

Seminar Report

Environmental Community Awareness Seminar Series

Air Pollution in Kathmandu Valley



Prepared by

Asta-Ja Research and Development Centre (Asta-Ja RDC) Kathmandu, Nepal

Supported by

**Non-Resident Nepali Association National Coordination Council (NRNA NCC) USA,
Community Environment Academy, and Asta-Ja USA**

18th September 2019

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1. Background

Air pollution has been a major problem of 21st century for both developed and developing world. It has a negative impact on various environmental aspects which directly or indirectly affect the quality of human health. Nepal, especially Kathmandu, in the current situation, is observing rapid urbanization and various infrastructure development activities. As a result, these sorts of human activities have been responsible for increasing air pollution in an enormous rate inside Kathmandu Valley. Furthermore, Rapid urbanization, unplanned development activities, smoke from brick kilns, ongoing road widening drive and construction works and increasing number of vehicles have contributed in making Kathmandu one of the most polluted cities in the world.

Air pollution has been a huge burden to the residents of Kathmandu, threatening the lives of thousands of people of every year. The scenario is obvious to worsen in the coming years if immediate preventive measures are not taken. It is of utmost urgency to educate the common people on harmful aspects of air pollution and the necessary precautions to prevent its deadly consequences. The solution to Kathmandu's air pollution can be achieved only when the government takes the leading role in addressing the situation and everyone is responsible for taking action in reducing air pollution. Lately, many governmental and non-governmental organizations and International Agencies are taking great initiatives and putting their efforts in controlling the problem of air pollution. However, the pace of the implementation of pollution corrective measures is very slow. Local communities have very low level of environmental awareness, if any. Hence, it is urgent to raise community awareness against air pollution and environmental degradation in the country. Young students can provide big support in fighting air pollution while taking initiatives on their own and spreading the words of air pollution control to the local communities.

With the purpose of contributing to the governmental campaign of making urban and rural areas environmental pollution free, Asta-Ja Research and Development Centre (Asta-Ja RDC), Kathmandu, Nepal, organized the Seventh seminar "Air Pollution in Kathmandu Valley" as part of the on-going 'Environmental Community Awareness Seminar Series' on 18th September, 2019 with funding support from Community Environment Academy & Non-Resident Nepali Association National Coordination Council (NRNA NCC) USA and technical support from Asta-Ja USA. The seminar was hosted in GS College Kalimati, Kathmandu. Students from 10+2 and Bachelor level, the College Program Coordinator of the College, and Board of Director from Asta-Ja RDC were actively participated in presentation, discussion, and interaction sessions.

Major objective of the seminar was to provide students with basic knowledge and understanding of air pollution, sources and impacts of air pollution, and important air pollution control measures. The seminar consisted of PowerPoint presentations, discussions, interactions, and feedback collection sessions. The seminar was a great success. Expected outcomes of the seminar include that the students will be able to evaluate the main causes of air pollution, analyze any existing pollution reduction technologies, and create their own model, technology and innovation which may eventually help in controlling air pollution.

2. Seminar objectives and Target groups

The overall objective of the seminar series is to raise community awareness on environmental pollution in Kathmandu Valley targeting primarily student communities representing both Colleges and High Schools. Students will acquire basic knowledge about air pollutants, understand the sources and effects of air pollution, and they will use their knowledge in minimizing or controlling air pollution. Students will be able to analyze existing air pollution control strategies and develop their own model, technologies or strategies for future implementation.

3. The Seminar on Air Pollution in Kathmandu Valley

The Seventh seminar in this series was held on the topic of “**Air Pollution in Kathmandu Valley**” on 18th September 2019. In total 36 students of 10+2 and Bachelors in Management had participated in the seminar along with College management team and members of Asta-Ja RDC. The seminar was held at GS College, Kalimati, Kathmandu. Dr. Shanti Kala Subedi, Chief, Research & Innovation Unit of Himalaya College of Engineering, Lalitpur, was the resource person for the seminar. Dr. Subedi has a long experience in environment program, teaching, research & training and consultancy services particularly in the field of Engineering, Rural Community Development and environment management for the implementation of environmental issues in Nepal. Asta-Ja RDC Executive Member Mr. Bishnu Dayal Singh coordinated and facilitated the seminar. Mr Singh also highlighted about the activities of Asta-Ja with their success stories. Mr. Dipen Limbu, Program Coordinator of GS College Kalimati, Kathmandu highlighted issues of air pollution in Kathmandu and thanked the Asta-Ja RDC team for hosting the event in GS College Kalimati, Kathmandu. Office Coordinator of Asta-Ja RDC, Mr. Hari Bhusal, provided logistics management support.

