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From Editor's Desk.....

Greetings!!!

It gives me great pleasure to bring out the issues of Population and Environment Bulletin for the year 2016. IIPS publishes Population and Environment Bulletin (ISSN No. 0975-7287) at regular interval. The Bulletin and Envis website (www.iipsenvis. nic.in) are supported by Ministry of Environment, Forest and Climate Change (MoEF & CC), Government of India.

The current volume, presents a research article on urbanization and environmental health hazards in Mumbai city. A brief of our initiative on assessing the impact of dumping ground fire on health in Mumbai and a report on national evaluation workshop held at New Delhi along with upcoming seminars and conferences.

I hope you will find this bulletin interesting and useful.

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Urbanization and Environmental Hazards in Mumbai City

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ABSTRACT

The pace of rapid urbanization leads to the random growth of cities. In India, over 300 million people reside in cities and towns. Urbanization has occurred very slowly in other developing countries as compared to India. It took about forty years to raise the urban population to 230 million, but it will take hardly half the time to add 250 million more. Cities are acting as economic growth engines, but they are also getting affected by environmental hazards. Urbanization brings development, while the haphazard growth of cities increases various risks due to rising population and changes in land use. The vulnerability of cities is increasing as the human population is getting urbanized day by day. The increase in the number of vehicles in urban cities is creating a serious risk of environmental pollution. The urban environment is exposed to various physio-chemical hazards like air pollution, traffic hazard, and industrial pollutions. This study has been done basically to study the urban environment and its relationship with the environment. The impact of rainfall is seen upon the environmental pollution. This will provide an insight upon the condition of pollution and the changes it brings with respect to rainfall on temporal basis.

Key Word: Urbanization, environmental hazard, pollution, population.

INTRODUCTION

Urban areas are recognized as the engines of inclusive economic growth. Around 32 percent of India's population resides in urban areas. Urbanization is a transitional process of cities from an agrarian economy to industrial activities which may lead to increase in population concentration in urban areas. Industrialization has greatly influenced urbanization process in the developing nation like India. It has affected the growth and economic development of the urban centres. The urban growth is, however happening in uneven manner and at an alarming rate. Around one-fourth of India's population resides in urban areas. According to World Bank (1985), India's level of urbanization was high and it ranked 91st in 1981 among other countries and has a third position after the United States of America and erstwhile USSR in terms of size of the urban population.

Though, urbanization happens with a higher standard of living, economic activities, greater productivity and getting better services. On the contrary, it also faces certain repercussions like congestion and urban crowding, slum growth, inadequate amenities, urban poverty environmental pollution and many more. According to United Nations (1980), 70 percent of total population resides in urban areas of developed region while 31 percent of total population resides in urban areas of less developed regions. The trend of growth of urban population has been increasing from 106 million in 1971, 217 million in 1991, 286 million in 2001 and 377 million in 2011.

The urban growth in India is happening rapidly due to natural growth and migration from rural areas. In 1987, a National Commission was formed by the government of India to look upon the problems related to urbanization. It basically looked upon the urban planning, management and needs of cities. The growth of Indian cities followed certain patterns of development, initially, as various areas were demarcated for certain importance like industrial areas, central business districts and others. Many models were also developed to have a proper development of cities.

Economic growth is one of the significant factors leading to urban growth. The production rate of the city increases with the size of the city (I.U.B. Reddy, 1998). Rapid urbanization increases the urban population from 220 million to 732 million from 1990 to 1950. By the year 2007, world population living in cities was 50 percent. With the increase in technology, the density of urban areas has also increased. It is expected that 4.9 billion people, which is around 60 percent of the world's population will reside in urban areas by 2030 (FIG, 2010).

In the last five decades, India has seen explosive growth in population accompanied by uncontrolled urbanization. According to the 2011 census, around 99.5 percent of India's population resides in the area with PM 2.5 pollution, which is much higher than the World Health Organization (WHO) standard of 10 micrograms per cubic meter. Particulate pollution is affecting the mortality rates leading to premature deaths and reducing the life by three years (Nandi, 2015). According to the WHO in the year 2015, the air pollution level was 82.94 which are very high for Mumbai having PM_{10} as 136 and $PM_{2.5}$ as 45, which is higher than the given standards (NUMBEO, 2015).

In 2011, the population of India rose to 1.21 billion in a decade. About 35 percent of India's population resides in urban areas or cities. In the last five decades it is seen that Delhi has grown by 4.1 percent, Mumbai by 3.1 percent and Kolkata by 2 percent. With this pace of growth, by 2015, Mumbai population is expected to cross 25 million and Delhi and Kolkata would touch 16 million.

The population growth is mainly seen around cities, which is basically due to large scale migration and accelerated growth rates (Singh, Prasad, & Chauhan, 2005). Growing urbanization rate is serious concern in India as it poses environmental issues in terms of change in land use and land cover, increases in carbon emission, poor sanitation amenities, solid waste generation / disposal, air and water pollution. According to National Air Quality Monitoring Program, 101 out of 127 cities shows that at least one pollutant exceeds the annual average air quality standard (Sridhar & Kumar, 2012). The air quality of cities directly affects the health and indirectly affects the climatic condition.

Rapid population growth and industrialization has affected the urban climate and air quality. The highest level of air pollutants like SOx, NOx, lead, CO, repairable suspended particulate matter (RSPM) and aerosol are found in urban areas because of traffic congestion, poor air quality of fuel, bad maintenance of vehicles. The SOx and NOx present in the atmosphere when combines with the water vapour present in air forms weak nitric and sulphuric acids which precipitates as acid rains. The sulphur emission and aerosol radiates more than carbon dioxide. India ranks fifth in terms of Global Greenhouse Gas Emission after United States, China, European Union and Russian

Federation. India's per capita emission rate is only 0.5 as compared with USA having 6.6. In recent years, carbon emission in India is also increasing. The metropolitan cities emit more carbon in India which is 1.19 tons per capita while the national average is 0.90 tons per capita. The cities have more number of public as well as private transportation facilities which tends to increase the emission rate (Singh, Prasad, & Chauhan, 2005).

Objectives:

The main objective is to study the relationship between environmental pollution and urban environment and the specific objectives are:

1. To study the cause of air pollution

2. To study the pattern of environmental pollution and rainfall in urban areas.

Study Area:

Mumbai, earlier known as "Bombay" is situated on the west coast of India, facing the Arabian Sea. Mumbai is the capital of Maharashtra state and also known as the financial capital of India. The Municipal Corporation of Greater Mumbai (MCGM) is divided into two revenue districts Mumbai city district and Mumbai suburban district. The Salsette (formally known as Trombay Island), Mumbai island creek and Thane creek separates Mumbai from mainland. Greater Mumbai is surrounded from three sides by Arabian Sea on west, Harbour Bay in south and Thane creek in east.

