ours. As said by Evo Morales, a Bolivian politician, “Sooner or later, we will have to recognise that the Earth has rights, too, to live without pollution. What mankind must know is that human beings cannot live without Mother Earth, but the planet can live without humans.”

But still, the question remains 'How?' How can I, an average individual from a middle class family, make a meaningful contribution to help achieve such an impossible goal? As we ponder, what we do not realize is that half the battle is already won. Now that we have taken responsibility for our past actions, and agreed upon redressing it, we are only a few short steps away from reaching our desired intention. Armed with intelligence, and fuelled with innovation, if we can mobilise our youth, we can surely change our tomorrow.

Before we begin discussing how each of our small actions can make a difference, let us take a moment aside to consider the different types of pollution plaguing the Earth. The list would include Air, Water, Soil, and Noise pollution, but is, by no means, exhaustive.

We start with Air pollution – the most common type of pollution, something that we are all aware of. It is a shame to own that man has been so selfish in his actions that he has not even cared to keep the air breathable for the generations to come. Especially for a developing country like India, the severity of the situation is extremely dangerous. The Environmental Performance Index, which was developed as part of the UN's Millennium Development Goals, has ranked our country 155 out of 178 countries in 2013. The metropolitan cities are worst affected: our national capital Delhi has the highest concentration of PM2.5 - particulate matters less than 2.5 microns - one of the most serious pollutants, among all the cities of the world (Ambient Air Pollution, WHO, 2014). And what is causing all of this? Fuelwood and biomass burning, fuel adulteration, vehicular emission and traffic congestion. The annual burning of crops, practiced in northern India, is another, often ignored, important seasonal source of smoke, soot and particulate matter.

It is obvious that an improvement can be brought about by having a stricter legislative system, but change can begin at the grass root level as well. If we can successfully create awareness among the general public at large, a lot can be achieved in a very short time. To begin with, at the individual level, one can adopt certain simple changes in his lifestyle: cover short distances by walking or riding a bicycle, use a carpool or public conveyance instead of driving to office, use more fuel-efficient vehicles, get motorized vehicles regularly checked by the Pollution Control Board, get regular engine tune ups and car maintenance checks (especially for the spark plugs) etc. One can also act as vigilant and responsible citizens by reporting smoking vehicles to one's local air agency. At home, one can conserve energy and thereby reduce emissions from coal fired electricity plants. Commonplace actions like switching off all electrical appliances when not in use (no matter who is footing the bill), buying energy efficient goods with Star Ratings, using green technology with low pollution emissions, buying rechargeable batteries for devices used frequently, checking the house for cracks and crevices while operating air-conditioners will not only save money but also create a sustainable future. Use of aerosol cans should be



avoided, as they release CFC's into the air which breaks down the Ozone layer, and cause Global warming. Further, we should learn to respect 'No Smoking' signs at the very least, if not quit smoking altogether, especially when others around us are at risk. We can find alternative ways to celebrate Diwali - rather than bursting firecrackers – and celebrate the occasion for what it is: a festival of Lights. In the name of humanity, we must show this little concern to those who suffer from chronic respiratory problems, and not make life difficult for them just for our transient enjoyment.



**Thick smoke and air pollution during Diwali, Marine Drive, Mumbai. 2013**

Finally, we must allow our surroundings to become greener. We Should not only protest against deforestation to give way to multi-storied buildings, but also try to maintain small green patches as per our abilities. Terrace gardens or potted plants not only add to the aesthetics, but also help conserve nature.

Next, we come to Water Pollution. As water is a universal solvent, we don't understand the old saying that “Just because it disappears, doesn't mean it goes away.” We must, at all rates, refrain from dumping chemicals, motor oil or other automotive fluids into the sanitary system. These end up in the rivers or streams causing serious ecological imbalance, by forming a layer of oil on the top, which do not allow the passage of oxygen for the respiratory needs of aquatic plants and animals. For the same reason it is not advisable to pour fat from cooking or other similar sources down the sink – a commonly done practice. One should also not flush pills, liquid or powder medicines down the drain, or paper, cotton, diapers or tissues down the toilet. They should be properly discarded as solid wastes, in the garbage. Other easy ways to conserve water is to turn on the tap only when it is to be used, running washing machines and dishwashers only when there is a full load, or installing a water efficient toilet. Excess usage of detergents or bleach is also harmful, and replacing them with natural alternatives like baking soda and lemon will help reduce water toxicity levels. Use of household pesticides to kill flies, mosquitoes, or rodents should also be discouraged. Mass awareness camps could also be organized to educate that open defecation near water bodies spreads infectious diseases like diahoria, typhoid and cholera. Lastly, and most importantly, immediate bans should be imposed on the use and disposal of plastic. They clog drains and disrupt the sewage system, thereby wrecking havoc with the already poor sanitation facilities present in India.