4. Presentation outlines (contents)

The Power Point presentation from Dr. Shanti Kala Subedi included:

1. Air pollution, major pollutants,
2. Type & sources of air pollution
 - Type of Air pollution (Indoor Air pollution, Outdoor air pollution)
 - Sources of air pollution (Mobile sources, Stationary sources, Natural and Anthropogenic sources)
3. Causes and effects of air pollution
4. Air pollution in Kathmandu valley
5. Impact of air pollution on health and environmental
6. Preventive measures
7. Local, national and international initiation
8. Future challenges and opportunities

In the presentation, Dr. Shanti Kala Subedi highlighted importance of clean environment to human and other creatures and their interrelationships. Further, students were briefed why development works avoid environment conservation and take it as a burden. The session mainly focused on environmental air pollution and their types, sources of air pollution, effects of air pollution, air pollution in Kathmandu Valley, preventive measures, and pollution control initiatives taken by the Government of Nepal. The seminar also emphasized on legal and practical measures on air pollution in Nepal with current problems and management options. The role and responsibilities for different stakeholders were also shared among the

participants and also shared different pictures to trigger the participant's opinion in favor of air pollution protection.

Key messages communicated to the participants included:

- Environment is an integral part of human life, it should be protected to save the creatures on earth.
- Environment protection and development activities cannot be separated from each other. Sustainable development emphasizes wise and limited use of resources from the earth.
- Environmental air pollution is increasing day by day and it has alarming impacts on human health.
- The main key messages included were sources of air pollution, effects of air pollution, air pollution in Kathmandu Valley, preventive measures, and pollution control initiatives taken by the Government of Nepal
- “Being responsible” is the key to manage air pollution, and it further needs citizen's awareness enhancement.

5. Discussions:

Floor was open for discussion followed by PowerPoint presentation from the resource person. Questions asked by the participant students during the discussion session are presented below. The resource person responded very well to all the questions and concerns raised by the student participants in the seminar and also gave possible solution.

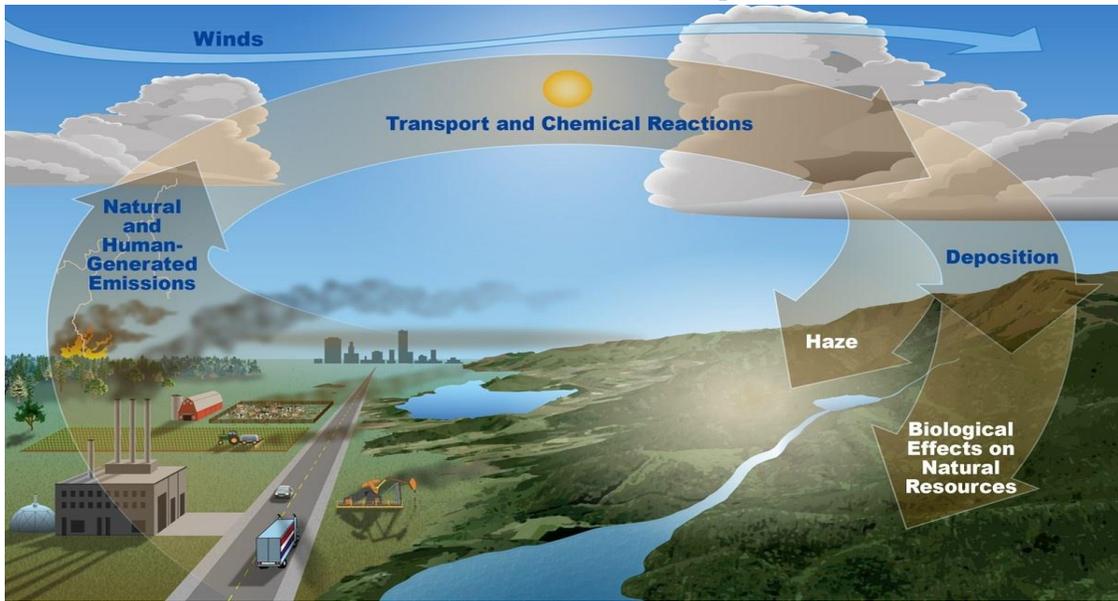
- How is urbanization affecting air pollution problem in Kathmandu and Nepal?
- Old / outdated vehicles are major cause of emission in Kathmandu valley, how can we manage them?
- How can we manage air pollution from Brick Kilns?
- Will the brooming system initiating from Municipality effective and sustainable?
- What can we do from our side to reduce air pollution in Kathmandu valley?

