GREEN AUDIT CELL
GURUKULA KANGRI VISHWAVIDYALAYA,
(Deemed to be University U/S 3 of UGC Act 1956)
HARIDWAR - 249404,
UTTARAKHAND, INDIA

GREEN AUDIT REPORT: 2019

GURUKULA KANGRI VISHWAVIDYALAYA

GREEN AUDIT

2019

REPORT

Assessing Sustainability

GREEN AUDIT - 2019

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“ASSESSING SUSTAINABILITY”

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR, INDIA

C I T A T I O N

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Preface

Self – judgement is a process required for the outgrowth of an individual or an organization. Seeing the importance of environmental degradation and rise in pollution and its causes, realization of values of environment for students, faculties and others working and residing in the campus, Green Audit cell of Gurukula Kangri Vishwavidyalaya has conducted audit of all the campuses. Aim is to record the present condition in terms of Energy Management, Water quality, Water Management, Waste Management, Landscape/environment, Built-up Environment, Transportation, Green Agenda in Syllabus, analyse it and pursue it for improving environmental quality and to make it better for future generations of students and staff.

Environmental auditing has long been a tool to **minimize liability and avoid the compliance costs** associated with new projects. The Environmental Protection Agency (EPA) defines environmental auditing as an objective, documented, and periodic assessment of any organization's operations compared with audit criteria. Auditing also helps companies identify opportunities to improve their operating practices.

These audit criteria might include types of compliance requirements, such as regulations or management practices, which work to benefit the environment. Audits provide information about the organization's operational status compared to management's expectations of environmental performance. In other words, if management expects the organization to comply with the regulations, then an audit provides information as to whether or not compliance has actually been achieved. If the organization has not achieved compliance, the audit will also reveal what specific measures are required to address this shortcoming.

With the assessment of all the data collected, the committee has made short term and long term suggestions to environmental concern to its higher most level and expecting that the administration as well as all the Departments of Vishwavidyalaya consider them for GKV's better and green future. We hope that this report will provide an accurate snapshot of Vishwavidyalay's environmental impact at this point in time, and that it will aid the campus in prioritizing positive steps it can take to improve overall sustainability. We intend this document to be revisited annually and updated by the Vishwavidyalaya.

I also take this opportunity to thank Hon'ble Vice Chancellor Prof. Roop Kishore Shastri for Providing necessary platform to conduct the Green Audit – 2019. It's my privilege to overall extend my thanks to Prof. Dinesh Bhatt, Registrar for his support

I would be failing in my duties as a Dean, Green Audit if I do not convey my thanks to Dr. Gagan Matta, Dr. Ajendra Kumar, Mr. Ranjeet as Core Team of Green Audit Cell, Gurukula Kangri Vishwavidyalaya, Haridwar for their ever ready attitude and extending all necessary cooperation for compiling this Report.

Prof. P.C. Joshi

Dean Green Audit Cell

FORWARD

PROF. ROOP KISHORE SHASTRI

Vice Chancellor
Gurukula Kangri Vishwavidyalaya,
Haridwar, Uttarakhand

Green Audit is a process which contributes in building clean India and sustainable development approach of individuals as well as of community for the nation. Environmental awareness is one holistic approach which is not bound under boundaries of nations or of any community.

Gurukula Kangri Vishwavidylaya, Haridwar is one of the oldest institutions of India, serving the society since 1902. Owing to the credentials of this Vishwavidyalaya, the National Assessment and Academic Council (NAAC) has grant it grade 'A' with 3.14 Score based on symbiosis of Vedic education with modern science and engineering education.

Green Audit is a process playing key role to initiate the efforts for providing environmental education to the students in terms of conservation of environment from water to electricity, ozone layer depletion to disaster management *etc.*, for the developing modern India with sustainable approach.

I appreciate the outstanding progress of Green Audit Cell, it's Dean, Prof. P.C. Joshi and all the members and wish it to make more progress in the field of environment and education and congratulate to all members of Green Audit Cell for their outstanding efforts to make green and clean campus of Vishwavidyalaya.

(**Prof. Roop Kishore Shastri**)

FORWARD

PROF. DINESH BHATT

Registrar
Gurukula Kangri Vishwavidyalaya,
Haridwar, Uttarakhand

Aiming at becoming a part of national and global initiative of environmental conservation and education, Gurukula Kangri Vishwavidyalaya, Haridwar is now entering into a new phase with its mandate of providing environmental awareness among students as well as to the society with spreading the ideas for sustainable development by Green Audit Cell. While going through all the activities of Green Audit growing from a seed to a fruit yielding tree with its branches increasing day by day. It is our pride that the dynamic team of Green Audit Cell including members of faculty and students of the Vishwavidyalaya working hard with innovative practices, state-of-art infrastructure and multi-disciplinary academic approaches for the sustainable development.

Today, in modern world, we cannot ignore the importance and role of clean and green environment in our daily life, requiring major attention. Looking around, we can only see the daily increase in pollution level in the metro cities as well as in cities like Haridwar which is surrounded by dense forest of Rajaji National Park. So with all these conditions it is our moral duty to identify our individual's duty and get involve in conservation of nature.

Green Audit Cell of G. K. V. is committed to promote awareness for environmental with excellence in eco - socially sustainable education and awareness, the Vishwavidyalaya is looking forward to help the team to make all efforts to meet to the national and global standards. In a short span of its existence, Green Audit Cell has been progressively moving towards becoming part of major initiatives for Green Development in the field of Environmental Education. I Congratulate Dean, Green Audit Cell, Prof. P.C. Joshi and his team for Green Audit – 2019.

(**Prof. Dinesh Bhatt**)

FORWARD

PROF. P. C. JOSHI

Dean, Green Audit Cell,
Professor
Department of Zoology & Environmental Science,
Gurukula Kangri Vishwavidyalaya,
Haridwar, Uttarakhand

It's a matter of great pleasure and pride for me to submit before you all the details of activities carried out by Green Audit Cell of Gurukula Kangri Vishwavidyalaya, Haridwar functioning in the campus. Gurukula Kangri Vishwavidyalaya was established in the foot hills of Shivalik ranges by a learned philosopher and freedom fighter Swami Shradhanandji with a great vision of reviving the Indian culture and producing the most knowledgeable citizens who have the love and compassionating attitude for their country and its natural environment. This is a fact that our ancient knowledge developed by the Rishis and Vedic Philosophers originated in the close vicinity of nature and most of our old and Vedic institutions were established in the vicinity of natural areas or to say forest and green cover areas. Indians always have a very cordial relationship with its natural environment and with the other creatures living on this planet earth. But in the past few decades, due to fast developmental activities, which are the need of the hour too, there has been an atmosphere prevailing with a non-serious attitude towards preserving a quality environment causing various serious problems for the existence of not only to the other living beings but also for the human beings itself.

Taking a thread from our ancient knowledge, Gurukul Kangri Vishwavidyalaya has established a Green Audit Cell in 2014, which takes into account the status of various environmental parameters in the GKV and makes suggestions for a quality environment to be maintained. This cell has been performing very well and keeping the campus clean and green. As has been submitted in the following pages, various activities have been carried out by Green Audit cell to spread the awareness about the various environmental aspects. It will be our sincere endeavour to make it a Clean, Green and pollution free campus with most eco-friendly practices and initiatives, Green Audit cell is open to receive suggestions, guidance and cooperation from all the Gurukulaites so as to make it a self-sustained campus. Our mission is to stride for a clean, green pollution free campus.

(**Prof. P. C. Joshi**)

Green Audit Cell

Core Committee

Prof. P.C. Joshi,
Dean, Green Audit Cell
Gurukula Kangri Vishwavidyalaya, Haridwar – 249404, India

Dr. Ajendra Kumar, Member, Green Audit Cell Department of Mathematics and Statistics, Gurukula Kangri Vishwavidyalaya, Haridwar – 249404, India	**Mr. Ranjeet Singh,** Member, Green Audit Cell J. E., Gurukula Kangri Vishwavidyalaya, Haridwar – 249404, India

Dr. Gagan Matta,
Member Secretary, Green Audit
Gurukula Kangri Vishwavidyalaya, Haridwar – 249404, India

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External Expert Panel

Prof. Jagbir Singh Punjabi University, Patiala	**Dr. S. Bhatnagar** Pollution Control Research Institute, BHEL, Haridwar	**Dr. D. P. Uniyal,** Uttarakhand Council for Science and Technology, Dehradun

Vishwavidyalaya Members

Dr. Manila, Kanya Gurukul Campus, GKV, Haridwar	**Dr. Sanjeev Lamba** Faculty of Engineering & Technology, GKV, Haridwar
Dr. Ravindra Kumar Faculty of Science, GKV, Haridwar	**Dr. Ajeet Tomar** Faculty of Humanities, GKV, Haridwar

From Left to Right: **Dr. Sanjeev Lamba, Dr. D.P. Uniyal, Prof. P.C. Joshi, Dr. Manila, Prof. Jagbir Singh, Dr. S. Bhatnagar, Dr. Ajendra Kumar, Dr. Ravindra Kumar, Dr. Gagan Matta**

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INTRODUCTION

Green Audit was initiated with the beginning of 1970s with the motive of inspecting the work conducted within the organizations whose exercises can cause risk to the health of inhabitants and the environment. It exposes the authenticity of the proclamations made by multinational companies, armies and national governments with the concern of health issues as the consequences of environmental pollution. It is the duty of organizations to carry out the Green audit of their ongoing processes for various reasons such as; to make sure whether they are performing in accordance with relevant rules and regulations, to improve the procedures and ability of materials, to analyse the potential duties and to determine a which can lower the cost and add to the revenue. Though Green Audit, one gets a direction as how to improve the condition of environment and there are various factors that have determined the growth of carrying out Green Audit. Some of the incidents like Bhopal Gas Tragedy (Bhopal; 1984), Chernobyl Catastrophe (Ukraine; 1986), Exxon-Valdex Oil Spill (Alaska; 1989), have cautioned the industries that setting corporate strategies for environmental security elements have no meaning until they are implemented.

The term "Green" means eco-friendly or not damaging the environment. This can acronymically be called as "Global Readiness in Ensuring Ecological Neutrality" (GREEN). Green Audit can be defined as systematic identification, quantification, recording, reporting and analysis of components of environmental diversity. Green accounting can be defined as systematic identification quantification, recording, reporting & analysis of components of ecological diversity & expressing the same in financial or social terms. "Green Auditing", an umbrella term, is known by another name "Environmental Auditing". The 'Green Audit' aims to analyze environmental practices within and outside the college campus, which will have an impact on the eco-friendly ambience. It was initiated with the motive of inspecting the work conducted within the organizations whose exercises can cause risk to the health of inhabitants and the environment. Through Green Audit, one gets a direction as how to improve the condition of environment and there are various factors that have determined the growth of carrying out Green Audit. The green audit is a tool that organizations use to identify their environmental impacts and assess their compliance with applicable laws and regulations, as well as with the expectations of their various stakeholders. It also serves as a means to identify opportunities to save money, enhance work quality, improves employee health, safety and morale, reduce liabilities and achieve other form of business values. This concept has got its origin in recent past and suddenly got acceleration due to growth in population, needs has increased causing the increase in GAP between demand and supply.

Educational institutions have broad impacts on the world around them, both negative and positive. The activities pursued by campus can create a variety of adverse environmental impacts. But they are also in a unique position as educational institutions to be leaders in pursuing environmentally sustainable solutions. As environmental sustainability is becoming an increasingly important issue

for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent. The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. On this background it becomes essential to adopt the system of the Green Campus for the institutes which will lead for sustainable development and at the same time reduce a sizable amount of atmospheric carbon-di-oxide from the environment. The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit Report. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through Carbon Footprint reduction measures.

On the occasion of **World Environment Day - 2015** an initiative was taken by Gurukula Kangri Vishwavidyalaya and expressed its commitment to sustainability while forming a committee to conduct audit of campus and its facilities. Vishwavidyalaya has taken a number of positive steps to reduce its environmental impact. But many areas remain in which substantial improvements can be made. This report serves to highlight some accomplishments of and to make recommendations for improving the campus Green and environmental sustainability.

Phases of Green Audit

Phase – I: Pre – Audit

- Plan the Audit
- Selection of Audit Team (External experts and Members for Current Audit)
- Collect the Background Information
- Start assessing the certain environmental factors required for prior to On – Site Phase

Phase – II: On – Site

- Understand the significance of Green Audit
- Conduct the Audit and collect the information in prescribed format
- Make an inventory for all the observations during the audit

Phase – III: Post – Audit

- Prepare the Draft report on the information collected during audit
- Generate a Final Report
- Submit the Report to higher authorities of Institution with action plans to overcome the flaws
- Share all the current status and recommendations with all the Heads and Deans of Institution
- Time to time check the action plan

For the current Green Audit, the focused was made on following indicators, covering an extremely wide range of environmental impacts:

1. **Air Quality Audit**
    a. Air Quality Indices

2. **Water Quality Audit**
    a. Water quality Indices
    b. Water footprint

3. **Green Cover Audit**
    a. Oxygen Production
    b. CO_2 Consumption

4. **Human Activities**

5. **Environmental Practices Audit**
    a. Build-up Environment
    b. Energy Management
    c. Water Resources and Management
    d. Waste Management
    e. Landscape Environment
    f. Green Agenda in Syllabus
    g. Transportation

6. **Eco-Club activities**

    For each indicator, we establish a benchmark to evaluate Vishwavidyalaya's overall performance. We examine the performance of Vishwavidyalays's on each of these indicators, and offer recommendations about how the campus can reduce its environmental impact within each indicator.

GREEN AUDIT – 2019


FACULTY OF MANAGEMENT STUDIES


Faculty of Engineering & Technology
Gurukula Kangri Vishwavidyalaya, Haridwar

OBJECTIVES

Green Audit is assigned to the Criteria of NAAC, National Assessment and Accreditation council which is a self-governing organization of India that declares the institutions as Grade A, B or C according to the scores assigned are the time of accreditation.

The intention of organizing Green Audit is to upgrade the environment condition in and around the institutes, colleges, companies and other organizations. It is carried out with the aid of performing tasks like waste management, energy saving and others to turn into a better environmental friendly institute.

To conduct the Green Audit, Green Audit Cell, GKV has made a self-inquiry on various parameters of the campus with the following objective:

- To establish a baseline of existing environmental conditions with focus on natural and physical environment.
- securing the environment and cut down the threats prosed to human health.
- To make sure that rules and regulations in terms of environmental laws are taken care of.
- To understand the current practices of sustainability with regard to the use of water and energy, generation of wastes, purchase of goods, transportations, *etc*.
- To avoid the interruptions in environment that are more difficult to handle and their correction requires high cost
- To suggest the best protocols for adding to sustainable development
- To promote environmental awareness through participatory auditing process
- To create a report that documents baseline of good practices and provide future strategies and action plans towards improving environmental quality for future.

Significance of Green Audit

One of the major threats arising from urbanization and increase in population on earth is over-development and unmanaged utilization of resources. To monitor this there are a number of environmental management techniques that can be used to minimize the effects of development. One of the techniques associated with environmental management programmes is that of Green Audit or Environmental Auditing. The purpose of this management tool is to measure the actual and potential environmental impacts in the ecosystems.