**Polluted water body, Kolkata, 2015**





If we are successful in incorporating these changes, the current situation can be improved. At present, we as a country are faring pretty badly. A 1995 WHO report can be cited, which claims that 114 Indian cities are dumping untreated sewage and the partially cremated bodies directly into the Ganges River. However, the Central Pollution Control Board, a Ministry of Environment & Forests Government of India initiative, has established a National Water Quality Monitoring Network comprising 1429 monitoring stations in 27 states and 6 in Union Territories on various rivers and water bodies across the country, which monitors the water quality all the year round.

Our next concern is Soil Pollution. Indian cities alone generate more than 100 million tons of solid waste a year. Litter and filth cover sidewalks, making them not only unhygienic, but also breeding grounds for mosquitoes, flies, rats and pests which ultimately become the carriers of infectious diseases.

The first thing that we should do to combat this, is to inculcate some civic sense. It is sad to see that we as Indians do not respect our lanes, our neighbourhoods or our cities enough to take the responsibility to keep them clean. The general idea is that as long as our own houses are well maintained, nothing should concern us. But what we fail to realize is that the environment is something that affects us all equally – no matter how rich or poor we are. So the moment we litter our playgrounds, our parks, our lakes and our beaches, with plastic cups, or packets of potato chips, we are robbing ourselves of the pleasures of a clean recreational spot.

What we could do instead is carry our disposables until we find the nearest dustbin, throw our garbage only in the designated municipal vats, segregate the garbage to see what can be reused or recycled and sell them to the 'kabadiwala', use organic wastes for compost heaping, limit the use of non-biodegradable products like plastic and lead, and lastly reduce the use of paper. There are so many instances when we unnecessarily print and waste paper, even when the materials can be easily accessed electronically. Such callous behaviours should be condemned, and conscious efforts should be put to save trees. This will ultimately reduce the overall levels of pollution.

Another relatively modern problem which has rapidly escalated to high levels is Noise Pollution. It is a major concern in India, as unrestricted use of firecrackers and loudspeakers comes hand in hand with every religious and cultural festival. Traffic and industrial machineries also contribute to the menace to a large extent. The repercussions on human life include increased stress, lack of concentration, insomnia, and in certain extreme cases, noise induced hearing loss. We can do our bit to control noise pollution by being good neighbours and not blare our speakers or televisions at top volume. We should also respect 'No Horn' signs, stop bursting loud firecrackers, place padding under noisy equipments like blenders, plant trees which act as buffer zones, and lastly, advocate the city municipality bodies to begin regulating noise.

To combat all of these problems, certain organizations are taking an active interest in promoting sustainable development. We too should do our bit by propagating the concept of 'Reuse, Reduce and Recycle'. Reuse old items, before they are worn down and have to be discarded, Reduce our levels of pollution generation, and recycle old items into new technology.

In conclusion, one must realize that in order to conquer this sickly disease that is rapidly corroding the organs of the Earth, one must act fast. And this is the time to act. Unless, we learn to understand this simple truth, we shall forever have to hang our head in shame in front of our future generations, when we pass on a 'developed' world to them, with land that cannot be farmed, air that cannot be breathed, and water which cannot be drunk. Shall they forgive us when they learn that even though we knew an irreparable damage was going on, we simply sat idle? Statistics show that if the levels of pollution could be reduced in the world, around 40% of the deaths could be avoided (Cornell University, 2007). Health conditions would improve drastically along with the quality of life. Do we not, as children of Mother Earth, desire that? Just one annual customary Earth Day will help no one, unless we take the pledge to do small things everyday in order to realize a large effect. Let us, therefore, for a change, empower ourselves, by being in control of our destiny. Let us, as the famous song by Michael Jackson goes, "Heal the world: make it a better place, for you and for me, and the entire human races..."