6. Conclusion:

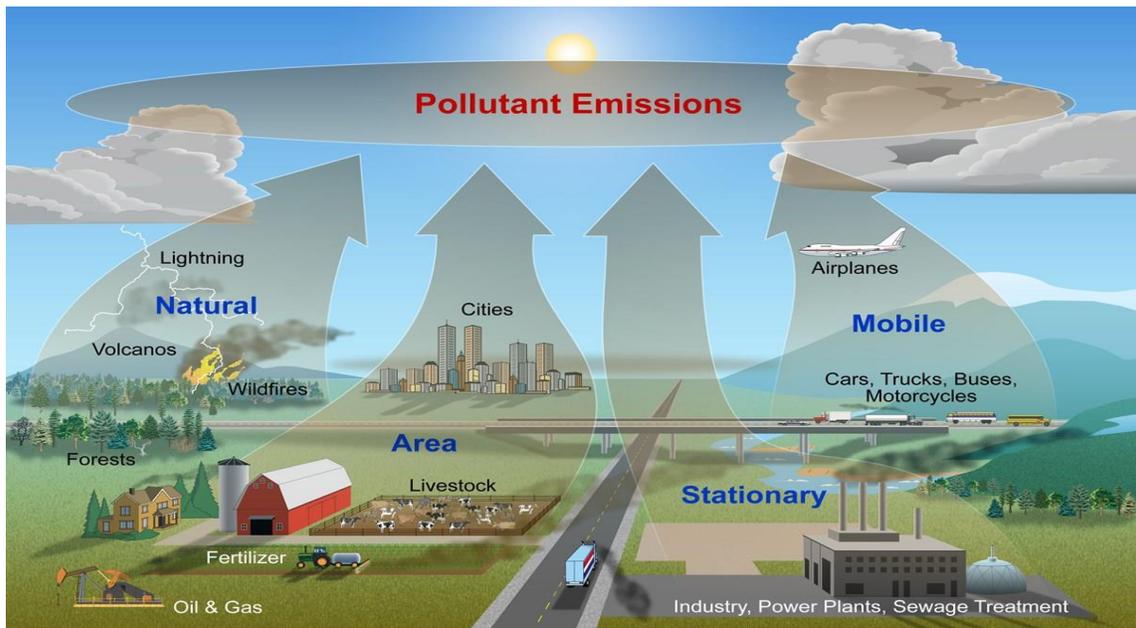
The seminar was very successful in conveying the message of air pollution effectively and clearly along with impacts of air pollution on public health to the participants. Air pollution may also cause harm to other living organisms such as animals and food crops, and may damage the natural or built environment.

The seminar was very helpful to student participants in gaining knowledge about air pollutants, understanding sources and effects of air pollution, and identifying important remedial measures for pollution control. Participants realized the responsibility of all stakeholders including students and common citizens in supporting environmental awareness programs undertaken by various agencies and the Government of Nepal for meeting the goal of clean, green and prosperous Kathmandu Valley.