In the present time, the pollution is significantly increasing day-by-day due to the industries and factories. It is causing serious health problems to the human being and also polluting the environment. It can also make an adverse effect on the mental, social, and economic ability of the person. It becomes imperative to save the people from dangerous chemicals and waste of the industries because people have to live in the green environment to lead a healthy life. It is important for the government to regulate rules and regulations for the industries to make the environment neat and clean. For this purpose, there is a strict need to employ environmental inspectors who can perform Green audits to prevent the pollution.

Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being and he bears a solemn responsibility to protect and improve the environment for present and future generation." Most countries today face environmental threats due to the increase in pollution of the atmosphere, water and land. Wildlife habitats continue to be threatened. Water contamination and air pollution are critical problems facing most countries. Environment related problems are linked closely to the rapid growth of population, as well as to technological advancements.

Green auditing or environmental audit is a process of extracting information about a company that provides a realistic assessment of how the company affects the environment and also a set of environmental objectives and targets to reduce the effects. Eco-auditing is a systematic multidisciplinary method used periodically to assess the environmental performance of a project. Eco-auditing evolved as a management tool in the USA in 1980s. It has been promoted in Europe by the International Chamber of Commerce and by some multinational corporations as a means of getting effective environmental management. But, in developing countries, the eco-auditing concept is still a theoretical concept. However, India has modified its Companies Act to include a requirement for eco-audits. This it is very important for each organization to conduct it environmental audits or green audit to ensure that we are working in the direction of sustainable development.

Green audits are necessary to evaluate the impact of industries and their manufacturing on the natural resources. The environmental auditing is an important process to make sure continuous development in the environmental management. The environmental auditor appropriately monitors

the system for safe disposal of waste in the industries to ensure the safety of the natural resources. It also lessens the interference of the government directly since the environmental auditor can examine the required standards and present the report to the government.

A good environmental auditing system needs a constant effort to monitor and analyse the industrial working system to create the analysis on pollution being generated. The major objective of performing green audit is controlling the pollution. It also helps in improving the production safety and to making sure the prevention and reduction of the chemical waste. It also provides performance reviews of institutional working facilities and its possible impact on the surroundings.

The environmental auditor has to detect the existing environmental compliance problems and make recommendations to the manufacturers for reducing the pollution to save the environment.

While enforcing the Green Audit effectively,

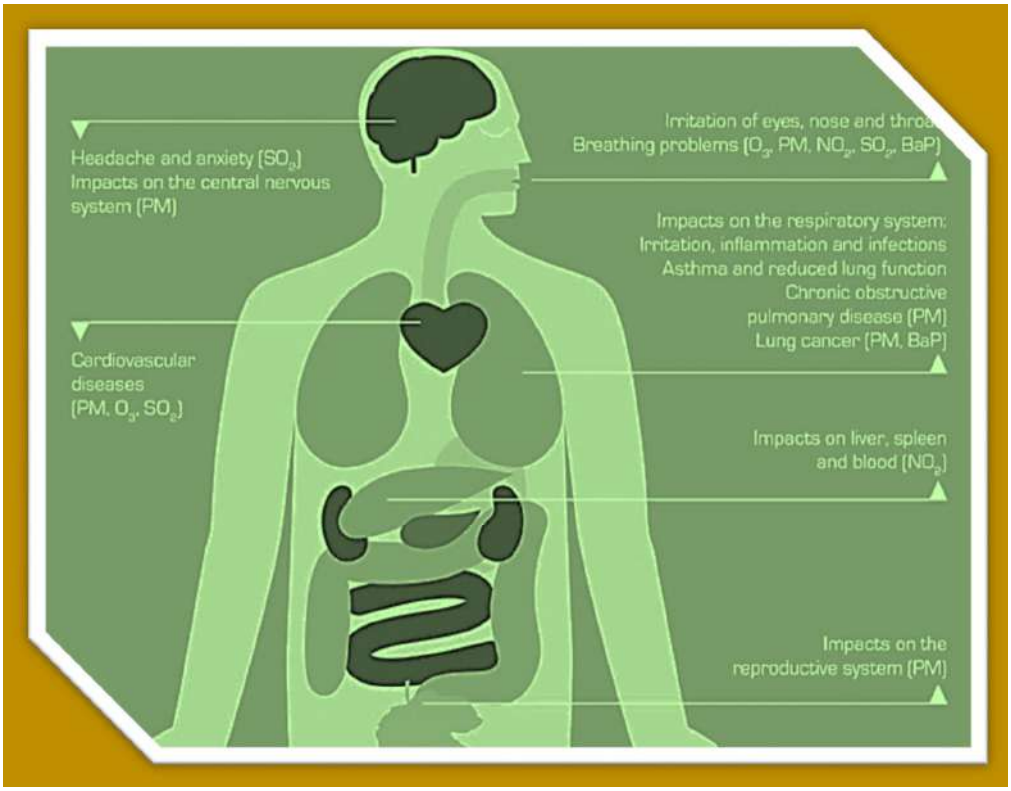
- Will help to maintain the environment and its resources in institution
- Highlight the problems from energy loss to water loss.
- Minimize the waste and use the resources efficiently.
- Give the better approach to environmental conditions and its improvisation
- Helps in awareness activities for students.

Can participate in national programmes like SWACHH BHARAT MISSION, NAMAGI GANGE, WATER CONSERVATION, SWASTH BHARAT *etc*.

Part I: AIR QUALITY

Air quality is influenced by a variety of factors and is a complex issue. The term air quality refers to the degree to which the air in a particular place is free from pollutants. Air pollutants are substances present in the atmosphere at concentrations above their normal background levels which can have a measurable effect on humans, animals and vegetation.

Good outdoor air quality is fundamental to our well-being. On average, a person inhales about 14,000 litres of air every day, and the presence of contaminants in this air can adversely affect people's health (see figure 4). People with pre-existing respiratory and heart conditions, diabetes, the young, and older people are particularly vulnerable.



Note: BaP = benzo(a)pyrene; NO2 = nitrogen dioxide; O3 = ozone; PM = particulate matter; SO2 = sulphur dioxide.

Source: European Environment Agency, 2013

Overseas studies have shown poor air quality can also adversely affect the natural environment. Ecological damage may occur when air pollutants come into direct contact with vegetation or when animals inhale them. Pollutants can also settle out of the air onto land and water bodies. From the soil, they can wash into waterways, or be taken up by plants and animals. Poor air quality can also affect our climate: some pollutants have a warming effect while others contribute to cooling (European Environment Agency, 2013). These effects of poor air quality on human health and the

environment can, in turn, have negative economic impacts. We incur major costs, for example, for hospitalisation and medical treatment, premature deaths, and lost work days. Damage to soils, vegetation, and waterways may reduce the productivity of our agriculture and forestry industries. In urban areas, air pollution can be costly when, for example, transport is disrupted (due to large-scale events like volcanic eruptions), or corroded buildings need to be repaired. The sources of some of these pollutants also have positive effects. For example, having a warm home (from burning wood or coal, or other heating sources) has health benefits, while transport provides people with mobility and the distribution of goods and services.

Indian cities are reeling under multiple problems, including environmental issues that they must contend with. Most pressing of them all is the issue of air pollution. The poor air quality that citizens are forced to breathe- especially in the heavily polluted cities- has a detrimental impact on their health and well-being. In 2016, a World Health Organisation (WHO) study found that fourteen of the twenty world's most polluted cities belonged to India. Kanpur, in Uttar Pradesh, emerged as the city with the highest PM2.5 level, standing at 173 (17 times higher than the limit set for safety). It is estimated that in 2016, over 9 lakh deaths were caused due to air pollution in India. Some other cities with high PM 2.5 levels include Faridabad, Varanasi, Gaya, Patna, Delhi, Lucknow and Agra. Delhi, as the capital of the country, too gained notorious reputation as a result of its severely poor air quality. In the past, there have been multiple instances where the presence of heavy smog in the national capital has led to the declaration of public health emergencies, flight cancellations, school closures and inevitable political acrimony.

In 2016, a World Health Organisation (WHO) study found that fourteen of the twenty world's most polluted cities belonged to India. Kanpur, in Uttar Pradesh, emerged as the city with the highest PM2.5 level, standing at 173 (17 times higher than the limit set for safety).

The sources of air pollution are multiple. Vehicular emissions, crop burning, generation of dust- particularly from construction sites, depleting tree covers and poor waste management – all contribute towards the declining air quality. One of the problems with tackling air pollution solely at the city level is that several factors which contribute towards increasing pollution levels have their origins in the bordering sub-urban areas. In Delhi, for instance, one of the major factors responsible for its declining air quality is paddy straw burning in its neighbouring states.

Vehicular emissions, crop burning, generation of dust- particularly from construction sites, depleting tree covers and poor waste management – all contribute towards the declining air quality.

Air pollution does not recognize geographical boundaries. Just as polluted air from rural areas travels into cities, cities too contribute towards rural pollution. Thus, it is critical for anti-pollution efforts to be coordinated across different levels. Urban-rural and inter-state

responses are integral to crafting successful solutions. Fortunately, the Government of India (GoI) has responded to the air pollution epidemic with a nation-wide programme. This is likely to have very positive impact on the health of all citizens, especially city dwellers. The Air Quality Life Index indicates that if national standards with regard to air quality are met, life expectancy would go up by two years.

It is critical for anti-pollution efforts to be coordinated across different levels. Urban-rural and inter-state responses are integral to crafting successful solutions.

This is clearly what the National Clean Air Mission (CAM-INDIA) aims to achieve. It is a cross-sectoral initiative for air pollution mitigation launched by GoI involving Ministries of Transport, Power, Construction, Agriculture, Rural Development, Environment and the states. Along with a five-year action plan to curb air pollution, the Mission hopes to build a pan-India air quality monitoring network and heighten citizen awareness. Air quality can be significantly improved by cutting the use of solid fuel in households; using sustainable fuels can reduce air pollution levels by almost 40 percent. According to the 2011 Census, 16.6 crore households out of a total of 24.7 crore continued to rely on solid fuels (firewood, crop residue, dung and coal) for cooking. Hopefully, GoI's Ujjwala scheme, which provides cooking gas to millions of poor households will substantially reduce solid fuel usage. Additionally, reducing emissions from thermal power plants, instituting strong emission standards for industries and introducing stronger vehicular emission standards also need to be effectively implemented. In this regard, state pollution control boards (PCBs) are adopting the Star Rating Programme. The programme rates industries on their fine particulate pollution emissions and enables the monitoring of industries' pollution levels. Furthermore, in partnership with GoI, states are promoting an electric vehicle policy. Use of electrically powered buses, cars and two-wheelers are bound to have a positive qualitative effect on air quality in cities.

The National Clean Air Mission is a cross-sectoral initiative for air pollution mitigation launched by GoI involving Ministries of Transport, Power, Construction, Agriculture, Rural Development, Environment and the states.

Certain policies and programmes focus specifically on cities- The National Clean Air Programme targets 102 polluted Indian cities and aims to reduce their PM2.5 levels by about one-third over the next five years. Steps are also being taken for upgradation to BS VI fuel from BS IV which is expected to reduce air pollution. Initial results are encouraging. The Environment Ministry reported a fall in the national annual average concentration of PM 2.5 from 134 micrograms per cubic metre in 2016 to 125 in 2017. For PM 10, the national annual average fell from 289 micrograms per cubic metre in 2017 to 268 in 2016. An action plan has also been readied for 94 cities which suffer from severe air pollution.

While steps are being taken to reduce air pollution at the national and state levels, cities could improve the national performance by introducing complementary initiatives. Firstly, the Clean India Campaign requires energetic implementation. Since dust and waste burning are major sources of PM, cities must ensure wall-to-wall paving of streets, the vacuum cleaning of roads, enforce bans on open solid waste burning and attempt to effectively recover methane from landfills.

While steps are being taken to reduce air pollution at the national and state levels, cities could improve the national performance by introducing complementary initiatives.

Some state municipal acts make it mandatory for cities to prepare an annual environment status report. The main objective of such a report is to curate data which allows cities to take cognizance of where they stand in terms of environmental well-being, including the status of air pollution. The next step for cities should be to launch remedial steps as the annual report enables municipalities to assess the impact of their policies on a yearly basis. Sadly, while the reports have been prepared, not much action has been taken. This needs to change.

Many cities also carry out a decennial tree census' which tells them what their tree population is. Depletion of tree cover in specific areas triggers a warning mechanism advising the city to replenish tree stock via fresh plantation. Another city-centric solution that municipalities should consider implementing is the incentivisation of the maintenance of roof-top gardens as well as, potted plants in balconies and kitchen gardens through suitable amendments in development control regulations.

While the issue of air pollution has managed to capture public imagination, the problem of growing question of growing population density in cities continues to be at best- an afterthought. High human density hinders the successful implementation of positive initiatives. The volume of polluting activities continues to multiply, as the space to counteract them physically shrinks. The question of decentralising urbanisation needs to be addressed in a meaningful way, for it holds the key to improving the quality of urban life.

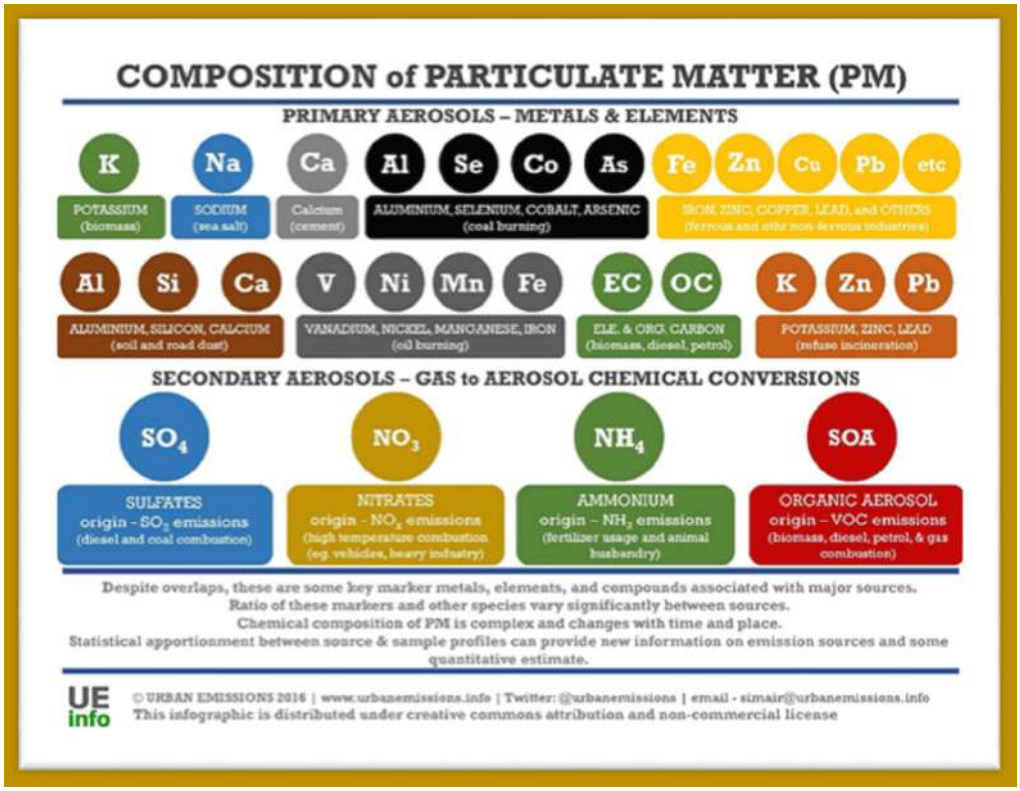
When there are many different types of air pollutants, why do we focus on PM 2.5? Why is it particularly dangerous?