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## WORLD HEALTH DAY CELEBRATION BY POP-ENVIS

On the occasion of **World Health Day 2015** dated **07 April 2015**, we distributed certificates and prizes to the volunteers who have contributed for various Pop-Envis activities. The program was chaired by acting director Dr. L. Ladu Singh and was facilitated by Dr. Aparajita C, Pop-Envis Coordinator. Dr. Aparajita briefed the Envis activities with special emphasis on housing, drinking water and sanitation (HWS) survey of Mumbai slums. She thanked the director, student volunteers & pop-envis staff for their endless support extended during various pop-envis activities. Student volunteers shared their experience in different slums during housing, drinking water and sanitation survey. Knowledge dissemination on Literacy, Environmental Health and Medical Check up activity was highly praised by many students and faculties. Dr. L. Ladu Singh encouraged pop-envis to take up new research initiatives.

The programme was ended with distribution of prizes & certificates to the participants who contributed in

1. Competition on commentary writing.
2. Qualitative data collection on Housing, drinking water and sanitation (HWS) survey of slums in Mumbai.
3. Knowledge dissemination on Literacy, Environmental Health and Medical Check up in Mankhurd slum.



**Ms. Vidya sharing experience on literacy program of pop-envis**



**Prize distribution**



**Dr. Aparajita explaining Pop-Envis activity**



# WORKSHOP ON GENDER, DEVELOPMENT AND ENVIRONMENT

11<sup>TH</sup> – 14<sup>TH</sup> AUGUST 2014, IIPS, MUMBAI

The report provides a short summary of the workshop organised by the International Institute for Population Sciences Alumni Association (IIPSAA) from 11<sup>th</sup> August – 14<sup>th</sup> August 2014. The workshop was funded by the United Nations Population Fund (UNFPA) & supported by the Population – Environment – Human Settlement Project (POP – ENVIS) of Ministry of Environment, Forest and Climate Change (MoEFCC). The workshop was held in the International Institute for population sciences (IIPS), Mumbai. Forty seven participants from IIPS and Tata Institute of Social Sciences (TISS) participated in the workshop.

The main objectives of the workshop were to build capacity among young researchers on gender and development and to provide comprehensive knowledge on gender issues related to development and environment. The target audience for the workshop was research scholars, young researchers and academicians who are interested on gender and development.

The lectures focused on gender equality and equity, concepts and issues related to gender and development; gender Justice in context of India. The workshop was inaugurated on 11<sup>th</sup> August 2014 at 2.00 PM with lighting up the lamp by acting Director and Senior Professors, IIPS; Dr. D. K. Mangal, UNFPA, and IIPSAA President gave the inaugural address. Eminent personalities from various background and organizations were invited to deliver their talk. A brief of the discourse is given below:

**Dr. Anuja Gulati;** UNFPA, is a well-known personality who worked on gender issues. She discussed on “*Gender and Reproductive health*”. Dr. Gulati threw light on the very crucial effects of gender and sex, and the differentiation between the two was very insightful and thought provoking. She illuminated the IIPS fraternity on how patriarchy affects women folk as a whole in different dimensions. She also highlighted the various problems encountered by women in their different walks of life especially reproductive health which is so influenced by the elements of patriarchal hegemony, societal ignorance and neglect on the part of policy makers.

**Dr. T. K. Roy;** a renowned demographer, Ex. Director of IIPS worked extensively on areas of fertility, sex ratio, abortion, family planning, sampling etc. He delivered lecture on “*Sex ratio in India*”. His discussions highlighted the scenario of world sex ratio, child sex ratio, Indian situation of sex ratio and the future of sex ratio at birth in India.

**Dr. Ilina Sen;** of Tata Institute of Social Sciences, is an internationally known feminist scholar. She gave a talk on “*Engendering Development*” and “*Lessons from Indigenous women*”. Her talk revolved around historical perspective of women's work and empowerment issues, economic modernization in India and marginalized women's work in rural India. She cited case studies of Chhattisgarh tribal belt, women's contribution in economy and environment. She threw light on crucial pathways of development, some historical decisions that brought modernization in Indian agriculture, the diversity of tribal society, their closeness with and care for environment, the decision making process for policy formulation and many other important issues which were thought provoking.

**Dr. P. Bindhulakshmi;** from Tata Institute of Social Sciences talked on “*Gender State, and mobility: the case of Migrant women domestic workers*”. She discussed about migration of India in general with special reference to International labour migration in the Middle East. Her talk elaborated the process of illegal migration, the modalities, the existing rules and regulation, the way of living in the Middle East, the economic aspects, remittances etc.