Annexes 1: Air Pollution related photos



Picture 1: Air pollution basic causes



Picture 2: Sources of Air Pollution



Picture 3: Air Pollution in Kathmandu valley



Picture 4: air pollution from unmanaged traffic lanes, and protection measures



Picture 5: Air pollution in Kathmandu valley by underconstructing road condition



Picture 6: Air pollution from brick factory, Bhaktapur, Nepal

Annexes 2: Event photos



Picture 7: Presentation on 'Air Pollution in Kathmandu Valley'



Picture 8: Students Participating on 'Air Pollution in Kathmandu Valley'



Picture 9: Students Participating on 'Air Pollution in Kathmandu Valley'



Picture 10: Attendees in 'Environmental Community Awareness Seminar'

**ASTA-JA RESEARCH AND DEVELOPMENT CENTRE
KATHMANDU NEPAL**

Air Pollution

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9/18/2019

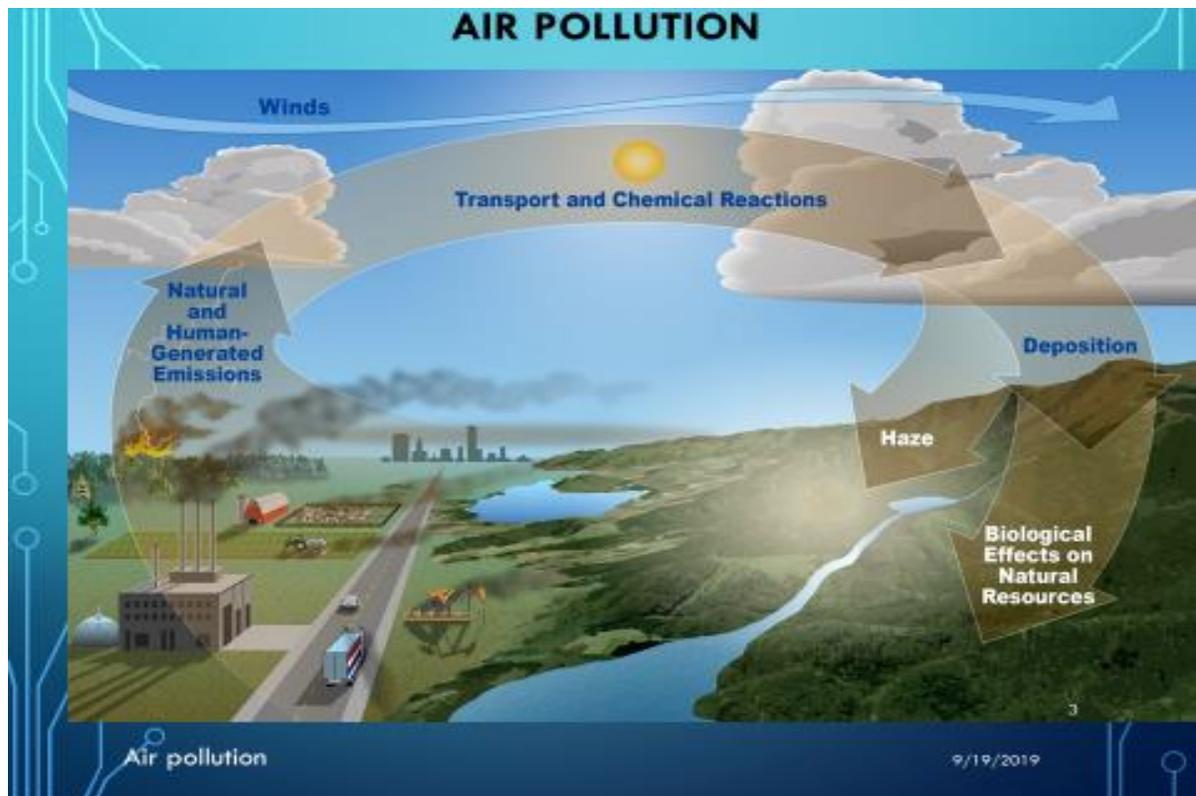
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PRESENTATION OUTLINE