A chemically charged pollutant, PM has contributions from all the primary emissions.

- Black carbon and organic carbon, as primary emissions are part of PM 2.5
- SO_2 undergoes chemical reactions to form sulphate aerosols, which is part of PM 2.5
- NO_x-CO-VOC combine and react in many ways to chemically transform to form nitrate and secondary organic aerosols, which are part of PM2.5

- NO_x-CO-VOC also combine and react in many ways to form and consume ozone (depending on the mixture of the gases), which also contributes to health impacts and also participates in the formation of nitrates and secondary organic aerosols, which are part of PM 2.5

  So, if we target PM 2.5, the one pollutant we are mainly concerned about in India, we are invariably targeting all the other pollutants as well. Therefore, any control mechanism aimed to reducing direct PM 2.5 emissions also reduces other pollutants (since sources to all these pollutants are common), except for resuspended dust.



The particle size, less than 2.5 micro-meter, is small enough to enter our lungs and blood stream, and stay there for a long time. There are more studies linking PM 2.5 to various health risks than any of the other pollutants.

Meteorology over the Indo-Gangetic plains is complicated and it plays a strong role in the observed seasonal cycle of air pollution in the cities in this region – with the winter time highs (due to high inversion) and the summer time lows (due to rains).

While meteorology plays its part, there is also an increase in the total emissions during the winter months, which further exaggerates the problem. These additional emissions are primarily from the burning of wood, coal, and waste for space heating as the temperatures drop. While the need for space heating is there for most part of the winter season, there are also episodic spikes from bursting of crackers during Diwali, which lasts for 2-3 days as well as crop residue burning, which lasts for 2-3 weeks.

Do we have adequate information on air pollution in India? What do we need to improve the quality of this information?

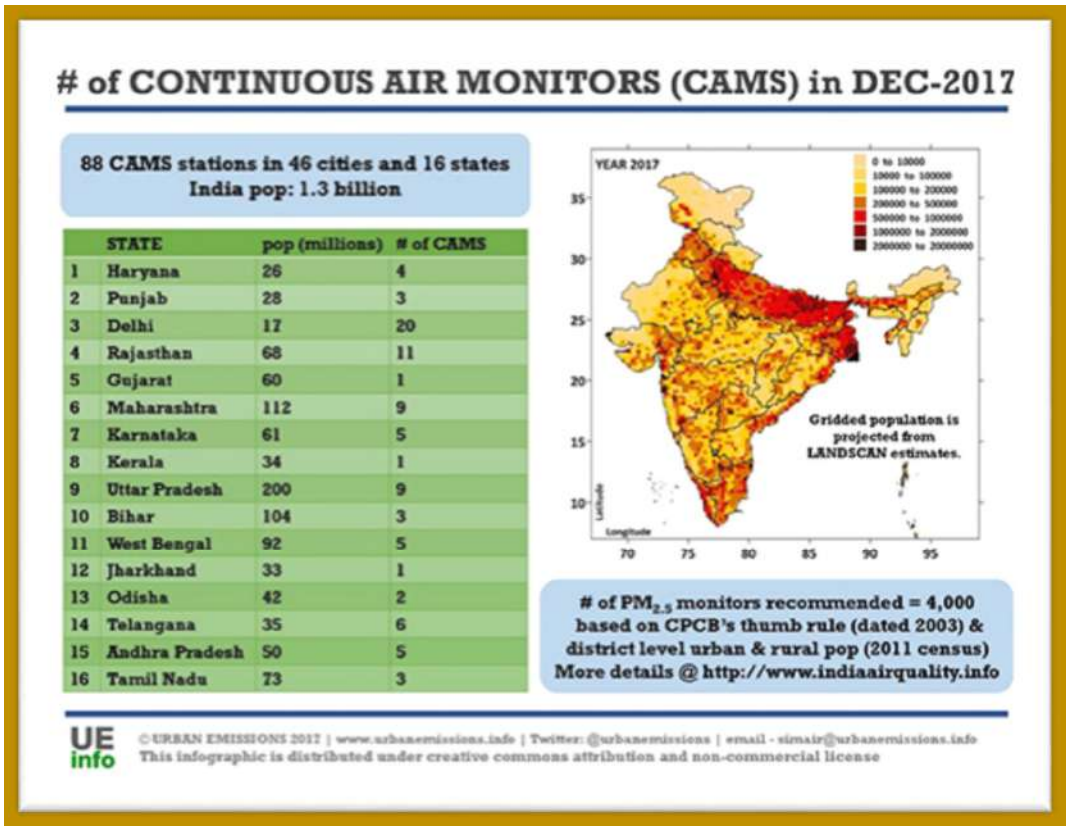
An excerpt from an article recently published in 'The Wire' – *It's About Time We Got Smarter About Monitoring Our Air Pollution* (9th September, 2017):

> The quality of air in India is bad and is becoming a serious public health issue with huge repercussions to our quality of life and economy. We know this through anecdotal evidence and through the little data on monitoring that trickles down to the public. This limited information is not enough – to formulate policy, to understand seasonal and diurnal variations, to tease out patterns or to calibrate forecasting models. It is the right of any citizen to have access to information on the quality of air she is breathing – monitoring data that is real-time, reliable and accessible to any citizen.
>
> While the results of the GBD study do fill in this lacuna of information, it is not a substitute for real-time information. These results are obtained through a modelling exercise that combines satellite feeds, emission inventories and historical monitoring data to then estimate ground-based concentrations. Note that satellites neither measure one location nor take ground measurements at all times (orbital satellites create a snapshot of the entire planet every one or two days). These snapshots are interpreted using the global chemical transport models to better represent the vertical mix of these measurements (known as aerosol optical depth). Like any modelling exercise, this data also comes with uncertainty. While this process is very useful in establishing annual trends, these systems are not a substitute for daily on-ground monitoring.
>
> What we need are ground measurements using reference methods approved by the environment ministry. This ensures that the monitoring information is reliable and conforms to the government's standards. Low-cost sensors do provide some information but because many of them are not recognised by the government or are not calibrated accurately, the data they generate cannot be used for policymaking."

In India, we estimate that we require around 4,000 continuous monitoring stations to spatially and temporally represent the air pollution problem – 2,800 in the urban areas and 1,200 in the rural areas. Currently, data when available comes from around 600+ manual stations and less than 100 continuous monitoring stations.

Among all the cities and states, most number of continuous monitoring stations are present in Delhi, which means there is more information coming from Delhi, there are more studies by national and international institutions on Delhi, and there is more media and public focus on the issue of Delhi. It is very important to understand that air pollution is a regional

problem. We need to focus on regions in the country, where people are exposed to unsafe levels of pollution, and there are no monitors to determine how much that is.



	STATE	pop (millions)	# of CAMS
1	Haryana	26	4
2	Punjab	28	3
3	Delhi	17	20
4	Rajasthan	68	11
5	Gujarat	60	1
6	Maharashtra	112	9
7	Karnataka	61	5
8	Kerala	34	1
9	Uttar Pradesh	200	9
10	Bihar	104	3
11	West Bengal	92	5
12	Jharkhand	33	1
13	Odisha	42	2
14	Telangana	35	6
15	Andhra Pradesh	50	5
16	Tamil Nadu	73	3

As Delhi's air quality worsens every day, a similar situation has been observed in one of India's most visited destination – Haridwar. Pollution in Haridwar has been in news for about a few years now. As the tourist population of Uttarakhand is rising, naturally the pollution level is increasing.

The constant rise in industrial emission, stubble burning, and forest fire has resulted in air pollution in Haridwar. Weather reports suggest that Haridwar weather is getting hotter during summers due to unusual weather pattern.

The locals say that the city is facing major water and air pollution issue. Local government authorities have done no more than little to control the issue. Similar to major city people, Haridwar and Rishikesh are also choking on hazardous air quality. The increase in PM 2.5 in the city's air quality is the real reason for major respiratory issues among the people.

PCRI (Pollution Control Research Institute) recently reported that the presence of PM 2.5 – one of the deadliest air components, causes chronic health issues.

Fine particulate matter can pose a great health risk and can have both long-short-term effects. Breathing PM 2.5 can be dangerous and it can minimize the human heart and lung functionality.

Tourists and Locals – Prone to ill effects of pollution in Haridwar and other cities

Tourist destination such as Dehradun, Nainital, Haridwar and Rishikesh witnesses over thousands of visitors everyday traveling via Government transport services or by own mode of the vehicle. The increase in the number of vehicles emits harmful substances that pose a serious threat to not only the tourists but also the locals residing in the city.

The shocking figures of pollution in Haridwar is worrisome

Ambrish Gupta of Pollution Control Research Institute says, "The actual cause of increasing air pollution which is reported highest during the summer season in Haridwar is vehicular emission. The tourist influx in the city leads to excessive movement of vehicles."

Haridwar is about 223 km away from the national capital of India, New Delhi. Currently, the capital sees a daily average of AQI as 97 (Moderate Air Quality Index), while Hardiwar is 174 which is poor air quality.

"There are few recommendations like phasing out vehicles that have completed 15 years cycle, restricting public transport with only four-stroke engines, modification of engines and others," said SP Subuddhi, member secretary of the Uttarakhand Environment Protection and Pollution Control Board (UEPPCB).

New Delhi, particularly has become an epicenter for the country's pollution crisis, since harmful air substance has covered the city's air. At the same time, neighboring cities have also started to declare public health emergency which has now become a debatable topic.

a. AIR QUALITY ASSESSMENT

Determinant	Unit	Value (Average)		NAAQS	Remarks
		2017 – 18	2018 - 19		
SPM	µg/m^3	159.18	161.89	60 µg/m^3 (Annual)	Exceeds limit
RSPM	µg/m^3	61.72	64.82	40 µg/m^3 (Annual)	Exceeds limit
SOx	µg/m^3	10.11	12.92	50 µg/m^3 (Annual)	Well within limit
NOx	µg/m^3	22.09	25.34	40 µg/m^3 (Annual)	Well within limit
Ozone	µg/m^3	7.20	8.43	100 µg/m^3 (8 hrs.)	Well within limit

SPM: Suspended Particulate Matter

RSPM: Respirable Suspended Particulate Matter

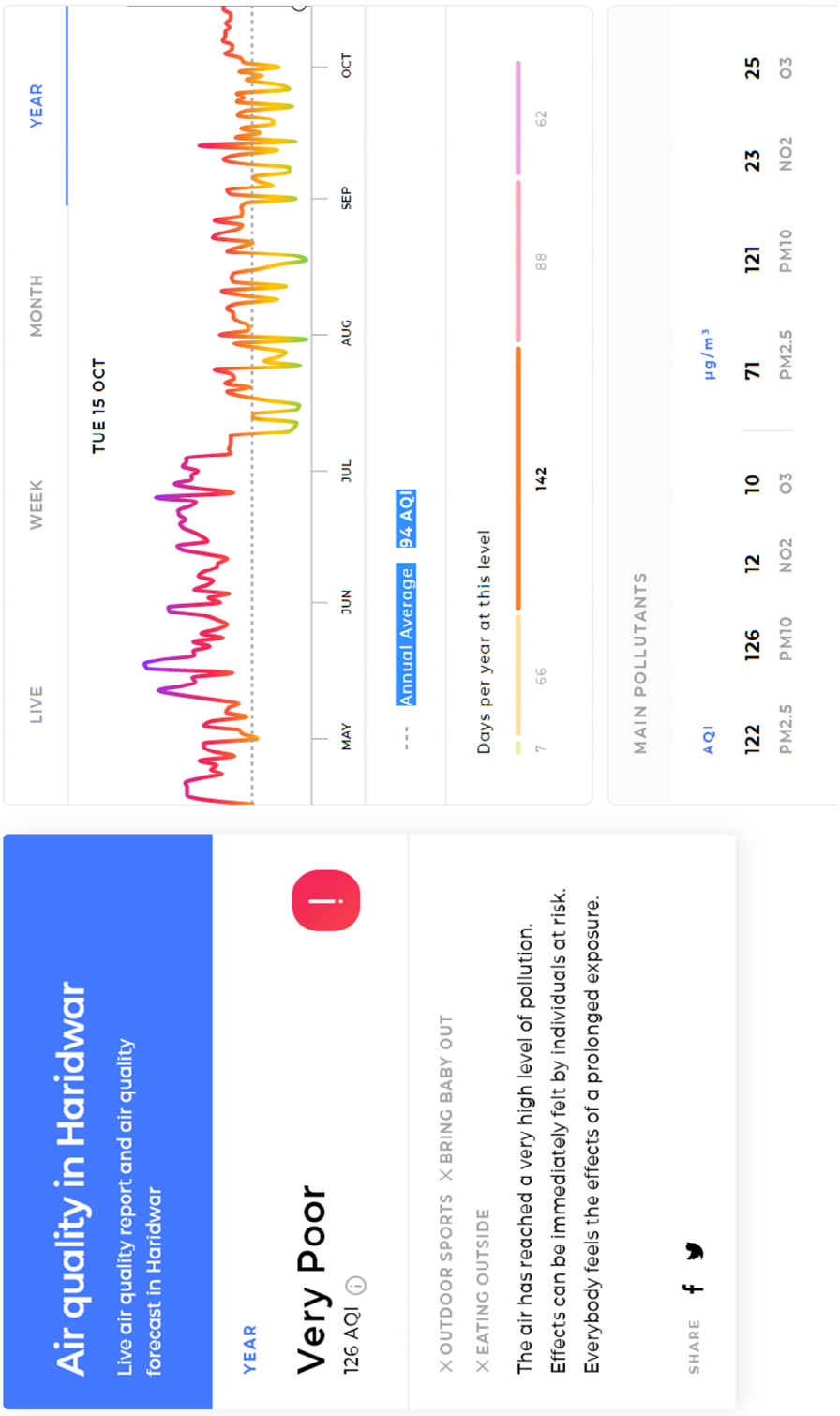
SOx: Oxides of Sulphur

NOx: Oxides of Nitrogen

NAAQS: National ambient Air Quality Standards

Table 1: **Air Quality Measurement in the campus of Gurukula Kangari Vishwavidyalaya for the two consecutive years**

b. AIR QUALITY INDICES



Source: https://air.plumelabs.com/air-quality-in-haridwar-5ktx
Contains modified Copernicus Atmosphere Monitoring Service information 2019.
South America Model: GMAI/CPTEC/INPE#

Determinant	Air Quality Index		AQI Category	Sensitive Groups	Health Effects Statements	Cautionary Statements
	2017 – 18	2018 - 19				
SPM	210	212	Very Poor	People with respiratory or heart disease, the elderly and children are the groups most at risk.	Significant aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant increase in respiratory effects in general population.	People with respiratory or heart disease, the elderly and children should avoid any outdoor activity; everyone else should avoid prolonged exertion.
RSPM	54	55	Moderate	People with respiratory disease are the group most at risk.	Unusually sensitive people should consider reducing prolonged or heavy exertion.	Unusually sensitive people should consider reducing prolonged or heavy exertion.
SO_X	14	17	Good	People with asthma are the group most at risk.	None	None
NO_X	21	24	Good	people with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.	None	None
Ozone	6	7	Good	Children and people with asthma are the groups most at risk.	None	None
Source: https://airnow.gov/index.cfm?action=airnow.calculator						

Part II: WATER QUALITY

Humans have wrestled with water quality for thousands of years, as far back as the 4th and 5th centuries BC when Hippocrates, the father of modern medicine, linked impure water to disease and invented one of the earliest water filters. Today, the challenge is sizeable, creating existential threats to biodiversity and multiple human communities, as well as threatening economic progress and sustainability of human lives.