The Greater Mumbai covers an area of about 437.71 sq. km of the total area of Maharashtra. Mumbai city covers an area of 67.79 sq. km while the suburban area covers an area of 370 sq. km (Maharashtra, 2007). It is the most populous city of India and fifth populous city in the world.

The city has 17 traffic divisions and 7 police zones. The Mumbai city area is covered with sandy soil while suburb area is covered with alluvial and loamy soil. It comprise of Deccan Basaltic terrain. Mumbai experiences a tropical maritime/monsoon climate and receives rains during June-September from the south-west monsoon. Mumbai city usually have four months of rainy season; the average rainfall is 2000 mm, of which 70 percent happens in July and August. Indian Meteorological Department (IMD) has two rain gauge stations, one at Santacruz and other at Colaba. The average total annual rainfall is 2146.6 mm and the maximum annual rainfall recorded was 3451.6 mm. The average maximum temperature is 31.2 degree celsius while the average minimum temperature is 23.7 degree Celsius (Maharashtra, 2007).

Cities are complex, interdependent and vulnerable to both natural and manmade hazards, Environment is associated with rapid urbanization which has its own implication upon the environment. According to The Energy and Resource Institute (TERI) University, Indian cities are growing faster than it is expected. The urban location are overloaded and under planned.

The total population of Mumbai is 18,414,288 which comprises of 9,894,088 males and 8,520,200 females as per 2011 census. Around 60 percent of the city's population live in slum. Table 1 show the percentage growth rate which is varying over the period of time and currently the percentage growth rate have increased by 72.9 percent. Mumbai is a densely populated city with 3494 person per sq km.

Table 1: Population and Percentage Growth Rate of Mumbai

Year	Population in Million	Percentage Growth
1901	0.93	-
1911	1.15	23.7
1921	1.38	20
1931	1.4	11.5
1941	1.8	28.6
1951	2.99	66.1
1961	4.15	38.8
1971	5.97	43.8
1981	8.22	38
1991	9.92	21.1
2001	11.97	20.6
2011	20.7	72.9

Urban cities are prone to many hazard which can be human induces or natural hazards. The strategic location of the city makes it vulnerable to many hazards like floods, landslides, environmental and other ecological hazards.

Environmental Pollution

Environment gets deteriorated with rapid urbanization along with increasing population, poor infrastructure and planning. Environmental pollution is one of the greatest problems existing in the world causing grave and irreparable damages with every passing year. Environmental pollution is creating problem for both developed and developing countries. Urbanization and population growth plays a significant role in stretching the natural resources, thereby creating greater demands. Environmental pollution consists of five types of pollutions; they are air, water, soil, noise and light pollution. The air pollution, water pollution and industrial pollution are due to heavy discharge and emission. It is the major environmental problems (Bowonder, 1986). The change in land use has reduced the resilience factor for the atmosphere.

Air pollution is the most harmful of all the above mentioned pollution in our environment. Air pollution is a process in which the air contains gases, dust, fumes or odour in harmful amounts that could cause damage to living being and materials (EPA). Air pollution is caused by injurious smokes emitted by vehicles and industries/

factories. Even burning of garbage, leaves and cigarettes is harmful to human being and atmosphere. The human induced air pollution includes movable sources like cars, trucks, buses, stationary source like factories, power plants, refineries and indoor sources like building materials and cleaning activities (EPA).

Some of the notable air pollutants are carbon monoxide, sulphur dioxide, nitrogen dioxide, carbon dioxide, ozone, air borne particles, volatile organic compounds (VOCs) and other radioactive pollutants. Smokes constitutes of sulphur dioxide, carbon monoxide and nitrogen oxides.

The major source of air pollution in Mumbai is from industrial, transportation and domestic use. Pollution caused by transportation includes fuel combustion in stationary source pollution as there are many vehicles that run through the roads of Mumbai while traffic congestion adds to the air pollution the most. Domestic pollution is through burning of fossil fuels like coal, wood and dry grass. Construction activities and industries also add up to the air pollution. Industrial source includes all the manufacturing industries and petrochemical plants. Environmental pollution is the by-products of industrialization. There are 30,877 industries/factories in Mumbai out of which 12,054 industries and factories are located in city and 18,823 of them are located in suburbs (MCGM, Environment, 2005).

The vehicles produce increased levels of carbon monoxide (CO), hydrocarbons (HC) and nitrogen oxides (NO). Burning of fuels, construction activities and bad road condition along with residential and commercial activities generate dust (particulate matter) pollution. The gaseous pollutants, odours and SPM (suspended particulate matter) like fumes, smoke, mist and dust adds up to pollute the air. The concentration of all these pollutants in and near the urban areas increases the pollution level of the surrounding. Air pollution is human induced in nature through industries and transportation. The source and interaction nature of pollutants with other air component varies the chemical composition that may impact the health condition. As the pollution level in urban areas is high as compared with rural counter parts, it can create serious health problems (Sudhahar, Begum, Shariff, & Punyasehudu, 2014).

Hazardous air pollution is also known as toxic air pollution which can cause serious damage to health including reproductive and birth defects along with adverse environmental and ecological damages. The increasing air pollution leads to various health problems like lung cancer, asthma, allergies, breathing problems and irreparable damages to flora and fauna (UCCEE). Poor air quality affects respiratory system and cardiovascular system. Air pollutants bring about biochemical and physiological changes in human body. It creates difficulty in breathing, wheezing, coughing and aggravates existing respiratory and cardiovascular problems. Though it might vary from person to person and with their degree of exposure but it can create some long term health problems as well.

Heavy fog envelope during morning reveals that the air quality of Mumbai is deteriorating. Air pollution level is low during monsoon, stable during winter and high during summer. These fluctuations are due to meteorological conditions like wind direction, rain, turbulence and frequency of inversion and others. The pollutants are dispersed or accumulated due to high turbulence and are washed down due to rains (MCGM, Environment, 2005).

The pollution is caused due to increasing vehicular density, construction, renovation or restoration work. Mumbai Pollution Control Board (MPCB) has recorded the increased pollution level of Nitrogen Oxide (NO_x) and Suspended Particulate Matter (SPM) as 211 and 286 micrograms per cubic meter as compared with the national standard limit of 80 and 100 micrograms per cubic meter. Vehicles emit more pollution when they run at slow speed. The air station at Bandra and Sion shows higher level of NO_x and SPM level as these areas are more traffic congested (Masand, 2013). According to Mumbai Pollution Control Board logs, the levels of Nitrogen Oxide (NO_x) and Suspended Particulate Matter (SPM) are very high. In the year 2013, the levels of Nitrogen Oxide (NO_x) and Suspended Particulate Matter (SPM) was recorded as 211 and 286 micrograms per cubic meter respectively (Times of India).

Studies conducted by Environmental Pollution Research Centre (EPRC) mentions that the level of traffic exhausts are very high. The risk prone areas are demarcated as CST, Bhindi Bazar and Parel. Environmental Status report of Greater Mumbai 2012-2013 reveals that the construction activities and increasing number of vehicle leads to increase in suspended particulates in the ambient air and it is high based upon the air quality standards set by Central Pollution Control Board (CPCB).