- 1. Air pollution**
- 2. Types and sources**
- 3. Causes and effects**
- 4. Preventative measures**
- 5. Local, national and international initiation**

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TYPES OF AIR POLLUTION

- **Indoor Air pollution**
- **Outdoor air pollution**

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SOURCES OF POLLUTION

- **Mobile sources** – such as cars, buses, planes, trucks, and trains
- **Stationary sources** – such as power plants, oil refineries, industrial facilities, and factories
- **Natural sources** – such as wind-blown dust, wildfires, and volcanoes

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SOURCES OF AIR POLLUTION

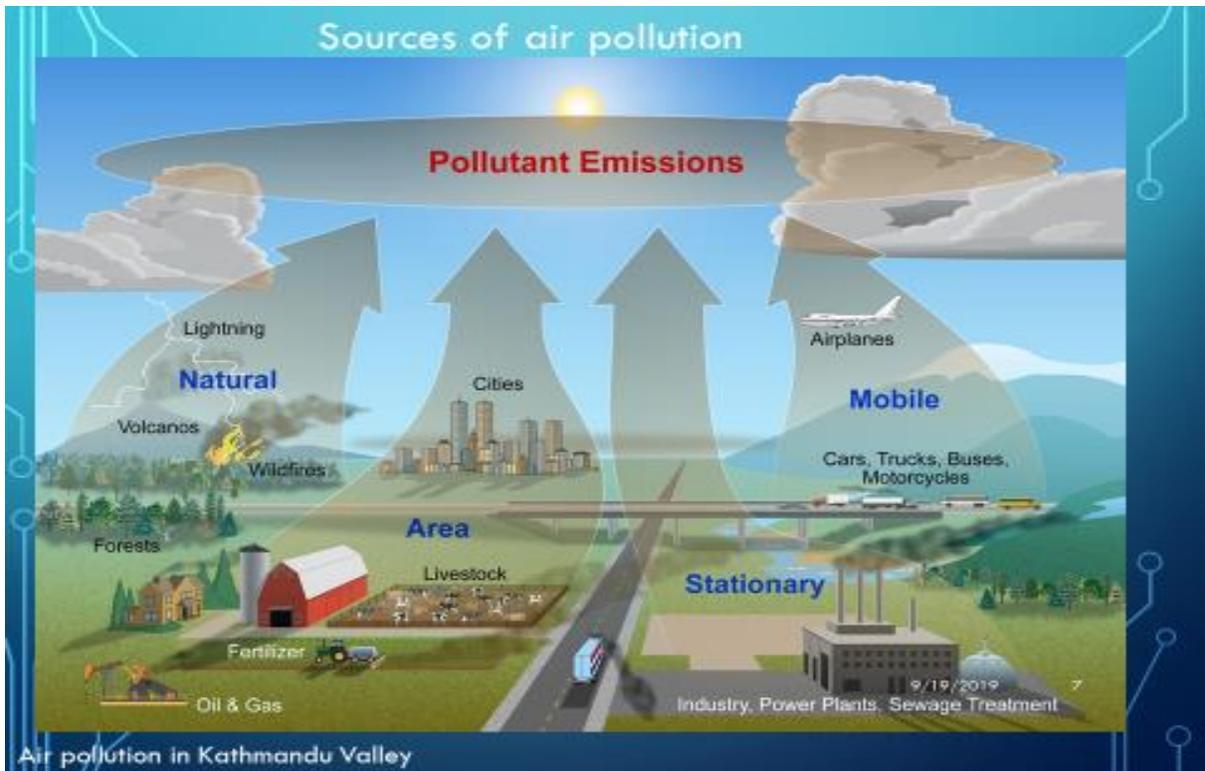
• **Anthropogenic air pollution sources are:**

1. **Combustion of biomass**
2. **Excessive use of fossil fuels**
2. **Emissions from industries and factories, releasing large amount of carbon monoxide, hydrocarbon, chemicals and organic compounds into the air**
3. **Agricultural activities, due to the use of pesticides, insecticides, and fertilizers that emit harmful chemicals**4/29/2019
4. **Waste production, mostly because of methane generation in landfills**