**Dr. Subhadra Mandalika;** of University of Mumbai, is a nutritionist and an expert in food behaviour, health sciences etc. She gave a speech on “*Risk of lifestyle diseases – the gender specific issues*”. Which revolved around human immunology, disease pattern, food and major diseases. Also we had good discussion on varying issues related to herinformative discourse on food and nutrition.

**Dr. Srijit Mishra;** from Indira Gandhi Institute of Development Research, Mumbai discussed on “*Rawls justice – Is it relevant from a Gender perspective*” and “*A critical appraisal of the Gender development Index*”. In his first lecture he delivered with the famous theory of Rawl on social justice. Rawls, who was a political philosopher developed principles



of justice to govern a modern social order. Dr Mishra explained the significance of that theory with examples. In the discussion participants were asked to think themselves as a member in the Rawlsian utopian society and make choices on the basis of the aforesaid principles (under the veil of ignorance). After the interaction session it emerged that the most of choices are made on the principles of equality, fair choices, rightfulness and benefit of the least advantaged. He further added that beyond Rawls there are theories like impartial observer, Gandhiji's Talisman and also more recent critique of Rawls by Amartya Sen in the idea of Justice (2009). In his second lecture, he elaborated issues related to calculating gender index with special emphasis on Gender Development Index. He wonderfully pinpointed the problems of current index and methods of modifying that index. It was a great learning experience for the participants.

The **valedictory session** on 14th August was addressed by IIPS director, Prof. F. Ram who thanked the UNFPA for financial support for organizing the workshop.

**UNFPA representatives Dr. D.K. Mangal & Dr. Anuja Gulati along with Prof. L.Ladu Singh, IIPS**

**Dr. Ilina Sen : Engendering Development and Lessons from Indigenous Women**



**Dr. Bindhulakshmi : Gender, State & Mobility: The case of migrant women domestic worker**

**Dr. Subhadra Mandalika : Risk of Life Style Diseases – The gender specific issues**



**Valedictory Function**

**Participants and organizers of the workshop**



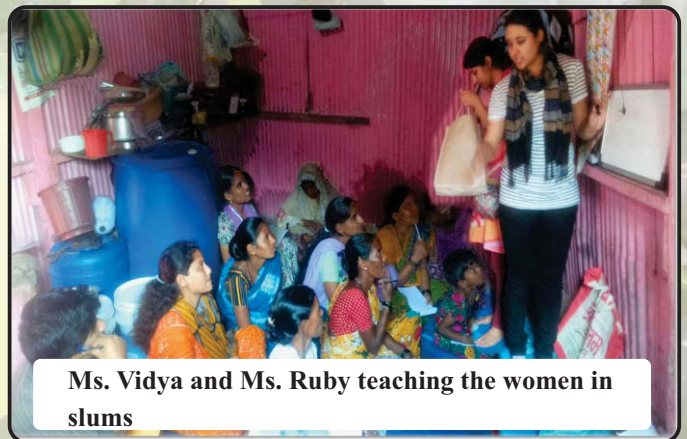


## KNOWLEDGE DISSEMINATION ON LITERACY-ENVIRONMENTAL HEALTH AND MEDICAL CHECK UP AT MANKHURD, MUMBAI

Based on the recommendations of our previous activities in the slum areas, Pop-Envis with IIPS student volunteers took an initiative to disseminate knowledge on environmental health along with literacy and health camp in Mankhurd slum. We started this activity in January 2015. We teach adult women twice a week and facilitate them with health check-up once a week by a qualified physician. We got enthusiastic support from IIPS students who actively participated in the above activities. Around 15 women are regularly attending the teaching classes conducted by our student volunteers / expert member and all of them who were illiterate have now learned to write. The rooms where we teach are voluntarily provided by an auto driver and a widow. Our regular students are: Aashma, Seema, Unisa, Rezwana, Jahana, Subhadra, Naseema, Faimida, Eelma, Usha, Guindamma, Lakshmi, Maheswari, Razia and many more.



Participation in literacy camp



Ms. Vidya and Ms. Ruby teaching the women in slums

“Medical camp”, are organised in different areas of Sathé Nagar, Mankhurd slum since January 2015. During health camp we came across many health cases such as nausea, cough, cold, fever, anaemia, Joint pain, skin infection, scabies etc. It's our great privilege to share that some women shower gratitude to Pop-Envis for arranging this camp, to listen to their sufferings. The patients are also very happy and comfortable with the team to share their health issues. Pop-Envis team thanks the student volunteers: Vidya Yadav, Rajan Gupt, Bibhishana Bhuyan, Ruby Jain, Santosh Phad, Aravind Santu Jadhav, Bedanga Talukdar and many more. Pop-Envis team also thank Sunny (assistant), Naseema and Chand (slum representatives). Dr. Geeta Raju is extending her support in treating the patient throughout the health camp.