Increasing the economic and human cost of toxic water-bodies

As India grows and urbanizes, its water bodies are getting toxic. It's estimated that around 70% of surface water in India is unfit for consumption. Every day, almost 40 million litres of wastewater enters rivers and other water bodies with only a tiny fraction adequately treated. A recent World Bank report suggests that such a release of pollution upstream lowers economic growth in downstream areas, reducing GDP growth in these regions by up to a third. To make it worse, in middle-income countries like India where water pollution is a bigger problem, the impact increases to a loss of almost half of GDP growth. Another study estimates that being downstream of polluted stretches in India is associated with a 9% reduction in agricultural revenues and a 16% drop in downstream agricultural yields.

Water pollution is one of the biggest issues facing India right now. As may be evident, untreated sewage is the biggest source of such form of pollution in India. There are other sources of pollution such as runoff from the agricultural sector as well as unregulated units that belong to the small-scale industry. The situation is so serious that perhaps there is no water body in India that is not polluted to some extent or the other.

In fact, it is said that almost 80% of the waterbodies in India are highly polluted. This is especially applicable of ones that some form or the other of human habitation in their immediate vicinity. Ganga and Yamuna are the most polluted rivers in India.

Causes of water pollution in India

The single biggest reason for water pollution in India is urbanization at an uncontrolled rate. The rate of urbanization has only gone up at a fast pace in the last decade or so, but even then it has left an indelible mark on India’s aquatic resources. This has led to several environmental issues in the long term like paucity in water supply, generation and collection of wastewater to name a few.

The treatment and disposal of wastewater has also been a major issue in this regard. The areas near rivers have seen plenty of towns and cities come up and this has also contributed to the growing intensity of problems.

Uncontrolled urbanization in these areas has also led to generation of sewage water. In the urban areas water is used for both industrial and domestic purposes from waterbodies such as rivers, lakes, streams, wells, and ponds. Worst still, 80% of the water that we use for our domestic

purposes is passed out in the form of wastewater. In most of the cases, this water is not treated properly and as such it leads to tremendous pollution of surface-level freshwater.

This polluted water also seeps through the surface and poisons groundwater. It is estimated that cities with populations of more than one lakh people generate around 16,662 million litres of wastewater in a day. Strangely enough, 70% of the people in these cities have access to sewerage facilities. Cities and towns located on the banks of Ganga generate around 33% of wastewater generated in the country.

Following are some other important reasons of increasing levels of water pollution in India:

- **Industrial waste**
- **Improper practices in agricultural sector**
- **Reduction in water quantity in rivers in plains**
- **Social and religious practices like dumping dead bodies in water,**
- **Bathing, throwing waste in water**
- **Oil leaks from ships**
- **Acid rain**
- **Global warming**
- **Eutrophication**
- **Inadequate industrial treatment of wastes**
- **Denitrification**

Water pollution can have some tremendously-adverse effect on the health of any and every life form living in the vicinity of the polluted water body or using water that has been polluted to some extent. At a certain level polluted water can be detrimental to crops and reduce the fertility of soil thus harming the overall agricultural sector and the country as well. When sea water is polluted it can also impact oceanic life in a bad way. The most fundamental effect of water pollution is however on the quality of the water, consuming which can lead to several ailments.

In fact, as far as India is concerned polluted water is one of the major factors behind the general low levels of health in India, especially in the rural areas. Polluted water can lead to diseases such as cholera, tuberculosis, dysentery, jaundice, diarrhoea, etc. In fact, around 80% stomach ailments in India happen because of consuming polluted water.

The cost of environmental degradation in India is estimated to be INR 3.75 trillion ($80 billion) a year. The health costs relating to water pollution are alone estimated at about INR 470-610 billion ($6.7-8.7 billion per year) – most associated with diarrheal mortality and morbidity of children under five and other population morbidities. Apart from the economic cost, lack of water, sanitation and hygiene results in the loss of 400,000 lives per year in India. Globally, 1.5 million children under five die and 200 million days of work are lost each year as a result of water-related diseases.

As per the latest estimate of Central Pollution Control Board, about 29,000 million litre/day of wastewater generated from Class-I cities and class-II towns out of which about 45% (about 13000 mld) is generated from 35 metro-cities alone. The collection system exists for only about 30% of the wastewater through sewer line and treatment capacity exists for about 7000 million litre/day. Thus, there is a large gap between generation, collection and treatment of wastewater. A large part of un-collected, un-treated wastewater finds its way to either nearby surface water body or accumulated in the city itself forming cesspools. In almost all urban centres cesspools exist. These cesspools are good breeding ground for mosquitoes and also source of groundwater pollution. The wastewater accumulated in these cesspools gets percolated in the ground and pollute the groundwater. Also in many cities/towns conventional septic tanks and other low cost sanitation facilities exists. Due to non-existence of proper maintenance these septic tank become major source of groundwater pollution. In many urban areas groundwater is only source of drinking. Thus, a large population is at risk of exposed to water borne diseases of infectious (bacterial, viral or animal infections) or chemical nature (due to fluoride or arsenic). Water borne diseases are still a great concern in India. Pollutants are being added to the groundwater system through human activities and natural processes. Solid waste from industrial units is being dumped near the factories, and is subjected to reaction with percolating rainwater and reaches the groundwater level. The percolating water picks up a large amount of dissolved constituents and reaches the aquifer system and contaminates the groundwater. The problem of groundwater pollution in several parts of the country has become so acute that unless urgent steps for abatement are taken, groundwater resources may be damaged. The quality of groundwater depends on a large number of individual hydrological, physical, chemical and biological factors. Generally higher proportions of dissolved constituents are found in groundwater than in surface water because of greater interaction of ground water with various materials in geologic strata. The water used for drinking purpose should be free from any toxic elements, living and non-living organism and excessive amount of minerals that may be hazardous to health. Some of the heavy metals are extremely essential to humans, for example, Cobalt, Copper, etc., but large quantities of them may cause physiological disorders. The contamination of groundwater by heavy metals has assumed great significance during recent years due to their toxicity and accumulative behaviour. These elements, contrary to most pollutants, are not biodegradable and undergo a global eco-biological cycle in which natural waters are the main pathways. The determination of the concentration levels of heavy metals in these waters, as well as the elucidation of the chemical forms in which they appear is a prime target in environmental research today.

A vast majority of groundwater quality problems are caused by contamination, over-exploitation, or combination of the two. Most groundwater quality problems are difficult to detect & hard to resolve. The solutions are usually very expensive, time consuming & not always effective. An alarming picture is beginning to emerge in many parts of our country. Groundwater quality is slowly but surely declining everywhere. Groundwater pollution is intrinsically difficult to detect,

since problem may well be concealed below the surface & monitoring is costly, time consuming & somewhat hit-or-miss by nature. Many times the contamination is not detected until obnoxious substances actually appear in water used, by which time the pollution has often dispersed over a large area. Essentially all activities carried out on land have the potential to contaminate the groundwater, whether associated with urban, industrial or agricultural activities. Large scale, concentrated sources of pollution such as industrial discharges, landfills & subsurface injection of chemicals & hazardous wastes, are an obvious source of groundwater pollution. These concentrated sources can be easily detected & regulated but the more difficult problem is associated with diffuse sources of pollution like leaching of agrochemicals & animal wastes subsurface discharges from latrines & septic tanks & infiltration of polluted urban run-off & sewage where sewerage does not exist or defunct. Diffuse sources can affect entire aquifers, which is difficult to control & treat. The only solution to diffuse sources of pollution is to integrate land use with water management. Once pollution has entered the sub-surface environment, it may remain concealed for many years, becoming dispersed over wide areas & rendering groundwater supplies unsuitable for human uses.

Data disclosure and public policy

Access to information has been an important part of the environmental debate since the beginning of the climate change movement. The notion that "information increases the effectiveness of participation" has been widely accepted in economics and other social science literature. While the availability of reliable data is the most important step towards efficient regulation, making the process transparent and disclosing data to the public brings many additional advantages. Such disclosure creates competition among industries on environmental performance. It can also lead to public pressure from civil society groups, as well as the general public, investors and peer industrial plants, and nudge polluters towards better behaviour.

a. WATER QUALITY ASSESSMENT

Parameter → / Sites ↓	Temp (^{O}C)	pH	EC (µS/Cm)	TDS (mg/L)	DO (mg/L)	Chloride (mg/L)	Alkalinity (mg/L)	Ca (mg/L)	Mg (mg/L)	TH (mg/L)
S-1	23.00	7.23	545.00	285.00	6.90	70.00	201.00	168.00	30.10	195.10
S-2	22.10	7.47	565.00	296.00	5.95	72.12	196.00	169.00	32.80	215.20
S-3	21.0	7.56	724.00	388.00	9.24	77.00	188.00	188.00	26.90	217.90
S-4	20.60	6.91	348.00	196.00	8.12	62.10	112.00	132.00	25.00	159.40
S-5	22.00	7.29	738.00	391.00	8.14	79.36	158.00	162.00	33.10	199.60
S-6	22.00	7.42	740.00	402.00	9.10	80.00	110.00	218.00	35.20	248.10
Min	**20.6**	**6.91**	**348**	**196**	**5.95**	**62.1**	**110**	**132**	**25**	**159.4**
Max	**23**	**7.56**	**740**	**402**	**9.24**	**80**	**201**	**218**	**35.2**	**248.1**
BIS 2012	--	6.5-8.5	--	500	--	250	200	75	30	300

S-1:	Zoology and Environmental Science	**S-4:**	Pandit Lekhram Hostel
S-2:	BAMS Ayurvedic College	**S-5:**	Deptt. Of Pharmacy
S-3:	Kanya Gurukul Campus	**S-6:**	Registrar Office

Table 2: **Water Quality Measurement in the campus of Gurukula Kangari Vishwavidyalaya, Haridwar**

b. WATER QUALITY INDICES

A Water Quality Index (WQI) is a means by which water quality data is summarized for reporting to the public in a consistent manner. It is similar to the UV index or an air quality index, and it tells us, in simple terms, what the quality of drinking water is from a drinking water supply.

Essentially the WQI is calculated by comparing the water quality data to "Guidelines for Canadian Drinking Water Quality". The WQI measures the scope, frequency, and amplitude of water quality exceedances and then combines the three measures into one score. This calculation produces a score between 0 and 100. The higher the score the better the quality of water. The scores are then ranked into one of the five categories described below:

- Excellent: (WQI Value 95-100) - Water quality is protected with a virtual absence of impairment; conditions are very close to pristine levels. These index values can only be obtained if all measurements meet recommended guidelines virtually all of the time.
- Very Good: (WQI Value 89-94) - Water quality is protected with a slight presence of impairment; conditions are close to pristine levels.
- Good: (WQI Value 80-88) - Water quality is protected with only a minor degree of impairment; conditions rarely depart from desirable levels.
- Fair: (WQI Value 65-79) - Water quality is usually protected but occasionally impaired; conditions sometimes depart from desirable levels.
- Marginal: (WQI Value 45-64) - Water quality is frequently impaired; conditions often depart from desirable levels.
- Poor: (WQI Value 0-44) - Water quality is almost always impaired; conditions usually depart from desirable levels.

Sites	WQI		
S-1	51.86		
S-2	64.31		
S-3	66.64		
S-4	29.25		
S-5	55.51		
S-6	68.01		
S-1:	Zoology and Environmental Science	S-4:	Pandit Lekhram Hostel
S-2:	BAMS Ayurvedic College	S-5:	Deptt. Of Pharmacy
S-3:	Kanya Gurukul Campus	S-6:	Registrar Office

Part III: GREEN COVER

a.	**Area under Green Cover in Vishwavidyalaya**	:	**50% of Entire Vishwavidyalaya Campuses**
b.	**No. of Trees in Vishwavidyalaya**	:	**2718**
c.	**No. of Plants in Vishwavidyalaya**	:	**8572**

You've probably heard that trees produce oxygen, but have you ever wondered just how much oxygen one tree makes? The amount of oxygen produced by a tree depends on several factors, including the species of tree, its age, its health, and the tree's surroundings. A tree produces a different amount of oxygen in summer compared to winter. So, there is no definitive value.

Here are some typical calculations:

"A mature leafy tree produces as much oxygen in a season as 10 people inhale in a year."

"A single mature tree can absorb carbon dioxide at a rate of 48 pounds/year and release enough oxygen back into the atmosphere to support two human beings."

"One acre of trees annually consumes the amount of carbon dioxide equivalent to that produced by driving an average car for 26,000 miles. That same acre of trees also produces enough oxygen for 18 people to breathe for a year."

"A 100-foot tree, 18 inches' diameter at its base, produces 6,000 pounds of oxygen."

"On average, one tree produces nearly 260 pounds of oxygen each year. Two mature trees can provide enough oxygen for a family of four."

Sources

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- Stancil, Joanna Mounce. The Power of One Tree - The Very Air We Breathe. U.S. Department of Agriculture. March 17, 2015.
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Green cover' refers to a broad range of strategies to integrate green, permeable and reflective surfaces into cities and towns, which are home to 89 per cent of our population. Surface temperatures in urban areas can be 10°C to 20°C higher than in the air temperatures because buildings, roads and other hard surfaces absorb and store heat. High temperatures, due to climate change, will further intensify the impacts of urban heat.

Unlike hard surfaces, trees and vegetation (sometimes called green infrastructure) provide shade, and cool and clean the air by evapotranspiration. Other benefits are better health and wellbeing for

urban-dwellers, more biodiversity and wildlife in urban areas, and better regulation of localised flooding.

Types of urban green cover include bushland, private and community gardens, parks, greenways, habitat corridors, street trees, roof gardens and plant-covered walls, as well as reflective and permeable walls, pavements and other surfaces. Protecting local green spaces, designing eco-friendly buildings and creating urban networks of green space can help to minimise the impacts of urban heat in our cities and towns.