The major contributor of air pollution in the city is transportation sector followed by industrial sector. In the year 2012-2013, there are 1,80,441 registered vehicles in Mumbai which contributes to high level of carbon monoxide, suspended particulate, lead, sulphur dioxide, hydrocarbons, nitrogen oxides and other pollutants. In March 2013, total number of vehicle existing in the city was 22,08,954. The increasing vehicular density and construction activity affects the air quality. Dr. Neelam Rane, professor of D.Y. Patil Medical College says that the vehicle emits more pollution when it moves slowly. The pollution is amplified due to traffic and some construction, renovation or restoration work happening in Mumbai.

According to Environmental Health Rights Organization of India (EHROI), the particulate matter around the dumping area is 2000 micrograms per cubic meter. The burning of garbage at the 100 hectare area of Municipal Garbage Dump located at north of Chembur-Vashi road affects the air quality of Chembur, Ghatkopar, Mankhurd and Navi Mumbai. World Health Organization (WHO) standard shows the upper limit as 150 micrograms per cubic meter, even the nitrogen dioxides level was reported high. According to Environmental Pollution Research Centre (EPRC), 10 percent of the population suffers from bronchitis and respiratory disease in Chembur.

According to the National Environment Engineering Research Institute, when the weather is cooler, the SPM level rises due to inversion. Generally, cold air remains near the earth's surface rather than the upper atmosphere. Inversion is a process in which cold air remains near the earth's surface which gets trapped under the warmer air. This situation will not enable the hot and cold air to mix in the upper atmosphere. Due to this process the pollutants gets trapped in the lower atmosphere itself. The pollutants are blown away and inversion breaks when strong wind blows. Bandra and Sion area faces major traffic jam and therefore the SPM and NOx levels are high in these areas.

City's Vehicular System

The Mumbai city's biggest infrastructure that is visible to us is transportation networks. The city is well connected with road networks including highways, arterial roads, link roads and other minor roads. Generally, the road network is good and maintained properly. The design of the road was done considering the traffic density, axle load, drainage, sub-grade conditions and others. The pedestrians, new foot paths, foot over bridges, subways and skywalk also exist in the city. The Area Traffic Control (ATC) is also setup in the city to regulate the traffic congestion, reduce the travel time and fuel consumption by responding to the traffic density. Many networks are being constructed for easy accessibility, reducing the traffic congestion problems and pollution. The major road network includes Jogeshwari-Vikhroli link road, Santacruz- Chembur link road, Bandra - Worli Sea link road and western free way sea link road.

Table 2- Vehicle Per'000 Person in Mumbai Area

Sl. No.	Areas	Population 2011 Census (in '000)	Vehicle population in 2013	Vehicles per 000' Population
1	Mumbai City	3146	676514	215
2	Mumbai Suburb	9332	1519884	162
3	Maharashtra	112372	21488152	191

Table 3- Number of Vehicles

Categories	Number of Vehicles	Categories	Number of Vehicles
Motor Cycles	806278	School Buses	2168
Scooters	395831	Pvt. Service Vehicles	1138
Mopeds	33173	Ambulance	1411
Two wheelers	1235282	Arti. & Multi.Axled Vehicles	11
Cars	672223	Trucks & Lorries	7542
Jeeps	29490	Tankers	381
St. Wagons	3839	Del. Van (4 Wheeler)	21261
Taxi Meter Fitted	44433	Del. Van (3 Wheeler)	33900
Taxi Tourist Cabs	12662	Tractors	201
Auto Rickshaws	111591	Trailers	95
Stage Carriages	4526	Others	1174
Contract Carriages	4070	Total	2187398

Heavy traffic on the city roads is increasing day by day which is one of the serious causes for environmental pollution and traffic delays. There is a tremendous increase of vehicles on road consisting of cars, taxies, trucks, buses, three-wheelers as shown in Table 4. Table 2 shows the number of vehicles per thousand persons in the area. During the peak hour traffic density is high that vehicles hardly can move at a speed of five to eight kilometer per hour. The total number of vehicle in Mumbai in the year 2013 in Mumbai was 2196398. Table 3 shows the number of vehicles and their composition is 36 percent two wheeler, 24 percent motor cycle, 20 percent car, 12 percent scooter, 1 percent moped, jeeps, meter taxis and delivery vans (3, 4 wheeler).
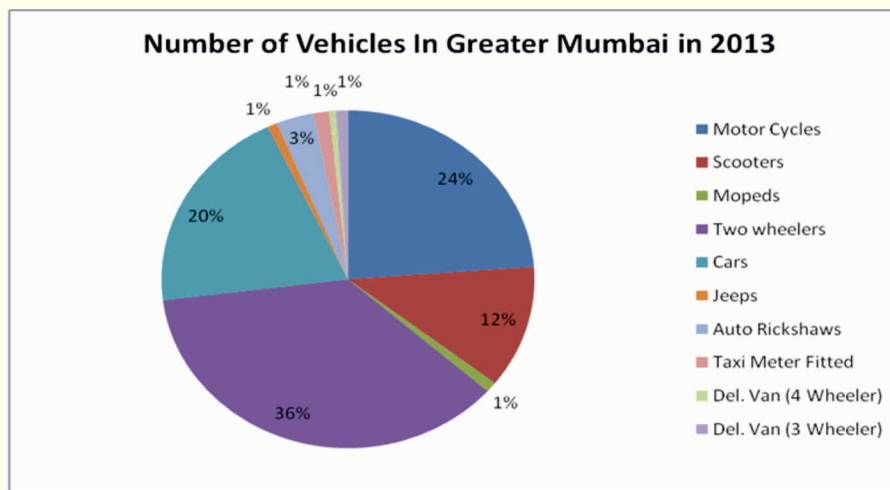
Figure 1: Distribution of number of vehicles in Greater Mumbai

Table 4-Growth of Vehicles in Mumbai as on March 2010, 2011, 2012 and 2013

Name of Office	2010	2011	Percentage Growth	2012	Percentage Growth	2013	Percentage Growth
Mumbai C	593902	601176	1.22	637768	6.09	676514	6.08
Mumbai W	809225	870558	7.58	950394	9.17	1026821	8.04
Mumbai E	364671	398577	9.3	440338	10.48	484063	9.93
Greater Mumbai	1767798	1870311	5.8	2028500	8.46	2187398	7.83
Maharashtra	15768421	17434099	10.56	19432361	11.46	21488152	10.58

To control the air pollution due to vehicles of Mumbai, the fuel used to run the vehicle has mostly been shifted from petrol and diesel to CNG. CNG and LPG are the clean fuels. The air pollution happening through vehicular exhaust due to fuel consumption comprises of Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2), Carbon Monoxide (CO), Suspended Particulate Matter (SPM), hydrocarbons and others. The pollution directly affects the human and environment and in a long run it might create lots of health risk. The nitric oxide and nitrogen dioxide level was recorded as 252 microgram per cubic meter (mcg/m^3) which is beyond the safe limit of 80 mcg/m^3 (Karkaria,

2014). The Pollution under Control (PUC) tests have been initiated to reduce the exhaust pollution, it has been introduced in Mumbai under Bharat-IV norms. PUC check, unleaded petrol and catalytic converter are effective to control air pollution due to particulates, carbon monoxides, lead and other. But the unleaded petrol vehicle emits benzene as a pollutant which is cacogenic in nature. Total suspended particles (TSP) source are majorly from roads caused by vehicle, emissions from diesel and gasoline vehicle and so on (MCGM, Environment, 2005).