Dr. Geeta Raju and Dr. Aparajita C along with Pop-Envis staff interacting with patients





# REGIONAL EVALUATION WORKSHOP OF ENVIS FOR WESTERN REGION

16<sup>TH</sup> – 17<sup>TH</sup> FEBRUARY 2015

Western region evaluation workshop was conducted by the MoEFCC at NEERI Nagpur from 16th -17th February 2015. The workshop focused on evaluation of the Envis centres of western region and workshop on Bhuvan portal. There were around 30 participants from ENVIS Centres located in Maharashtra, Gujarat, Madhya Pradesh, and Chhattisgarh. The workshop was inaugurated by NEERI Director Dr. S. R. Wate. He welcomed all the participants from different Envis Centre and thanked the Ministry for providing an opportunity to conduct evaluation workshop in their institute and making it a grand success and also providing schemes and support to Envis centre, that they can help researchers, scholars, stakeholders and others who all are working in related field with required information. The evaluation was done through website presentation of each centre and experts have given comments, appreciation and they have also advised to focus on data collection along with graphical or map representation. As an example, Pop-Envis is generating data in relation with Housing, Drinking water and Sanitation (HWS) Survey in Mumbai slums and conducting Knowledge Dissemination on Literacy-Environmental Health and Medical camp in Mankhurd slum. The Ministry appreciated Pop-Envis centre and suggested to include more nodes/field in HWS Survey and also suggested to extend this survey in urban-rural area of Maharashtra or India if possible.

Second day was an interactive session focused on Bhuvan portal for GIS application, map generation, graphical representation, analysis of data etc. The basic concept of how to use Bhuvan portal was elaborated i.e. upload, export and generation of maps using data.

**Token of appreciation to Dr. S. R. Wate, Director NEERI**



**Pop-Envis Coordinator expressing her views on envis model; dignatories on dias**



**Western Region Envis Team**



## HOUSING, WATER AND SANITATION (HWS) SURVEY OF SLUMS IN MUMBAI, 2015

Slum population in greater Mumbai is increasing. But, slum facilities are unsatisfactory due to lack of proper water supply and sanitation system. The present research study is a Pop-Envis initiative funded by the Ministry of Environment, Forest and Climate Change (MoEF&CC), with the following objectives:

1. To study the housing condition of slums in Mumbai.
2. To investigate drinking water and sanitation facility available for slum dwellers.
3. To analysis quality of drinking water at source in Mumbai slums.
4. To understand the cleanliness habits and associated issue of hygiene.
5. To explore the suggestive measures of slum dwellers on drinking water, sanitation.

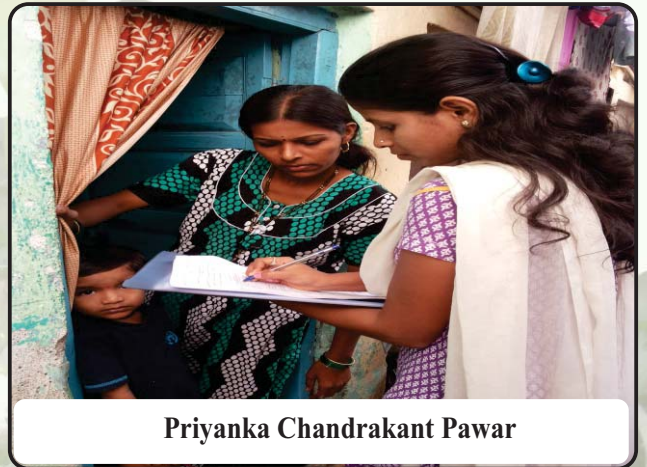
We collected a total of 1452 household sample from selected wards of Mumbai metropolitan region in February - March, 2015. Adult female was the household respondent. Drinking water samples were collected and ground coordinates were measured in selected wards. Qualitative data were also gathered by IIPS students.







Sayyed Rubina



Priyanka Chandrakant Pawar



Rani Singh



Vishal Vasant Raste



Art work:

by Chandrakala R  
Pop-Envis, IIPS

## *World Environment Day*

June 5, 2015

*“Seven Billion Dreams. One Planet. Consume with Care.”*

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