Gurukula Kangri Vishwavidyalya is one of the oldest institution of India committed for maintaining cultural heritage while moving towards a better future with scientific and sustainable perspective. In terms of environment, the Vishwavidyalaya is very rich with number of exotic species of plants, conservation measure of water undertaken *viz*. awareness, conservation of water from distillation assemblies *etc.*, recycling of waste to convert it into compost and vermi-compost *etc*. In recent years steps like formation of Eco-club, awareness camps and workshops, celebration days like Himalayan Day and World Environment Day while planting trees and motivated lectures are taken place within all the campuses of Vishwavidyalaya.

Conducting green audit is also another step while assessing the present condition and improve wherever is required in terms of green cover from energy conservation to water conservation, planting trees to awareness programmes.

Part IV: HUMAN ACTIVITIES

A community pursuing environmental sustainability does not exist in and of itself. Trade, transportation, and air borne pollutants, to name several examples, can put it directly in touch with those carrying on in less than sustainable ways. Similarly, college campuses do not exist in and of themselves. It is fairly safe to say that the typical college campus is unlikely to be able to support the livelihood of its human residents without importing some food, energy, materials, and so on, and exporting some waste ± solid or otherwise. Still, the degree of the environmental impact that ensues is not cut in stone nor is it necessarily unsustainable. Like the community aspiring toward sustainability, many things on a college campus can be done that help increase the effectiveness of actions that reduce environmental impacts.

Universities play a significant role in responding to climate change by creating knowledge and integrating the handling of climate issues in educational and research programs, as well as direct and indirect operational activities. Large-scale campus like Gurukula Kangri VIshwavidyalaya, Haridwar, consisting of gates, teaching buildings, school service buildings, living quarters, roads, and other facilities of varying sizes. Comparing to other working place or entertainment venues as well nature or artificial ecological niche, in the campus, there are almost daily social activities, harboring disturbances from the exchanges of people and vehicles. Such a semi-open community

could be roughly defined as a sociological and biological community with constraint access of persons from outside with gates and hotels as the interfaces, which is strongly affected by

environmental stressors like temperature and population density. With the moving persons and vehicles as hosts, so do microbes move around the campuses, following the same routes as persons and vehicles on which they temporarily habit. This make ups the link among certain sets of locations on campus. The activities of dwellers and vehicles of large-scale campuses could in turn profoundly affect their surrounding environment.

Major Human activities in the Vishwavidyalaya:

- **Continues use of vehicles by students, teachers and non-teaching staff in the campus.**
- **Gathering of students in center places.**
- **Noisy environment due to students near classrooms and seminar halls.**
- **Less use of dustbins by students.**
- **No dumping sites for practical laboratories of respective departments.**
- **National Highway is just next to all the Vishwavidyalaya campuses, causing the air pollution in the campus.**
- **Time to time organization of conferences and workshops *etc*.**

Part V: ENVIRONMENTAL PRACTICES

The term *environmental* practice defines the application of appropriate combination of environmental monitoring, assessing and control measures. While including it in reports it also includes the strategies or the future recommendations. The following are the sub-headings on the basis of which the current green audit of Gurukula Kangri Vishwavidyalaya conducted:

a. Build-up Environment
b. Energy Management
c. Water Resources and Management
d. Waste Management
e. Landscape Environment
f. Green Agenda in syllabus
g. Transportation

A. BUILD-UP ENVIRONMENT

In the engineering and social sciences, the term **built environment,** or **built world**, refers to the human-made environment that provide the setting for human activity, ranging in scale from buildings to cities and beyond. It has been defined as "the human-made space in which people live, work and recreate on a day-to-day basis". The built environment encompasses places and spaces created or modified by people to serve their needs of education, office, accommodation, organisation and representation.

Currently, built environments are typically used to describe the design, construction, management, and use of these man-made surroundings as an interrelated whole as well as their relationship to human activities over time (rather than a particular element in isolation or at a single moment in time). It is the science to understand the drawing upon areas such as economics, law, public policy, public health, management, geography, design, engineering, technology, and environmental sustainability. Within the field of public health, built environments are referred to as building or renovating areas in an effort to improve the community's well-being through construction of "aesthetically, health improved, and environmentally improved landscapes and living structures".

An accessible physical environment benefits everyone, not just persons with disabilities. Measures should be undertaken to eliminate obstacles and barriers to indoor and outdoor facilities including

schools, medical facilities, and workplaces. These would include not only buildings, but also footpaths, curb cuts, and obstacles that block the flow of pedestrian traffic.

An accessible government building is one, where persons with disabilities have no barrier in entering it and using all the facilities therein. This covers the built environment – services, steps and ramps, corridors, entry gates, emergency exits, parking – as well as indoor and outdoor facilities including lighting, signages, alarm systems and toilets.

Identifying accessible buildings requires annual accessibility audits that determine if a building meets agreed upon standards. Once a building is deemed fully accessible, an annual audit is not necessary, but should be required for any proposed changes to the structure or systems contained therein. A full audit can then be done on a less frequent basis. Standards of accessibility should be as consistent as possible with international standards, such as those of the ISO, taking into account the local context. In regards to the built environment, ISO 21542:2011, Building Construction – Accessibility and Usability of the Built Environment, delineates a set of requirements and recommendations concerning construction, assembly, components and fittings.

While these things in mind the audit for build-up environment, we assessed all the infrastructure the Vishwavidyalaya have in all the campuses, having mixed infrastructure from old to new. Almost all the building is having plantation and green cover around them. In terms of safety almost all the departments are having Fire extinction system installed. With the earlier initiatives of Green audit cell, eco-club and authorities the campus is almost free from noise pollution inside the campus but a minimum was there due to Vishwavidyalaya campus are situated on the National Highways.

In many departments, earlier it was found that there are no rest rooms for females as well as differently abled persons in the main campus and Faculty of engineering but after the recommendations of Green Audit Cell in 2018 today the entire campus is equipped with all the basic facilities for females and differently abled persons. In last Green Audit report, the committee has recommended the development of students' knowledge and constructive thinking is recreation room which is still to be in consideration. We suggest and recommend a common recreation room inside each campus to be created for all the students.

With the current assessment it is clearly found in the build-up environment there are certain things which require upgradation and maintenance. We also recommend that all the conferences halls available in the different departments should be given some name of eminent researchers of the respective fields or eminent alumni's of the Vishwavidyalaya and there biography with a photograph should be there in the conference hall. It will lead to students more aware about the researchers of India and great alumni's of Vishwavidyalaya.

S. No.	Name of Department/ Faculty	Building Types Old / New	Area in Sq. ft.	Fire prevention provisions	Aeshthetic appeal	Facilities in Class Rooms	Toilets Male / Female	Recreation Room	Facilities for differently abled
I.	MAIN CAMPUS								
1.	Department of Philosophy	Old	200	No	Yes	Table, Chair	Yes	No	Yes
2.	Department of Zoology & Environment Science	Old & new	7000	Yes	Yes	Table, Chair, LCD Projector	Yes	No	Yes
3.	Department of Sanskrit	Old & New	3400	No	Yes	Table, Chair	Yes	No	Yes
4.	Department of Physics	Office & Class Room	2785.75	No	Yes	Table, Chair, LCD Projector, Smart Board	Yes	No	Yes
5.	Faculty of Management Studies	Old	21746.11	Yes	Yes	Table, Chair, LCD Projector, Smart Board, Wifi	Yes	No	Yes
6.	Department of Psychology	Brick Building	2516	Yes	Yes	Table, Chair	Yes	No	Yes
7.	Department of Yogic Science	Old & new	1000	Yes	Yes	Table, Chair		No	
8.	Department of Botany & Microbiology	Old and New	23202.36	Yes	Yes	Table, Chair, LCD Projector	Yes	No	Yes
9.	Department of Pharmaceutical Sciences	Old and New	42797	Yes	Yes	Table, Chair, LCD Projector	Male only	No	Yes
10.	Department of Chemistry	Old and New	14840	Yes	Yes	Table, Chair	Yes	No	No
11.	DSW	Room	10 x 10	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
12.	Swami Shradhanand Hostel	New	10000	Yes	Yes	Not Applicable		Yes	Yes

13.	Pt. Lekha Ram Hostel	Old	8000	Yes	Yes	Not Applicable		Yes	Yes
14.	Pt. Guru Dutt Vidhyarthi Hostel	New	8000	Yes	Yes	Not Applicable	Yes	Yes	Yes
15.	Corporate Affairs & Outreach Cell (CAOC)	New	1095	Yes	Yes	No	Yes	No	No
16.	Senate Hall (Guest House)	New and Old	9000	Yes	Yes	Not Applicable	Yes	Not Applicable	Yes
17.	Central Office	New	8000	Yes	Yes	Not Applicable	Yes	Not Applicable	Yes
18.	Vice Chancellor's Office	New	6000	Yes	Yes	Not Applicable	Yes	Not Applicable	Yes
19.	Faculty of Education	Old	405 m^2	No	Poor	Table, Chair	Yes	No	Yes
20.	Department of History	New	3500	Yes	Yes	Yes	Yes	No	No
21.	Archaeological Museum	Old	20000	Yes	Yes	Yes	Yes	No	No
22.	Department of Mathematics	Old	4650	Yes	Yes	Table, Chair, LCD Projector, Smart Board, Wifi	Yes	Yes	Yes
23.	Dean Office; Faculty of Science	Old	-	-	-	-	-	-	-
24.	Central Library	Old & New	6613 & 3788	Yes	Yes	N/A	Yes	-	Yes
II.	**KGC, Haridwar**	New Structure	15000	Yes	Yes	Table, Chair, LCD Projector,	Yes	Yes	Yes
III.	**FET, Haridwar**	New	7008.62	Yes	Yes	Table, Chair, LCD Projector	Yes	Yes	No

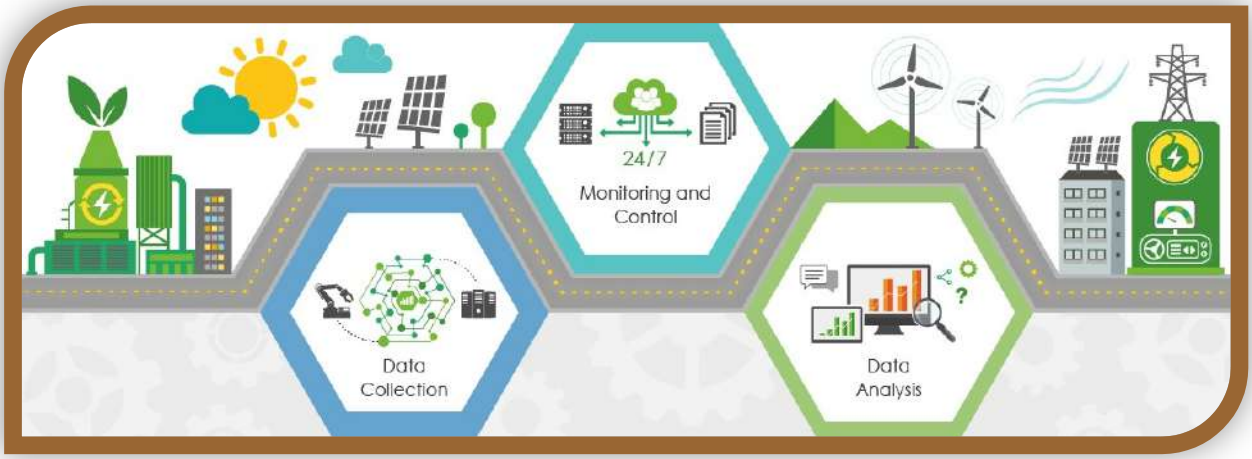
B. ENERGY MANAGEMENT

The increasing demand for power has led to considerable fossil fuels burning which has in turn had an adverse impact on environment. In this context, efficient use of energy and its conservation is of paramount importance. It has been estimated that nearly 25,000 MW can be saved by implementing end-use energy efficiency and demand side management measures throughout India. Efficient use of energy and its conservation assumes even greater importance in view of the fact that one unit of energy saved at the consumption level reduces the need for fresh capacity creation by 2 times to 2.5 times. Further, such saving through efficient use of energy can be achieved at less than one-fifth the cost of fresh capacity creation. Energy efficiency would, therefore, significantly supplement our efforts to meet power requirement, apart from reducing fossil fuel consumption.

The economic development of a country is often closely linked to its consumption of energy. Although India ranks sixth in the world as far as total energy consumption is concerned, it still needs much more energy to keep pace with its development objectives. India's projected economic growth rate is slated at 7.4 % during the period 1997-2012. This would necessitate commensurate growth in the requirement of commercial energy, most of which is expected to be from fossil fuels and electricity. India's proven coal reserves may last for more than 200 years, but the limited known oil and natural gas reserves may last only 18 years to 26 years, which is a cause of concern. The continued trend of increasing share of petroleum fuels in the consumption of commercial energy is bound to lead to more dependence on imports and energy insecurity. India's energy

intensity per unit of GDP is higher as compared to Japan, U.S.A. and Asia by 3.7 times, 1.55 times and 1.47 times respectively. This indicates inefficient use of energy but also substantial scope for energy savings. The increasing global trade liberalisation and growing global competition have made productivity improvement, including energy cost reduction, an important benchmark for economic success. Therefore, a paradigm shift in our approach to energy policy issues is needed – a shift from a supply dominated one to an integrated approach. This integrated approach would have to incorporate a judicial mix of investment in the supply side capacity, operational efficiency improvements of existing power generating stations, reduction of losses in transmission and distribution, end-use efficiency and renewable technologies. The policy goals and concepts would have to be shifted from "energy conservation" to "energy efficiency", and from "energy inputs" to the "effectiveness of energy use" and "energy services". Creation of new power generation capacity is costly and necessitates long gestation period whereas energy efficiency activities can make available additional power at comparatively low investments within a short period of time.

For the past few decades, energy generation has been shifted to alternative energy sources like renewable energy forms such as solar, wind and biomass energy *etc*. instead of the conventional



fossil fuel sources. Apart from the growth in the energy sector, there has been an equivalent increase in businesses and organisations, which has brought tremendous competition in the market in terms of increasing environmental standards and reducing global warming, carbon foot print and greenhouse gas emissions. Energy management is a process by which a sector or an organisation can effectively manage how much energy they produce and how to control, monitor and conserve as much energy as they can while also generating enough energy to meet the demand of the customers. Apart from protection of climate and conservation of resources, another important factor when dealing with energy conservation is cost savings. The cost should be reduced in a manner such that the work processes are not affected. And thus, profit should be maximised by minimising costs.