There are around 700,000 cars that run on the road of Mumbai. Government is directly or indirectly encouraging the private vehicle ownership by constructing the infrastructures like expressways and flyovers instead of increasing the capacity of mass rapid transit system. As a result in the last eight years, private vehicles have increased by 57 percent on the other hand public busses have only increased by 23 percent.

Mostly the urban services are privatized and individuals own their private vehicles. The increasing number of private vehicles leads to traffic jams and decrease the efficiency of public transport. Larger number of public and private vehicle emits SO_x, NO_x, CO and other particulate matter which results in air pollution.

MATERIAL AND METHODOLOGY

Qualitative methods have been used to understand the relationship between urbanization and environmental hazard. It is based on the secondary data analysis. The materials used for this study includes air pollution data, rainfall data and other secondary data sources.

Air pollution level of Bandra and Sion were compared and analyzed along with rainfall data on temporal basis for the period in between 2008 to 2012.
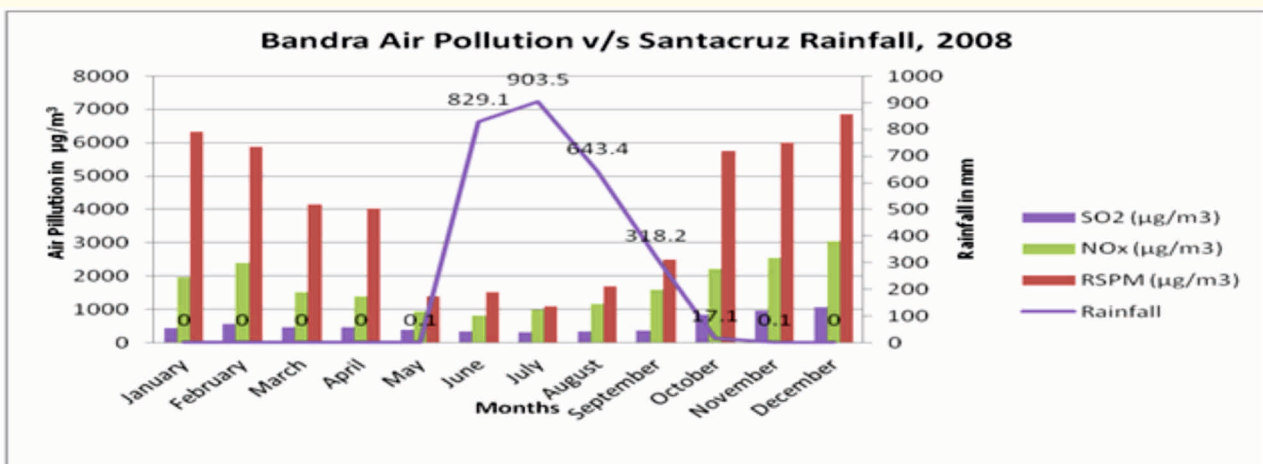
ANALYSIS AND DISCUSSION

Figure 2: Bandra air pollution v/s Santacruz rainfall, 2008

Figure 2 shows that in the year 2008 the pollution level of SO_2, NO_x and RSPM is 20, 22 and 14 percent respectively during the monsoon season.
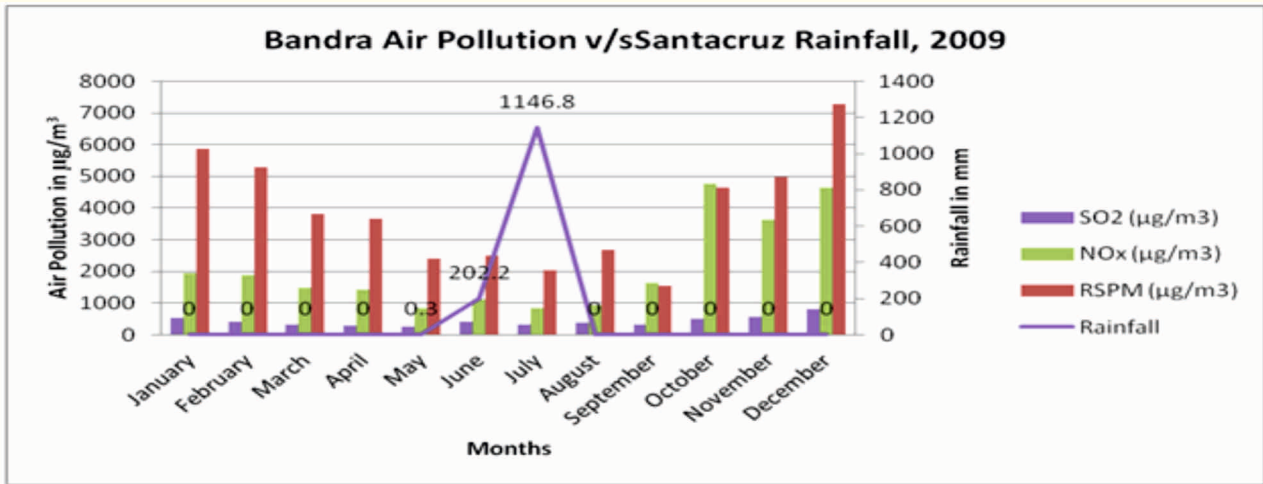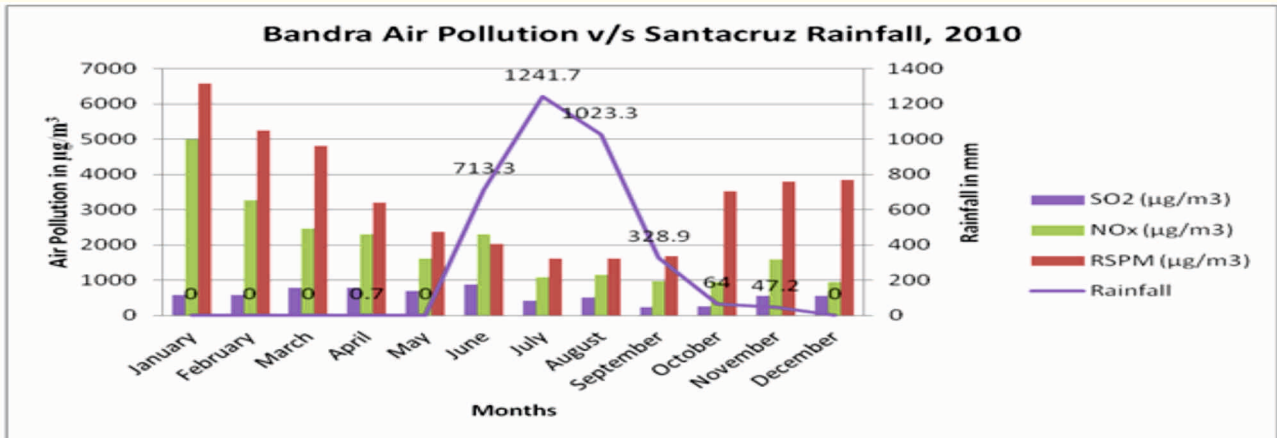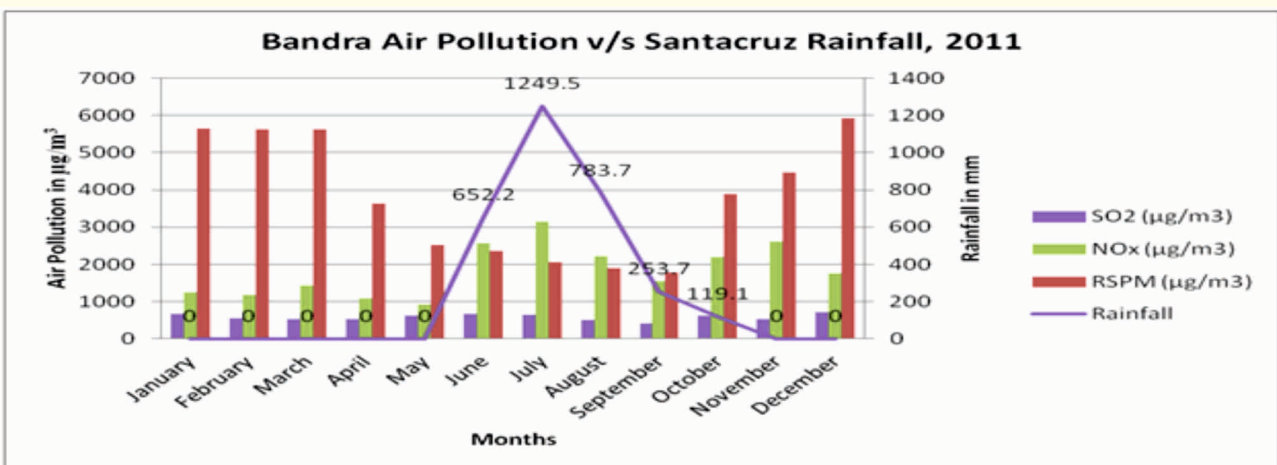
Figure 3: Bandra air pollution v/s Santacruz rainfall, 2009