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WAYS TO IMPROVE INDOOR AIR QUALITY

1. Reduce biomass burning for cooking; make biogas an alternative solution
2. Provide enough ventilations :
3. Make your home a non-smoking area,
4. Reduce tobacco and biomass burning
5. Keep a clean home.
6. Keep track of the humidity
7. Reduce the use of synthetic fragrances.
8. Indoor plants to promote air filtration
9. Test for Radon

CAUSE OF AIR POLLUTION

1. Burning of Fossil Fuels:

SO₂ from burning of coal, petroleum and other factory

CO caused by improper or incomplete combustion

NO₂ that is produced from both natural and anthropogenic processes.

2. Waste and deforestation

NH₃, CH₄- Waste management system –

Road construction (dusty and mostly ongoing)

CO, CO₂, SO₂- from Brick kilns

CO₂ emission : Deforestation: cutting off trees for road extension, carbon sequestration,

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AIR POLLUTION IN KATHMANDU VALLEY

Kathmandu is vulnerable for Air Pollution :

- Population (4.78% growth rate in 2017)
- CBS 2011, Dense population 13,225 per km²
- Increasing number/type of vehicles (14000 in 2001 to 8,00,000 in 2015)
- Rapid urbanization and infrastructure development
- Topographical settings (Valley/ cup shaped)
- Traffic management (roadways and airways)
- Waste management system
- Road construction (dusty and mostly ongoing)
- Agro-farming system (pesticides and fertilizers used)
- Brick kilns
- Deforestation: cutting off trees for road extension : - carbon sequestration,

POLLUTION GASES AND LEVEL

Terms used

- **Pollutants – Particulate Matters (PM)- PM10 and PM2.5, CO, CO₂, NO₂, CH₄, NH₃, SO₂, O₃,...**
- **Environment performance index, (EPI)**
- **National Ambient Air Quality (NAAQ)**
- **WHO standard**
 - **PM₁₀ - 120 µg/m³**
 - **PM_{2.5} - 40 µg/m³**
- **Impact on health and environment ...**

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CAUSE OF AIR POLLUTION ..

3. Exhaust from factories and industries:

- **Manufacturing industries release large amount of carbon monoxide, hydrocarbons, organic compounds, and chemicals**
- **Petroleum refineries also release hydrocarbons and various other chemicals that pollute the air and also cause land pollution.**

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EFFECTS OF AIR POLLUTION

• Health Impact

- 1. **Indoor air pollution:** Household cleaning products, painting supplies emit toxic chemicals in the air and cause air pollution. Have you ever noticed that once you paint walls of your house, it creates some sort of smell which makes it literally impossible for you to breathe.
- **Suspended particulate matter** popular by its acronym SPM, is another cause of pollution. Referring to the particles afloat in the air, SPM is usually caused by dust, combustion etc.

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HEALTH IMPACT

- **Respiratory and heart problems:**
- **Allergies, respiratory and cardiovascular diseases as well as lung damage.**
- **Several millions are known to have died due to direct or indirect effects of air pollution.**
- **60% of deaths premature death cardiovascular diseases have caused a maximum death of 22% followed by chronic respiratory diseases 13%, cancer 8%, and other NCDs 14%.**
- **Children in areas exposed to air pollutants are commonly suffer from pneumonia and asthma.**

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HEALTH IMPACT....

- **Status against WHO standard**
- **In 2016, Environmental Performance Index (EPI) of Nepal's air quality ranked 177th out of 180 countries**
- **Kathmandu is ranked one of the most polluted cities**
- **(PM2.5) in urban areas of Nepal was noted to be $140\mu\text{g}/\text{m}^3$ which is 10 times higher than the desirable value.**
- **Ministry of Science and Technology, in 2012, carried "National Ambient Air Quality. Test. The targeted PM10 and PM2.5 values were $120\mu\text{g}/\text{m}^3$ and $40\mu\text{g}/\text{m}^3$ 2nd times higher than the WHO targeted value.**

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EFFECTS OF AIR POLLUTION

4. Effect on Wildlife: Just like humans, animals also face some devastating affects of air pollution. Toxic chemicals present in the air can force wildlife species to move to new place and change their habitat. The toxic pollutants deposit over the surface of the water and can also affect sea animals.