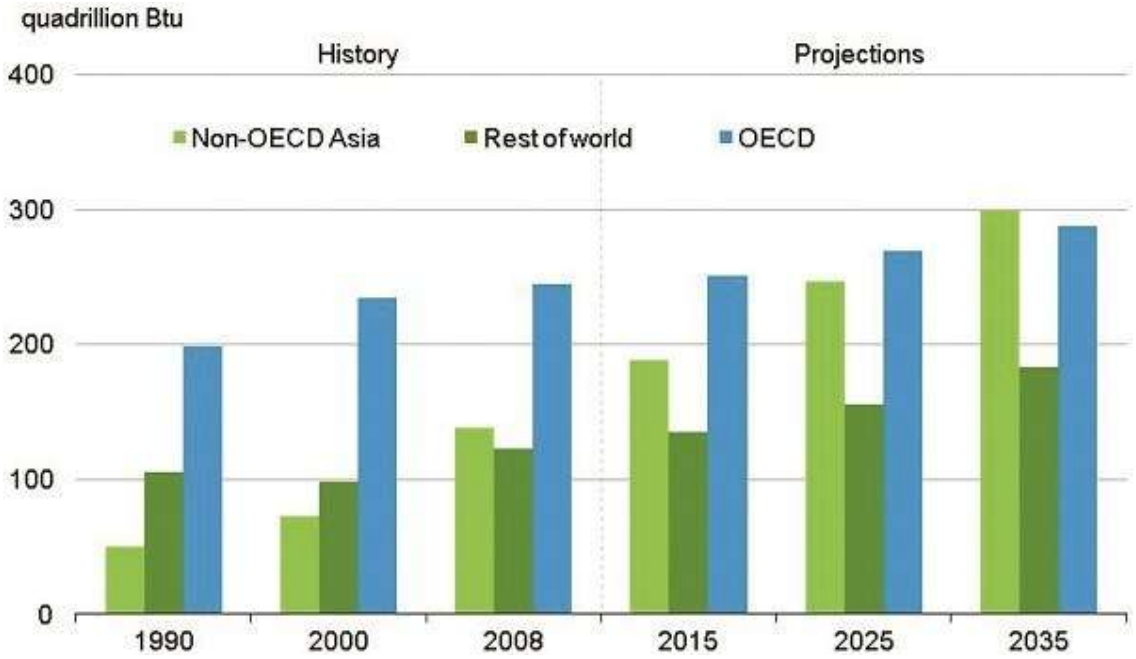


Figure 1: China and India account for about half of the world increase in Energy use
Source: EIA, International Energy Outlook 2011

According to a study released by the US Energy Information Administration in the year 2011, China and India were the two countries which were least affected by the worldwide recession. In the year 2008, both these nations accounted for 21% of the total world energy consumption. By 2035, both the countries will account for 31% of world energy use in the IEO2011 Reference case. This is shown in the figure 1.

With these rising statistics, it is essential that we not only reduce energy consumption at private and public organisations, but also at homes, to save energy and thus, protect our environment and reduce carbon emissions as well. In 2016, India stood fourth worldwide, as the largest consumer of energy, the figure being double of that in 2000. It is also expected that nearly 315 million more Indians will move to cities in the upcoming 25 years as the economy will grow and this in turn will lead to a rise in the energy demand.

With these rising statistics, it is essential that we not only reduce energy consumption at private and public organisations, but also at homes, to save energy and thus, protect our environment and reduce carbon emissions as well. In 2016, India stood fourth worldwide, as the largest consumer of energy, the figure being double of that in 2000. It is also expected that nearly 315 million more Indians will move to cities in the upcoming 25 years as the economy will grow and this in turn will lead to a rise in the energy demand.

A large amount of energy and money can be saved in general by employing energy management and the savings in any organisation can follow the profile as shown.

Low Cost Activities (First Year)	5 to 15 %
Moderate Cost, Significant Effort (Three to Five Years)	15 to 30 %
Long Term Potential Higher Cost, More Engineering	3 to 50 %

Table.1. Savings through Energy Management

As shown, huge amount of savings and paybacks can be achieved through energy management. It can also help companies by not only improving productivity but also the quality that they offer using energy efficiency techniques and better materials and manufacturing processes. The grouping of better quality, better products, lesser environmental damage, and lesser costs of energy provides bonus to the companies and in turn helps sustaining the environment and conserving the resources too.

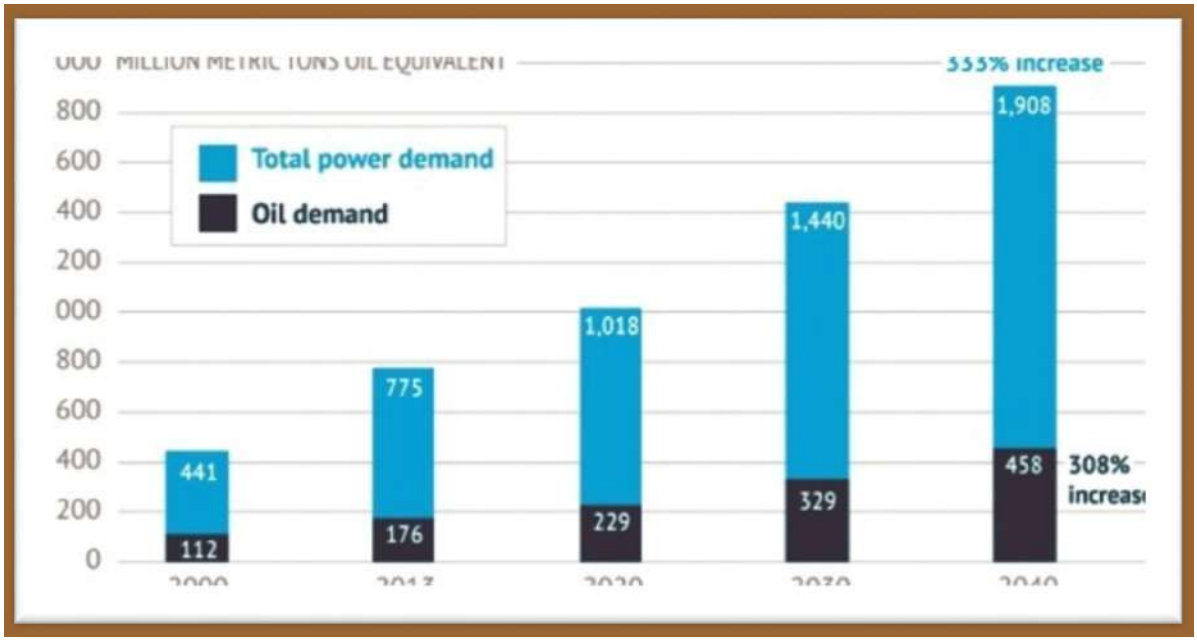


Figure 2: India's Energy Demand

Source: IEA, World Energy Outlook 2015

Principles governing energy management are as follows.

1. Control the costs of the energy function, and not the Btu of energy. Since energy always provides a service, it is converted to a useful function, it is advisable to control the total cost than just the Btu of energy since the total cost is more closely related to the interests of the organisation.
2. The second principle is to control energy functions as a product cost, not as a part of manufacturing or general overhead. The energy functions should be a part of the costing system so that the specific impact of each function can be better judged.

3. The third principle is to control and meter only the main functions – which accounts for only 20% functions which make up 80 percent of the costs.

4. The last principle states that the major effort of an energy management program should be put in to installing controls and achieving results. Each step of the process should be monitored to achieve appropriate results.

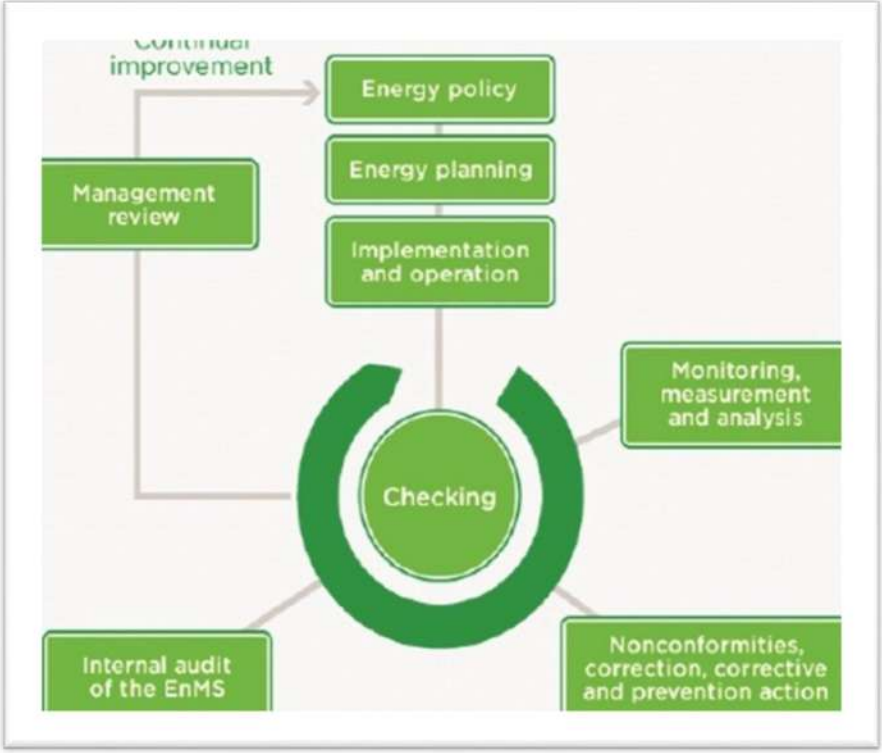


Figure 3: Basic Block Diagram of an Energy Management System Information sourced from ISO 50001

With the depletion of natural resources, switching to better options like smart grids and smart metering helps in reducing the amount of energy consumed and to also further increase the efficiency of these power systems, **Energy Management Systems (EMS)** are employed. It consists of a series of policy framework, processes and procedures to manage the energy usage. Therefore, EMS helps in maximising profits by reducing

costs and enhancing efficiency of the system.

When energy use is deliberately monitored, controlled, and conserved, decreases in utility consumption and overall costs can be realized without sacrificing facilities operations. Such energy management techniques can take on many shapes and sizes. Following are strategies facility management executives can use to increase efficiency while overcoming potential costly challenges.

1. Actively manage real-time energy use. Proactive, real-time data management can expose a wide range of unknown challenges associated with occupancy, building use, and peaks in utility usage. For example, my firm, Southland Energy, installed a comprehensive metering system for a data center customer, monitoring everything from air and water flows, to very specific details of the data center. The real-time data allowed the building operators to identify potential issues instantaneously, implement corrective actions to prevent critical shutdowns, and manage loads before they affected the entire system.

2. Actively manage what is measureable. Use advanced metering and energy management systems (EMS) to capture real-time data, ensure its accuracy and, in turn, address specific issues. For example, a K-12 school installed an energy dashboard that managed the overall facility while actively engaging faculty and students. The customer could view how the systems were operating and how much they were saving based on their actions and system improvements.

In instances where building owners have utility monitoring equipment but no collection or processing software, the meters or monitoring equipment become stranded assets. This is because millions of data points have to be gathered and processed manually, multiple times during the year. A sophisticated metering system equipped with the proper EMS software will automatically collect, process, and format these data points in real time, if not hourly. The ability to process these useful data points into an easy to use format improves the overall system effectiveness and functionality.

3. Actively manage energy consumption. Use collected data to build a strategy that manages costs and consumption on a daily, weekly, monthly, and annual basis. Southland Energy worked with an industrial customer to evaluate multiple peak demand reduction strategies. Load shifting and demand limiting systems were implemented to limit customer loads during peak hours and reduce costs.

Limiting peak demand consumption offers additional benefits that are not always easy to identify or claim. For example, during peak hours, utilities run “peaker plants” to meet demands from the grid. However, these plants are often older and less efficient electricity generation plants, with the sole purpose to run periodically to meet demand. Reducing peak demand during summer months saves electricity costs and overall greenhouse gas emissions per kW.

Managing consumption allows for early detection of improper set points, schedule misalignments, and equipment/system failures. Analysing trends of metered points over days, weeks, months, and

years helps to pinpoint irregularities, leaks, and excessive run times. The proper system can flag leaks, changes in occupancy, occupant set point changes, and energy and water waste.

4. Have a holistic plan. Without clear direction and an action plan, it is difficult to make a meaningful impact beyond the "low hanging fruit." A holistic plan is critical to leverage overall savings and provide a mix of improvements for substantial results. Facility leaders often benefit from a holistic plan that bundles low hanging fruit such as lighting and building automation measures with longer paybacks such as renewable energy. This evaluates all possible savings including water, waste, energy, and system/facility reliability to package the appropriate measures for the facility's goals and financial requirements.

5. Secure leadership buy-in and support. Real, holistic changes will not be attainable without direct involvement and support from leadership. It is critical to engage leadership and key decision makers that impact the financials of facility operations.

6. Establish an occupant behavioral awareness program. Technology implementation and building retrofits are only part of the equation. Occupants have a big impact on a building's efficiency and investments made. Education is key to the behavioural process, and empowering occupants with knowledge and resources will help increase energy savings as they can realize the impact through efficiency or financial gain.

Facility executives that adopt these 10 tips for energy management improvements are closer to ensuring their organizations are able to increase efficiency, while overcoming budget constraints, volatile energy costs, and the hidden expenses of aging equipment.

S. No.	Name of Department/ Faculty	No. of Tubes lights & Bulbs	No. of A.C.	No. of LCD Projectors	No. of Photocopiers	No. of Computers & Printers	LEDS	No. of Fans	Use of Non-Conventional (Solar Energy)	Energy Management practices
I.	MAIN CAMPUS									
1.	Department of Philosophy	3	1	1	1	2+4	2	6	No	Yes
2.	Department of Zoology & Environment Science	102+56	28	2	11	16+8	4	95	No	Yes
3.	Department of Sanskrit	39+6	11	No	No	Yes	Yes	38	No	No
4.	Department of Physics	162	22	2	Nil	30+7	23	150	No	Yes
5.	Faculty of Management Studies	57	19	10	05	50 & 13	30	50	No	Yes
6.	Department of Psychology	17+16	2	1	4	4 & 4	NO	11	No	Yes
7.	Department of Yogic Science	76+14	3	1	1	7+3	14	62	No	No
8.	Department of Botany & Microbiology	181	36	05	Nil	23 & 23	104	119	No	Yes
9.	Department of Pharmaceutical Sciences	175	13	2	2	37 & 9	Nil	126	No	Yes
10.	Department of Chemistry	330	22	04	03	53	Nil	113	Nil	Yes
11.	DSW	2+1	1	N/A	1	1	N/A	1	N/A	N/A
12.	Swami Shradhanand Hostel	214		No	No	2+1	20	214	No	Yes
13.	Pt. Lekha Ram Hostel	82+45	No	No	No	No	No	64	No	No
14.	Pt. Guru Dutt Vidhyarthi Hostel	500+50	No	No	No	20 + 2	12	180	No	No

15.	Corporate Affairs & Outreach Cell (CAOC)	16	2	0	2	5	No	8	No	Yes
16.	Senate Hall (Guest House)	210+40	38	1	1	1	No	92	No	No
17.	Central Office	88+20	25	02	6	45+22	20	44	No	Yes
18.	Vice Chancellor's Office	22+10	4	01	01	2+2	02	06	No	Yes
19.	Faculty of Education	-	2	Nil	Nil	3	4	9	No	Yes
20.	Department of History	77	13	2	1	11 & 3	1	46	No	Yes
21.	Archaeological Museum	681	7	No	3	4 & 3	No	68	No	No
22.	Department of Mathematics	56 & 19	17	03	No	26 & 9	01	40	No	Yes
23.	Dean Office; Faculty of Science	Nil	03	-	01	02 & 01	07	04	No	Yes
24.	Central Library	-	03	-	01	02 & 01	07	04	No	Yes
II.	**KGC, Haridwar**									
1.	Environmental Science	55+10	2	1	1	3	No	No	Yes	39
2.	Physics	29	1	1	No	2	No	No	No	22
3.	Microbiology	73	1	2	No	2+1	No	No	No	42
4.	Chemistry	73	1	1	No	2+1	No	No	No	42
5.	Ancient Indian History Culture & Archaeology	13+1	No	No	No	1	No	No	No	13
III.	**FET, Haridwar**	630	48	07	01	301	20	524	04	Yes