Figure 3 shows that in the year 2009 the pollution level of SO_2, NO_x and RSPM is 28, 18 and 19 percent respectively during the monsoon season.
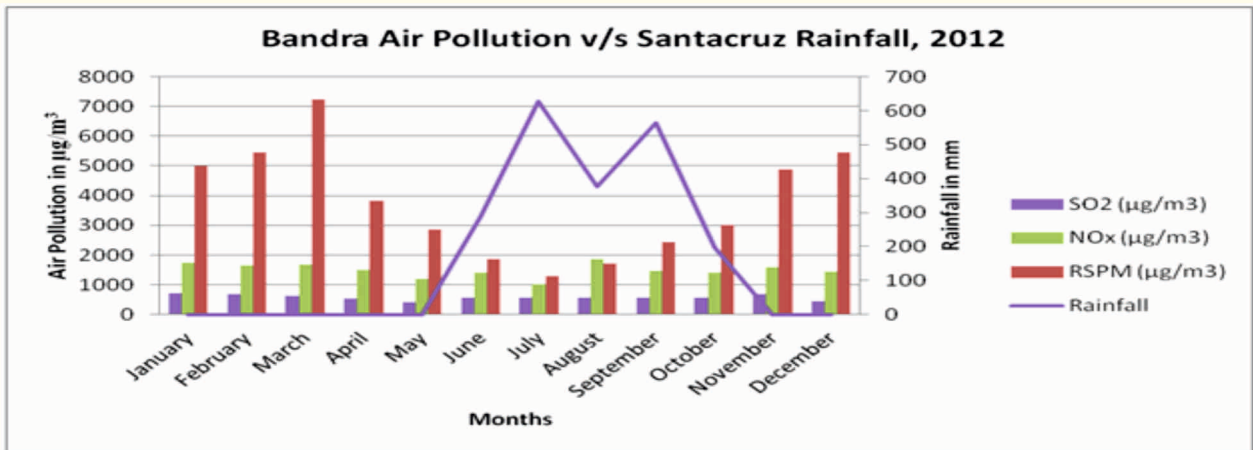

Figure 4:Bandra air pollution v/s Santacruz rainfall, 2010

Figure 4 shows that in the year 2010 the pollution level of SO_2, NO_x and RSPM is 30, 23 and 17 percent respectively during the monsoon season.

Figure 5:Bandra air pollution v/s Santacruz rainfall, 2011

Figure 5 shows that in the year 2011 the pollution level of SO_2, NO_x and RSPM is 32, 43 and 18 percent respectively during the monsoon season.

Figure 6: Bandra air pollution v/s Santacruz rainfall, 2012

Figure 6 shows that in the year 2010 the pollution level of SO_2, NO_x and RSPM is 32, 32 and 16 percent respectively during the monsoon season.
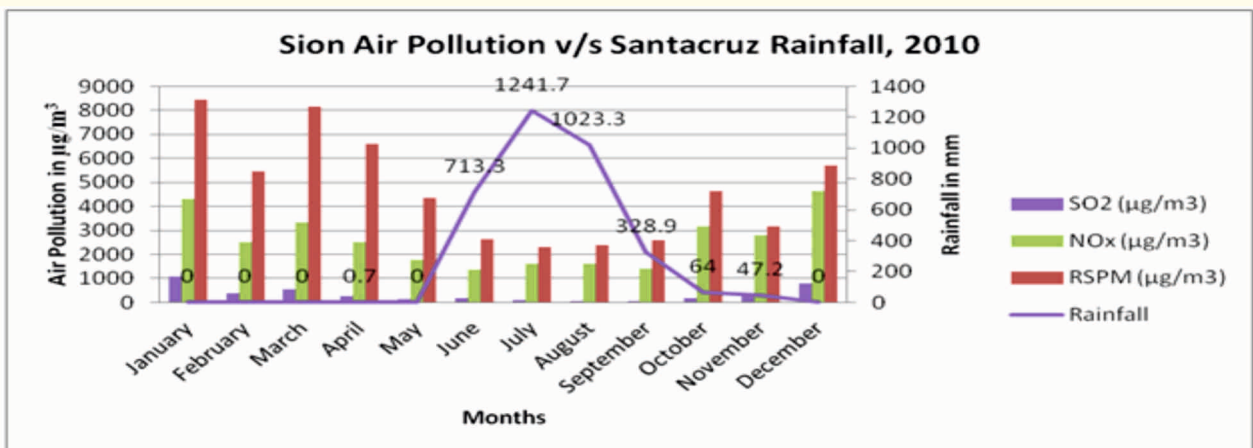