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ENVIRONMENTAL IMPACT

1. **Global warming: With increased temperatures world wide, increase in sea levels and melting of ice from colder regions and icebergs, displacement and loss of habitat have already signaled an impending disaster if actions for preservation and normalization aren't undertaken soon.**

2. **Depletion of Ozone layer: Ozone exists in earth's stratosphere and is responsible for protecting humans from harmful ultraviolet (UV) rays. Earth's ozone layer is depleting due to the presence of chlorofluorocarbons, hydro chlorofluorocarbons in the atmosphere. As ozone layer will go thin, it will emit harmful rays back on earth and can cause skin and eye related problems. UV rays also have the capability to affect crops.**

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ENVIRONMENTAL IMPACT

- **Acid Rain:** Harmful gases like nitrogen oxides and sulfur oxides are released into the atmosphere during the burning of fossil fuels. When it rains, the water droplets combine with these air pollutants, become acidic and then fall on the ground in the form of acid rain. Acid rain can cause great damage to human, animals and crops.

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PREVENTIVE MEASURES

- At local level :
- Use of energy efficient appliances like; Light bulb, vehicles, other electronic devices
- Understand the concept of Reduce, Reuse and Recycle
- Use public transports
- Power savers' mode; turn off lights in non-use time
- Water treatment plant- river cleaning campaign
- Plantation green belt on road sides
- Eco-friendly infrastructures, and favorable internal working environment

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PREVENTIVE MEASURES

1. Use renewable fuel and clean energy production

- The most basic solution for air pollution is to move away from fossil fuels, replacing them with alternative energies like solar, wind and geothermal.

2. Apply energy conservation and efficiency

- Producing clean energy is crucial. But equally important is to reduce our consumption of energy by adopting responsible habits and using more efficient devices.

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Air pollution in Kathmandu Valley

PREVENTIVE MEASURES

3. Use Eco-friendly transportation

- Shifting to electric vehicles and hydrogen vehicles, and promoting shared mobility (i.e carpooling, and public transports) could reduce air pollution.

4. Use green building

- From planning to demolition, green building aims to create environmentally responsible and resource-efficient structures to reduce their carbon footprint

7. Monitoring air pollution levels to detect pollution peaks, better control air pollution and eventually improve air quality.

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GOVT. ACTS AND LAWS

- 1. Environmental policy and legislative framework: Environmental Act 1996 and Regulation 1997,**
- 2. National Climate Change Policy 2011**
- 3. National Low Carbon Economic Development Strategy (still in draft), and National Pollution Control Strategy and Action Plan**
- 4. Transport Sector Policies and Legislations: National Transport Policy 2001, Transport Management Act 2049**
- 5. Vehicles and Transport Management Rules 2054 (Nepalese calendar year), and National Sustainable Transport Strategy (NSTS)(2015-2040**

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GOVT. ACTS AND LAWS

- Industry Sector Policies and legislations: Industrial Policy 2011, Foreign Direct Investment Policy 2015,**
- Land Industrial Enterprises Act(2073)**
- Energy sector Policies and Legislations: Hydropower development Policy 2001,**
- Rural Energy Policy 2006, and Renewable Energy Subsidy Policy 2016**

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GOVT. ACTS AND LAWS

- (i) Task Force on Air Pollution Control in Kathmandu valley, 2073
- (ii) High Level Committee on Probing and Solving the Issues on 20 year Old Vehicles, 2058
- (iii) Committee on Implementation of the Order of supreme CourtonPhaseoutof20YearOldVehicles, 2058/59
- (iv) Committee on Review of Vehicle Emission Standard and Monitoring Mechanism 2060.
- (v) Relocation of Brick Industries from Kathmandu Valley 2060

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CHALLENGES AND OPPORTUNITY

- Technical know-how about pollutants
- Socio-economic factors for choosing clean fuels
- Behavioral & cultural factors eg. For using biogas etc.
- National policy & programs.

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