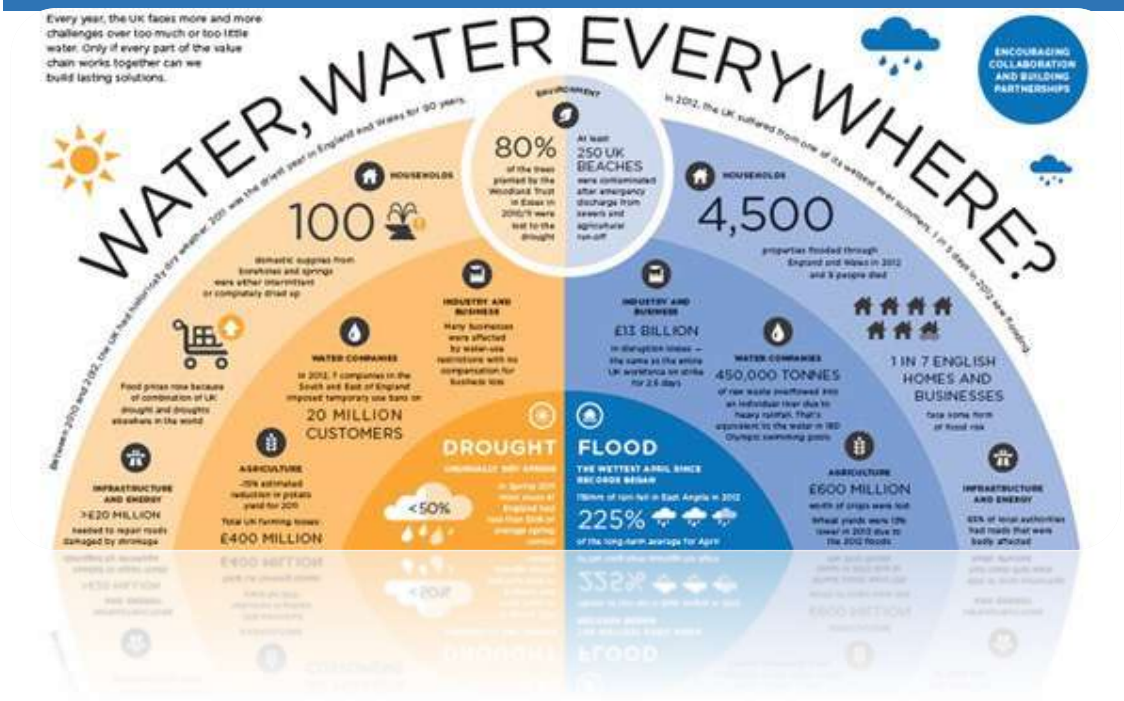
C. WATER RESOURCES AND MANAGEMENT

Water- a must for all life forms on earth and the most important natural resource. We all know that about three-fourths of the earth's surface is covered with water. But about 96.5% of the global water resources come from the oceans and seas. In India, the water resources amount to an estimated 1897 square kilometer per annum. However, we all know about the shortage of Water we are facing as a country. Let us learn more about the conversation of the water resource.

Water resource systems have benefited both people and their economies for many centuries. The services provided by such systems are multiple. Yet in many regions of the world they are not able to meet even basic drinking water and sanitation needs. Nor can many of these water resource systems support and maintain resilient biodiverse ecosystems. Typical causes include inappropriate, inadequate and/or degraded infrastructure, excessive withdrawals of river flows, pollution from industrial and agricultural activities, eutrophication resulting from nutrient loadings, salinization from irrigation return flows, infestations of exotic plant and animals, excessive fish harvesting, flood plain and habitat alteration from development activities, and changes in water and sediment flow regimes. The inability of water resource systems to meet the diverse needs for water often reflect failures in planning, management, and decision-making—and at levels broader than water. Planning, developing, and managing water resources to ensure adequate, inexpensive, and sustainable supplies and qualities of water for both humans and natural ecosystems can only succeed if we recognize and address the causal socioeconomic factors, such as inadequate education, corruption, population pressures, and poverty.

Over the centuries, surface and ground waters have been a source of water supply for agricultural, municipal, and industrial consumers. Rivers have provided hydroelectric energy and inexpensive ways of transporting bulk cargo. They have provided people water-based recreational opportunities and have been a source of water for wildlife and their habitats. They have also served as a means of transporting and transforming waste products that are discharged into them. The quantity and quality regimes of streams and rivers have been a major factor in governing the type, health, and biodiversity of riparian and aquatic ecosystems. Floodplains have provided fertile lands for agricultural crop production and relatively flat lands for the siting of roads and railways and commercial and industrial complexes. In addition to the economic benefits that can be derived from rivers and their floodplains, the aesthetic beauty of most natural rivers has made lands adjacent to them attractive sites for residential and recreational development. Rivers and their floodplains have generated, and, if managed properly, can continue to generate, substantial cultural, economic, environmental, and social benefits for their inhabitants.

Human activities undertaken to increase the benefits obtained from rivers and their floodplains may also increase the potential for costs and damages such as when the river is experiencing periods of droughts, floods, and heavy pollution. These costs and damages are physical, economic, environmental, and social. They result because of a mismatch between what humans expect or demand, and what nature offers or supplies. Human activities tend to be based on the "usual or normal" range of river flow conditions. Rare or "extreme" flow conditions outside these normal ranges will continue to occur, and possibly with increasing frequency as climate change experts suggest. River-dependent human activities that cannot adjust to these extreme flow conditions will incur losses.



The planning of human activities involving rivers and their floodplains must consider certain hydrologic facts. One of these facts is that surface water flows and aquifer storage volumes vary over space and time. They are also finite. There are limits to the amounts of water that can be withdrawn from them. There are also limits to the amounts of pollutants that can be discharged into them. Once these limits are exceeded, the concentrations of pollutants in these waters may reduce or even eliminate the benefits that could be obtained from other users of the resource.

Water resources professionals have learned how to plan, design, build, and operate structures that together with non-structural measures increase the benefits people can obtain from the water resources contained in aquifers, lakes, rivers, and estuaries. However, there is a limit to the services one can expect from these resources. Rivers, estuaries, and coastal zones under stress from over development and overuse cannot reliably meet the expectations of those depending on them. How can these resources best be managed and used? How can this be accomplished in an environment of uncertain and varying supplies and uncertain and increasing demands, and consequently of increasing conflicts among individuals having different interests in their management and use? The central purpose of water resources planning, management, and analysis activities is to address, and if possible answer, these questions. These questions have scientific, technical, political (institutional), and social dimensions. Thus water resources planning processes and products are must.

River basin, estuarine, and coastal zone managers—those responsible for managing the resources in those areas—are expected to manage those resources effectively and efficiently, meeting the demands or expectations of all users, and reconciling divergent needs. This is no small task, especially as demands increase, as the variability of hydrologic and hydraulic processes become more pronounced, and as stakeholder expectations of system performance increase in complexity. The focus or goal is no longer simply to maximize economic net benefits while making sure the distribution of those benefits is equitable. There are also environmental and ecological goals to consider. Rarely are management questions one-dimensional, such as how can we provide, at acceptable costs, more high-quality water to

municipalities, industry, or to irrigation areas in the basin. Now added to that question is how would those withdrawals affect the downstream hydrologic water quantity and quality regimes, and in turn the riparian and aquatic ecosystems.

Problems and opportunities change over time. Just as the goals of managing and using water change over time, so do the processes of planning to meet these changing goals. Planning processes evolve not only to meet new demands, expectations, and objectives, but also in response to new perceptions of how to plan and manage more effectively.

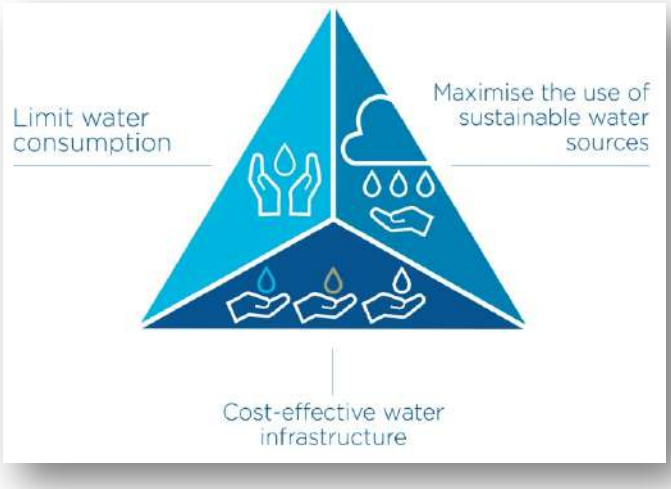
Some quick Facts and Figures

- The total volume of water on earth's surface- 96.5%
- The total volume of usable freshwater- 2.5%
- The volume of freshwater in ice-sheets and glaciers- 70%
- Stored groundwater- 30%
- Precipitation (rainfall) in India- 4% of earth's total
- India's rank in the world for water availability per person (per annum)- 133

Conservation & Management of Water Resources

'Water water everywhere, not a drop to drink.' It is a very old saying in a different reference to the situation. But, this is exactly what we fear will happen very soon, if we do not wisely use and conserve our water resources.

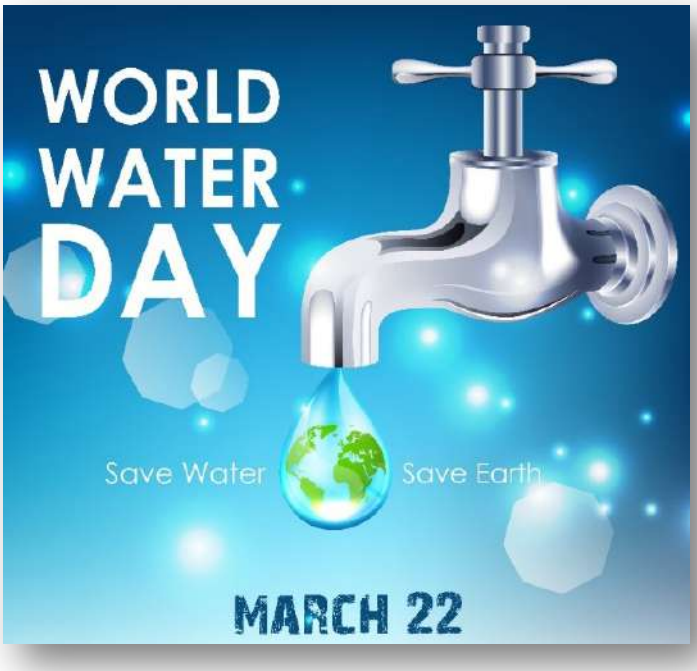
Research shows that by 2025, India, along with many other countries will face a serious scarcity of water. Many regions in our country are currently undergoing the process of 'water stress'. According to a research by Falken Mark, a Swedish expert on water, 'water stress' happens when the water availability falls below 1000 cubic meters per person per day.



Today, most countries are placing unprecedented pressure on water resources. The global population is growing fast, and estimates show that with current practices, the world will face a 40% shortfall between forecast demand and available supply of water by 2030. Furthermore, chronic water scarcity, hydrological uncertainty, and extreme weather events (floods and droughts) are perceived as some of the biggest

threats to global prosperity and stability. Acknowledgment of the role that water scarcity and drought are playing in aggravating fragility and conflict is increasing.

To strengthen water security against this backdrop of increasing demand, water scarcity, growing uncertainty, greater extremes, and fragmentation challenges, clients will need to invest in institutional strengthening, information management, and (natural and man-made) infrastructure development. Institutional tools such as legal and regulatory frameworks, water pricing, and incentives are needed to better allocate, regulate, and conserve water resources. Information systems are needed for resource monitoring, decision making under uncertainty, systems analyses, and hydro-meteorological forecast and warning. Investments in innovative technologies for enhancing productivity, conserving and protecting resources, recycling storm water and wastewater, and developing non-conventional water sources should be explored in addition to seeking opportunities for enhanced water storage, including aquifer recharge and recovery. Ensuring the rapid dissemination and appropriate adaptation or application of these advances will be a key to strengthening global water security.



S. No.	Name of Department/ Faculty	Water Use per day in Litres	Water Purification system	Use of Water Cooler	Water leakage Repair	Rain Water Harvesting	Water Tank Cleaning	Water pollution Incidences	Natural Water Bodies
I.	MAIN CAMPUS								
1.	Department of Philosophy	50	Yes	Yes	Yes	No	Yes	Yes	Yes
2.	Department of Zoology & Environment Science	100	Yes	Yes	Yes	No	Yes	Yes	Yes
3.	Department of Sanskrit	1500	Yes	Yes	Yes	No	Yes	Yes	Yes
4.	Department of Physics	1000	Yes		Yes	No	Yes	Yes	Yes
5.	Faculty of Management Studies	500	03	02	Yes	No	Yes	Yes	No
6.	Department of Psychology	20	Yes	Yes	Yes	No	Yes	Yes	Yes
7.	Department of Yogic Science	120	Yes	Yes	Yes	No	Yes	Yes	Yes
8.	Department of Botany & Microbiology	1500	Yes	Yes	Yes	No	Yes	No	No
9.	Department of Pharmaceutical Sciences	150	4	Yes	Yes	No	Yes	No	No
10.	Department of Chemistry	1500	Yes	Yes	Yes	No	Yes	No	Nil
11.	DSW	N/a	Yes	Yes	Yes	No	Yes	Yes	Yes
12.	Swami Shradhanand Hostel	500	Yes	Yes	Yes	No	Yes	Yes	Yes
13.	Pt. Lekha Ram Hostel	1000	Yes	Yes	Yes	No	Yes	Yes	Yes
14.	Pt. Guru Dutt Vidhyarthi Hostel	2000	Yes	Yes	Yes	No	Yes	Yes	Yes

15.	Corporate Affairs & Outreach Cell (CAOC)	5	No	No	No	No	No	No	No
16.	Senate Hall (Guest House)	Depend on Occupancy	Yes	Yes	Yes	No	Yes	Yes	Yes
17.	Central Office	1200	Yes	Yes	Yes	No	Yes	Yes	Yes
18.	Vice Chancellor's Office	800	Yes	Yes	Yes	No	Yes	Yes	Yes
19.	Faculty of Education	500	No	Nil	Yes	No	Yes	No	No
20.	Department of History	5	Yes	Yes	Yes	No	Yes	NO	Yes
21.	Archaeological Museum	6	Yes	Yes	Yes	No	Yes	No	NO
22.	Department of Mathematics	200	01	01	No	No	No	No	No
23.	Dean Office; Faculty of Science	5	N/A	N/A	N/A	No	N/A	N/A	N/A
24.	Central Library	-	03	Yes	01	No	Yes	Yes	Yes
II.	**KGC, Haridwar**								
1.	Environmental Science	1000	Yes	Yes	Yes	No	Yes	Yes	Yes
2.	Physics	10	Yes	Yes	Yes	No	Yes	Yes	Yes
3.	Microbiology	2000	Yes	Yes	Yes	No	Yes	Yes	Yes
4.	Chemistry	2000	Yes	Yes	Yes	No	Yes	Yes	Yes
5.	Ancient Indian History Culture & Archaeology	10	Yes	Yes	Yes	No	Yes	Yes	Yes
III.	**FET, Haridwar**	5000	Yes	Yes	Yes	Nil	Yes	Nil	Nil

D. WASTE MANAGEMENT

Waste management rules in India are based on the principles of "sustainable development", "precaution" and "polluter pays". These principles mandate municipalities and commercial establishments to act in an environmentally accountable and responsible manner—restoring balance, if their actions disrupt it. The increase in waste generation as a by-product of economic development has led to various subordinate legislations for regulating the manner of disposal and dealing with generated waste are made under the umbrella law of Environment Protection Act, 1986 (EPA**)**. Specific forms of waste are the subject matter of separate rules and require separate compliances, mostly in the nature of authorisations, maintenance of records and adequate disposal mechanisms.