Figure 7: Sion air pollution v/s Santacruz rainfall, 2010

Figure 7 shows that in the year 2010 the pollution level of So_2, NO_x and RSPM is 8, 19 and 18 percent respectively during the monsoon season
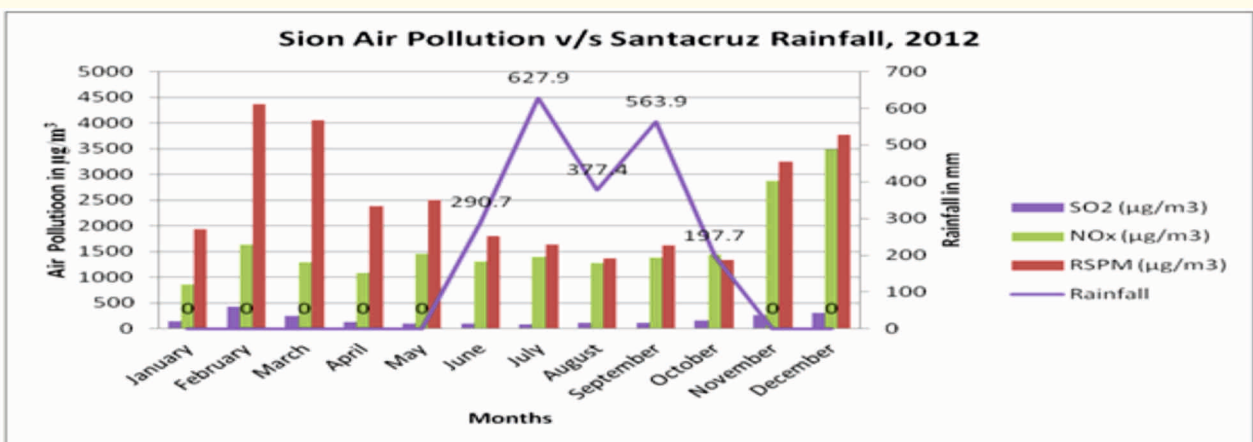

Figure 8: Sion air pollution v/s Santacruz rainfall, 2010

Figure 8 shows that in the year 2012 the pollution level of SO_2, NO_x and RSPM is 19, 27 and 21 percent respectively during the monsoon season.

RESULT AND CONCLUSION

The number of vehicles in the city of Mumbai has increased drastically over the period of time. There is a tremendous increase in the number of private vehicle including two and four wheelers as compared with the public transportation system. According to the above shown graphs it is noticed that throughout the year the absorbed level of air pollution is high except during the monsoon season.

There is a need for more environmental friendly vehicles in the city even though many vehicles run on CNG as a fuel. There has to be an adequate transportation and network infrastructure and proper maintenance need to be taken care at regular interval of time. Regular automated monitoring has to be done through geo-database to have a clear knowledge about the vehicle condition time to time.

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Impact Assessment of Dumping Ground Fire on Health: A Case Study in Mumbai
A Pop-Envis Initiative

Mumbai city witnessed high levels of air pollutants during January end – February first week, 2016 due to fire in the Deonar dumping ground in eastern suburb of Mumbai. The present research study is a pop-envis initiative funded by the Ministry of Environment, Forest and Climate Change (MoEF&CC).

Objectives:

High level of air pollution has much repercussion on health across all ages. The main objective is to understand how far such acute change in air quality is making on an impact on health of child, youth, adult and elderly people.

We have gathered information from households of around 340 located close to Deonar dumping ground. Around 30 student volunteers of IIPS were involved in data collection. Qualitative data were also gathered by IIPS student volunteers.

Training to Student Volunteers in Quantitative Data Collection

Quantitative Data Collection by Student Volunteers, IIPS, Mumbai

Aerial View of Deonar Dumping Ground Fire

Source: http://earthobservatory.nasa.gov/NaturalHazards / view.php? Id=87429

Thane Creek

Deonar dumping ground

Smoke

News on Deonar Dumping Ground Fire, 2016

1. **Mumbai: Fire at Deonar dumping ground leads to smog in nearby areas**

By Tanvi Deshpande | Mid-day | Posted 28-Jan-2016

A fire broke out at the Deonar dumping ground again on Thursday morning resulting in neighbouring areas such as Chembur, Govandi and even Ghatkopar having smog in the air. "The fire has broken out at two-three spots in the dumping ground but its cause is unknown. We are trying to control it with the help of heavy machinery. The machines help remove the garbage, following which the source of the fire is found and then it is doused. So far, we are doing it ourselves. If water is needed, we'll call the fire brigade," said deputy municipal commissioner Prakash Patil, in-charge of dumping grounds. Patil said that it will take the entire day to douse the fire. Meanwhile, its smoke has spread to the surrounding residential areas and people have taken to the social media to report the matter.

2. **Deonar fire rages on, continues to lead to smog in Mumbai**

DNA Web Team | Posted 29-Jan-2016

Mumbaikars living in the central and southern parts of the city experienced smog on a second consecutive day. Residents of Chembur, Wadala and Ghatkopar dealt with smog since early morning today. Chembur residents on Friday woke up to an unhealthy smog cover. Residents even complained of headache and coughing problems due to the smog. The smog is said to have worsened since yesterday, due to the fire at Deonar Dumping Ground.

Residents living near the dumping ground in Mumbai's North East area have been complaining about how the smoke has been affecting their health. Sarthak Mhatre a college student from Chembur, said, "There is a burning sensation in my eyes due to the smog. I am planning to call the day off."

"From Thursday morning the smoke started to affect residents of Mankhurd, Govandi and Chembur severely," said a senior civic official at Deonar to leading English daily.

As per the English daily, the fire was on the Ghatkopar side of the dumping ground. Ghatkopar side of the dumping ground.

Since the fire was 2,000 feet away from the main road, fire engines had found it difficult to go inside. They were using sand instead of water to control the fire since there was no source of water.

Upcoming Conferences

1. **ISEM 2016 — The International Society for Ecological Modelling Global Conference 2016**

    Conference Date and Location: 08 May 2016 - 12 May 2016, Baltimore, United States

    This global conference is the 20th biennial conference of the Society and looks to bring together scientists from all professions and applications that deal with the use of ecological models and systems ecology.

    Topics: Ecological Simulation Models, Ecological Modelling, Environmental Management, Socio-Ecological, Urban, Integrated Assessment, Modelling Ecosystem Services, Biodiversity, Conservation Modelling, Ecological Landscape, Land Use Change Modelling, Climate Change, Network Modelling, Systems Ecology

    Website: http://www.isemconference.com/

2. **GEG2016 — 3rd International Conference "Geography, Environment and GIS, for students and young researchers"**

    Conference Date and Location: 19 May 2016 - 21 May 2016, Targoviste, Romania

    The conference seeks possibility enhancement of research results in order to initiate collaboration between geographers and students from other specialized, from different universities in the country and foreign countries, to conduct interdisciplinary analysis on environmental issues.

    Topics: Geography, Global Positioning System, Earth Observation,   Meteorology and Climate Change

    Website: http://www.limnology.ro/geg2016.html

3. **2nd EWaS International Conference: 'Efficient & Sustainable Water Systems Management toward Worth Living Development'**

    Conference Date and Location: 01 Jun 2016 - 04 Jun 2016, Chania, Greece

    The conference is aiming to bring together scientists dealing with challenges encountered throughout the entire water cycle. The Conference Topics: deal with hydraulics, hydrology, water resources systems

management, urban water management, riverine systems, hydrodynamics and waves, climate change & smart cities, row and waste water treatment, waste management and groundwater and irrigation systems.

Website: http://www.ewas2.tuc.gr

4. **SDC 2016 — Sustainable Development Conference 2016**

Conference Date and Location: 07 Jul 2016 - 09 Jul 2016, Kuching, Malaysia

Sustainable Development Conference 2016 is a forum, discussion and networking place for academics, researchers, professionals, administrators, educational leaders, policy makers, industry representatives, advanced students, and others interested in the Topics: related to sustainable development.

Topics: Sustainable development, ecology, environment, green energy, biodiversity, agriculture, climate

Website: http://www.sdconference.org

5. **WCS — World Cities Summit**

Conference Date and Location: 10 Jul 2016 - 14 Jul 2016, Singapore, Singapore

The World Cities Summit is the exclusive and premier platform for government leaders and industry experts to address challenges of liveable and sustainable cities, share integrate urban solutions and forge new partnerships. The biennial World Cities Summit (WCS) is an exclusive and premier platform for government leaders and industry experts to address liveable and sustainable city challenges, share integrated urban solutions, and forge new partnerships.

Topics: Liveable Cities, Sustainable Cities, Globalisation, Urbanisation, Urban Solutions

Website: http://www.worldcitiessummit.com.sg/

6. **CESS — Clean Enviro Summit Singapore**

Conference Date and Location: 10 Jul 2016 - 14 Jul 2016, Singapore, Singapore

Clean Enviro Summit Singapore is the global platform for government leaders, policy makers, regulators and industry captains to connect, examine and discover practical solutions to address environmental challenges for tomorrow's cities.

Topics: Waste Management, Clean Management, Environmental Technology, Recycling Solutions

Website: http://cleanenvirosummit.sg/

7. **EWWM — International Congress on Water, Waste and Energy Management**

Conference Date and Location: 18 Jul 2016 - 20 Jul 2016, Rome, Italy

The 3rd International Congress on Water, Waste and Energy Management (EWWM) is organized by academics and researchers belonging to different scientific areas of the C3i/Polytechnic Institute of Portalegre (Portugal) and the University of Extremadura (Spain) with the technical support of Science Know Conferences.

Topics: Water, waste, energy, management, water management, energy management, waste management

Website: http://www.waterwaste.skconferences.com/

8. **ICEEE 2016 — International Conference on Energy, Environment and Economics**

Conference Date and Location: 16 Aug 2016 - 18 Aug 2016, Edinburgh, United Kingdom

ICEEE2016 focuses on energy, environment and economics of energy systems and their applications. Conference will provide forum for both researchers and academicians around the world to present original research papers.

Topics: Energy, Environment and Economics

Website: https://www.weentech.co.uk/iceee2016/

9. **IAP 2016: Interfaces Against Pollution**

Conference Date and Location: 04 Sep 2016 - 07 Sep 2016, Lleida, Spain

The conference Interfaces Against Pollution will be an opportunity for researchers active in the many fields of surface and colloid science related to environmental issues, to get together in a friendly and constructive atmosphere.

Topics: 1. Water treatment and soil remediation technologies

2. Instrumental techniques for probing interfacial processes

3. Elemental Speciation, bio uptake, bioavailability and toxicity

4. Natural and engineered colloids and nano particles

5. Fundamentals of Colloid and interface science

6. Global Environmental processes

Website: http://www.iap2016.org

10. WRW 2016 — 3rd International Conference "Water resources and wetlands"

Conference Date and Location: 08 Sep 2016 - 10 Sep 2016, Tulcea, Romania

The scientific subjects which will be addressed cover a wide area of interest ranging from the study of the behavior of inland waters (groundwaters, rivers, lakes and man-made reservoirs) and coastal sea waters to the analysis of the degree to which these resources have been affected in terms of quality due to human intervention and present climate changes.

Topics: Hydrology, Meteorology and Climate Change

Website: http://www.limnology.ro/wrw2016/abstract.html

11. 1st International Conference on Sustainable Water Processing

Conference Date and Location: 11 Sep 2016 - 14 Sep 2016, Sitges, Spain

The conference will allow the dissemination and discussion of cutting edge research in water process engineering, sustainability and energy efficiency. The scope will include theoretical and applied research, technological and industrial development.

Website: http://sustainablewaterprocessing.com/

12. 4th International Conference on Sustainable Development, ICSD-2016, Rome, Italy

Conference Date and Location: 16 Sep 2016 - 17 Sep 2016, Rome, Italy

This interdisciplinary forum is for scholars, teachers, and practitioners from any professional discipline who share an interest in—and concern for— sustainability in an holistic perspective, where environmental, cultural, economic and social concerns intersect.

Topics: Economic Sustainability, Environmental Sustainability, and Socio-Cultural Sustainability.

Website: http://www.ecsdev.org/index.php/conference

13. Green Urbanism

Conference Date: 14 Oct 2016 - 16 Oct 2016, Lecce, Italy

The conference provides a context for a general debate about the regeneration of the city center and discusses how urbanism is affected by the paradigms of ecology.

Website: http://www.ierek.com/events/international-conference-green-urbanism/

14. World Conference on Climate Change (Climate Change 2016)

Conference Date: Oct 24-26, 2016

Location: Valencia, Spain

It provides a premier technical forum for reporting and learning about the latest research and development, as well as for launching new applications and technologies and the effectiveness of various regulatory programs towards GIS and remote sensing.

Website: http://climatechange.conferenceseries.com/

Call for Paper

We are inviting research paper on **"population, human settlement and environment"** for our upcoming Pop- Envis Newsletter, ISSN NO- 0975-7287.

Kindly submit your paper to these email addresses: **popenvis@iips.net** and CC: to **iip-env@nic.in** .

Sr. No.	Information	Detail
1	ISSN NO.	0975-7287
2	Website	www.iipsenvis.nic.in
3	Email Id	popenvis@iips.net & iip-env@nic.in
4	Publication	Quarterly
5	Submission Mode	Online

Note: Kindly submit **Word format of your research paper**; Article, commentary, poetry, photographs etc. are invited based on **"population, human settlement and environment"** in your own words.

Web Page: www.iipsenvis.nic.in

National Interaction-cum-Evaluation Workshop
17th – 19th February, 2016

National Interaction-cum-Evaluation Workshop for ENVIS Centres was conducted by MoEF&CC and WWF India at New Delhi from 17th – 19th February, 2016. Dr. Anandi Subramanian, Senior Economic Advisor, MoEF&CC welcomed and thanked all the 69 Envis Centres across the country for their participation in the Workshop. The workshop was inaugurated by the Honourable Minister Shri Prakash Javadekar, Minister of State (Independent Charge), Environment, Forest and Climate Change by launching the ENVIS Portal. In his inaugural speech he said all centres should take initiative to find new ways to reach among people and make them aware regarding the subject and how it is useful for them. Shri Kumar Rajnish explained the use of the Envis web portal (http://envis.nic.in/index.aspx) and its new features added in Envis Network Link, Envis Subject Link, E-Publication Link, ISBEID, Envis on Bhuvan, Envis Library-Publication, Envis Subject, Envis expert in different subject etc. to all the envis centres.

ENVIS Portal launched by the Honourable Minister Shri Prakash Javadekar

ENVIS Portal: http://envis.nic.in/

ENVIS Network Publication

Bhuvan Portal
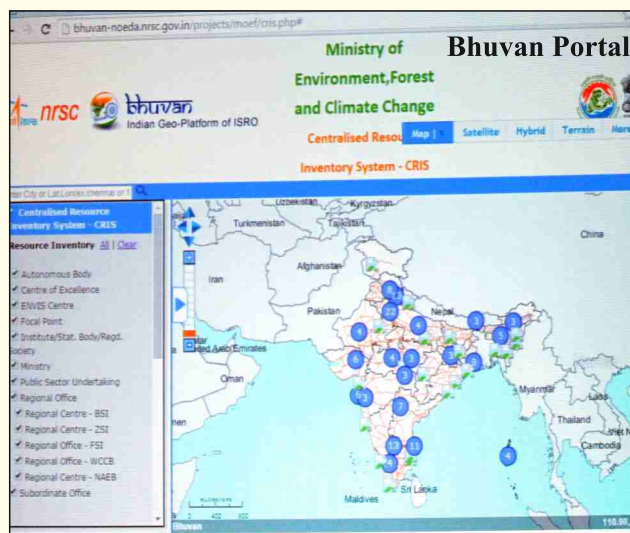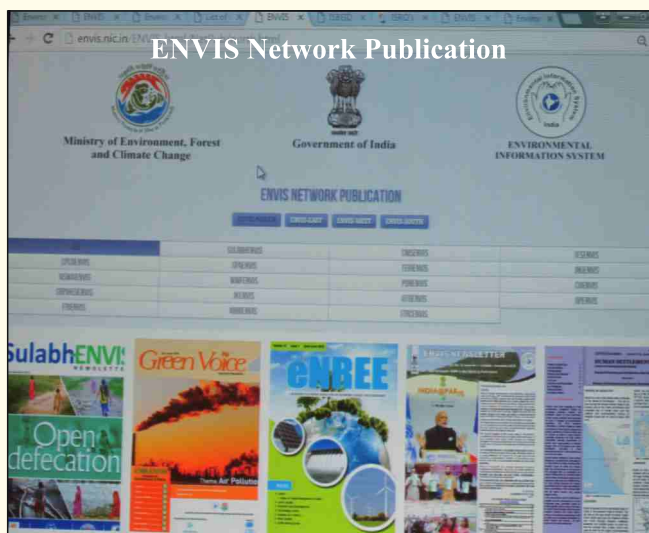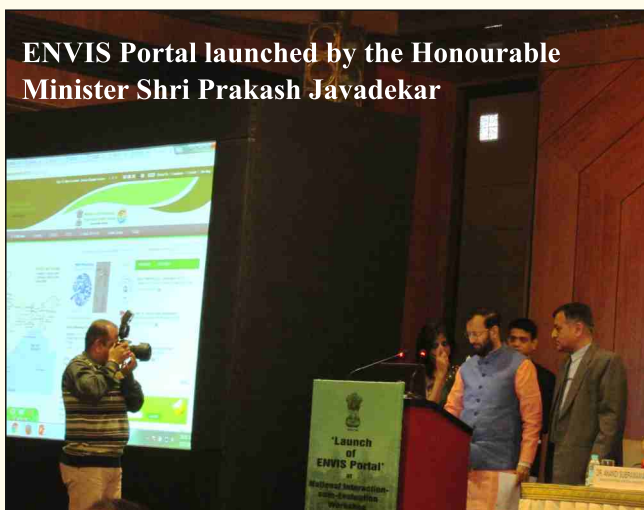
All the Envis centres displayed their activities, newsletters, knowledge product/information in the exhibition which was addressed by Honourable Minister Shri Prakash Javadekar, Shri Ashok Lavasa and Dr. Anandi Subramanian of MoEF&CC.

Display of Activities of Various Envis Centres

Shri Prakash Javadekar released knowledge products/information of ENVIS Centres such as Bulletin, Book, CD and two Android Mobile APP. Best thematic centre award was given to Indian Institute of Science, Bengaluru and Forests, Environment & Wildlife Management Department, Sikkim bagged the best State Envis centre award for the year 2015-16.

Release of Knowledge Products / Information

Release of Android Mobile APP

Mr. Vishnu Chandra, Deputy Director General & Head of Group, National Informatics Centre demonstrated 'BHARAT MAPS' and its importance and use to the participants. He explained the design and features available in Bharat maps. A representative of NIC explained about Terrain map, Base Maps and Satellite Imagery etc. and its uses. He added that this technology was developed by Department of Electronics & Information Technology, Ministry of Communications & Information Technology and National Informatics Centre (NIC).

Demonstration on 'BHARAT MAPS'

Demonstration on 'BHARAT MAPS' mapping features

Evaluation workshop for ENVIS centres was started with website presentation. Each Envis centre explained all their activities through website presentation. Judges appreciated the best work and effort and advised to focus on data analysis along with graphical or map representation.

Evaluation workshop

Evaluation workshop

Dr. Anandi Subramanian, Senior Economic Advisor, MoEF&CC has concluded the session by briefing the three days evaluation workshop. Vote of thanks was given by Envis Coordinator of World Wide Fund for Nature – India (WWF).

Concluding Session of
National Interaction-cum-Evaluation Workshop

ENVIS Family

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