With rapid urbanisation, the country is facing massive waste management challenge. Over 377

million urban people live in 7,935 towns and cities and generate 62 million tonnes of municipal solid waste per annum. Only 43 million tonnes (MT) of the waste is collected, 11.9 MT is treated and 31 MT is dumped in landfill sites. Solid Waste Management (SWM) is one among the basic essential services provided by municipal authorities in the country to keep urban centres clean. However, almost all municipal authorities deposit solid waste at a dumpyard within or outside the city haphazardly. Experts believe that India is following a flawed system of waste disposal and management.

Solid-waste management, the collecting, treating, and disposing of solid material that is discarded because it has served its purpose or is no longer useful. Improper disposal of municipal solid waste can create unsanitary conditions, and these conditions in turn can lead to pollution of the environment and to outbreaks of vector-borne disease—that is, diseases spread by rodents and insects. The tasks of solid-waste management present complex technical challenges. They also pose a wide variety of administrative, economic, and social problems that must be managed and solved.

The key to efficient waste management is to ensure proper segregation of waste at source and to ensure that the waste goes through different streams of recycling and resource recovery. Then reduced final residue is then deposited scientifically in sanitary landfills. Sanitary landfills are the ultimate means of disposal for unutilised municipal solid waste from waste processing facilities and other types of inorganic waste that cannot be reused or recycled. Major limitation of this method is the costly transportation of MSW to far away landfill sites.

In some urban centres, people working in the informal sector collect solid waste for each doorstep to get a collection fee and derive additional income from sale of recyclables. The informal recycling industry plays a major role in waste management. It also ensures that less waste reaches landfills.

There has been technological advancement for processing, treatment and disposal of solid waste. Energy-from-waste is a crucial element of SWM because it reduces the volume of waste from disposal also helps in converting the waste into renewable energy and organic manure. Ideally, it falls in the flow chart after segregation, collection, recycling and before getting to the land fill. But many waste to energy plants in India are not operating to their full potential.

Installation of waste-to-compost and bio-methanation plants would reduce the load of landfill sites. The biodegradable component of India's solid waste is currently estimated at a little over 50 per

cent. Bio-methanation is a solution for processing biodegradable waste which is also remains underexploited. It is believed that if we segregate biodegradable waste from the rest, it could reduce the challenges by half. E-waste components contain toxic materials and are non-biodegradable which present both occupational and environmental health threats including toxic smoke from recycling processes and leaching from e-waste in landfill into local water tables.

The concept of common waste treatment facility (ENVIS Newsletter, December 2010) is being widely promoted and accepted as it uses waste as a resource by either using it as a co-fuel or co-raw material in manufacturing processes. This has led to rise of Public Private Partnership (PPP) models in waste management which has open doors for doing business in waste management.

Bio-medical waste (management and handling) rules, 1998 prescribe that there should be a Common Biomedical Waste Treatment Facility (CBWTF) at every 150 kms in the country. CBWTFs have been set up and are functioning in cities and towns. However, establishment of functional CBWTF throughout the country must be ensured. Integrated common hazardous waste management facilities combine secured landfill facility, solidification/stabilisation and incineration to treat hazardous wastes generated by various industrial units. They contribute about 97.8 per cent of total landfill waste and 88 per cent of total incinerable hazardous waste generated in the country, as per an environment ministry report.

To anyone tuned into Davos last month, Indian leaders presented an impressive picture of a country open for business. “If you want wealth with wellness, come to India", was the message. For those closer to the ground, however, the quality of life in India’s towns and cities seems distinctly suspect.

Here is one important aspect of this: India generates over 150,000 tonnes of municipal solid waste (MSW) per day, with Mumbai being the world’s fifth most wasteful city. Yet, only 83% of waste is collected and less than 30% is treated. According to the World Bank, India’s daily waste generation will reach 377,000 tonnes by 2025. Blame urbanization and industrialization, but the consequences of India’s megacities producing tonnes of waste are tangible and troubling.

A noteworthy first step from the Narendra Modi government was propelling sanitation to the top of the policy agenda under the flagship Swachh Bharat Abhiyan programme. The Clean India Dashboard tracks programme achievements, 24x7. Out of 82,607 wards, 51,734 now have 100% door-to-door waste collection, up from 33,278 in November 2015. Almost 88.4 megawatts (MW)

of energy is generated from waste-to-energy (WTE) projects. Nevertheless, the disproportionate focus of the programme on toilet construction and eliminating open defecation deflects attention from colossal failures in waste management systems.

"A clean India would be the best tribute India could pay to Mahatma Gandhi on his 150 birth anniversary in 2019," said Shri Narendra Modi as he launched the Swachh Bharat Mission at Rajpath in New Delhi. On 2nd October 2014, Swachh Bharat Mission was launched throughout length and breadth of the country as a national movement. The campaign aims to achieve the vision of a 'Clean India' by 2nd October 2019.

Indeed, the unique economic and social development trajectories of individual countries mandate different approaches to waste management. Until the 1980s, Korea, like most other developing countries, focused on improving efficiency of waste management through incineration and landfills. This was considered relatively easier than public campaigns to "Reduce and Recycle". However, by the late 1980s, in the face of accelerating waste generation, South Korea implemented a volume-based waste fee system—a paradigm shift focused on controlling waste generation and achieving maximum rates of recycling while raising additional resources to finance waste management.

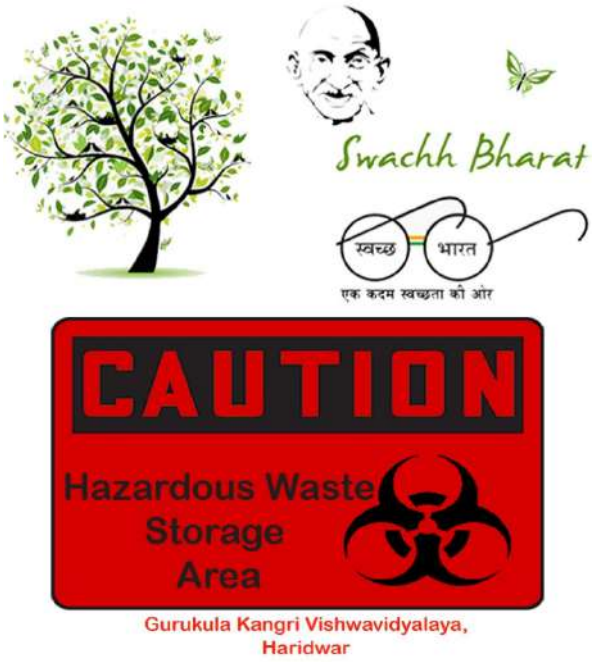
2018 ended with high aspirations of the Indian Environment Minister's resolution - 'to eliminate all single-use plastics from our beautiful country by 2022'. It may sound promising but one must

be critical to evaluate all the aspects of progress made by India and the prospected efficiency of existing legislatures and policy frameworks.

The combined efforts of CPCB (Central Pollution Control Board) and NGT (National Green Tribunal) have resulted in the emergence of several legislatures which can effectively control the waste issues in India. A bird's eye view on India's history can tell that the nation has gained a stronghold on several fronts in the last 5 years, especially in curbing E-waste and plastics.

Since the National Environment Policy Act of 1986, India has marked several milestones including the first comprehensive solid waste management rules of 2000 and revised solid waste management rules of 2016. The new rules have extended the producers' responsibility and promoted WTE (Waste-To-Energy) plants.

The report titled 'What a Waste 2.0' by the World Bank explored a trajectory where waste generation will overtake population growth by 2050, but also sheds light on the ways economies are tackling the issue. The noteworthy mentions in the report highlight efforts of waste collection by partnering with informal sector in Pune and sustainable source separation of waste in Panaji. These examples exemplify the seriousness of the government regarding the issue and also accounts for the increase in public awareness.



Central, State, and Local bodies are collectively trying to enforce a strict ban on non-recyclable multi-layer plastics packaging. Urban Local Bodies (ULBs) and Municipalities are also putting efforts to ensure segregation of waste sources and resource recovery.

In fact, the emergence of private players in the waste management sector also symbolizes the dawn of a new era, where the informal sector will effectively turn mainstream and re-organize to create efficient and safe waste management system. From the utilitarian perspective, the inclusion of informal sector workers will not just give them a better life but will also serve as the most effective tool to mitigate the rising waste issues.

Although infrastructure development and deployment of technology are going to take several more years yet the grassroots strengthening of major stakeholders including waste generator, waste collection agent and the final contractor will pave the path for a better future.

Tips to Reduce Waste

- Take reusable bags to the store when shopping
- Reduce or eliminate the use of paper plates and cups
- Store leftover foods in reusable containers instead of single use plastic bags or Polystyrene foam containers
- Reduce or minimize use of plastic bags and Polystyrene foam
- Donate unwanted, slightly used clothing, furniture and other household items to local non-profit organizations
- Take advantage of the many curbside and drop-off recycling opportunities
- Xeriscape your yard with native plants and non-watering landscapes
- Compost yard waste which also helps enrich the soil and reduces water run-off
- Purchase foods in bulk or those which use less packaging
- Purchase fruits and vegetables that are not pre-packaged in containers and plastics

S. No.	Name of Department/ Faculty	Organic Waste/Day (Kg)	Non-Plastic dry Waste/day (Kg)	Plastic, Themocol/ Day (Kg)	Other (E-waste)	Management of Organic Waste	Management of Other Waste	Waste dumping Pit?	Waste management Practices
I.	MAIN CAMPUS								
1.	Department of Philosophy	N/a	1	N/a	N/a	No	Yes	No	Yes
2.	Department of Zoology & Environment Science	No	5	No	No		Chemical dumped in dumping pit	Yes	
3.	Department of Sanskrit	1	1/2	No	No		No	No	
4.	Department of Physics	1	1	250 gm	No		No	No	
5.	Faculty of Management Studies	2	½	½	None		No	No	
6.	Department of Psychology	No	No	No	No		No	No	
7.	Department of Yogic Science	1	3	50gm	20gm		No		
8.	Department of Botany & Microbiology	06	½	No	NO		Microbial material dumped in dumping pit	No	
9.	Department of Pharmaceutical Sciences	5	5	¼	Nil		Yes	Yes	
10.	Department of Chemistry	02	06	½	No		Chemical dumped in dumping pit	Yes	

11.	DSW	N/A	N/A	N/A	N/A		N/A	N/A	
12.	Swami Shradhanand Hostel	5	8	No	No		No	Yes	
13.	Pt. Lekha Ram Hostel	10	10	No	No		No	Yes	
14.	Pt. Guru Dutt Vidhyarthi Hostel	10	10	No	No		No	Yes	
15.	Corporate Affairs & Outreach Cell (CAOC)	No	No	No	No		No	No	
16.	Senate Hall (Guest House)	Depend on Guest House Occupancy	Depend on Guest House Occupancy	No	No		No	No	
17.	Central Office	No	1 Kg	1 Kg	500 gm		Yes	Yes	
18.	Vice Chancellor's Office	No	500 Kg	250 gm	No		N/A	Yes	
19.	Faculty of Education	Nil	100 gm	No	NO		-	No	
20.	Department of History	No	No	No	No		No	Yes	
21.	Archaeological Museum	No	No	No	No		No	Yes	
22.	Department of Mathematics	Nil	Dry Waste ¼	Nil	Nil		Nil	Nil	
23.	Dean Office; Faculty of Science	No	No	No	No		No	No	
24.	Central Library	No	No	No	No		No	No	

II.	**KGC, Haridwar**								
1.	Environmental Science	1 Kg	3 Kg	250 gm	No	Yes	Chemical dumped in dumping pit	Yes	Yes
2.	Physics	1 Kg	YES	250 gm	No		No	YES	
3.	Microbiology	Yes	Yes	Yes	No		Microbial material dumped in dumping pit	Yes	
4.	Chemistry	Yes	Yes	Yes	No		Chemical dumped in dumping pit	Yes	
5.	Ancient Indian History Culture & Archaeology	No	No	No	No		No	Yes	
III.	**FET, Haridwar**	7kg	20 kg	Nil	Yes	Yes	Yes	Yes	Yes

E. LANDSCAPE ENVIRONMENT

'Landscape' is a concept which includes the physical environment and people's perception and appreciation of that environment. It is not restricted to the purely visual, but may comprise and encompass the ways in which individuals and communities perceive the natural and physical resources, as through traditions, lore, and legends that express the significant and memorable elements of a landscape.

The "sense of a broad expanse is common to the term "landscape"".

Landscape means the natural and physical attributes of land together with air and water which change over time and which is made known by people's evolving perceptions and associations.

Three broad categories of landscape attributes:

- Biophysical elements, patterns and processes;
- Sensory or perceptual qualities (such as the view of a scenic landscape or the distinctive smell and sound of the coast); and
- Associative meanings and values including spiritual, cultural or social associations.

We may never fully understand how prehistoric people perceived their surroundings, but such knowledge is not entirely out of our reach. The main difficulty that scholars encounter stems from the division between environment and landscape. Meier argues that environment-focussed studies are concerned with the world in relation to which humans are external observers, while landscape-orientated approaches place people at their centre. Despite the widespread use of the word landscape, most studies actually focus on the environment because they concentrate on quantifying its different aspects.

Landscape is not a single resource such as soils or vegetation. It is an integrative concept which is applied to a group of resources within a spatial area and which incorporates the human values associated with them. The extent of the spatial area may be defined by biophysical and/or perceptual/associative characteristics, but often relates to 'catchments' or locations/ areas/units that share particular landscape attributes.

A landscape includes the physical elements of geo-physically defined landforms such as living elements of land cover including indigenous vegetation, human elements including different forms of land use, buildings and structures.

Combining both their physical origins and the cultural overlay of human presence, often created over millennia, landscapes reflect a living synthesis of people and place that is vital to local and national identity. The character of a landscape in Vishwavidyalaya helps define the self-image of the culture and heritage Vishwavidyalaya is maintaining and its people who inhabit it and a sense of place that differentiates from other in terms of Vedic knowledge and modern outlook. It is the dynamic backdrop to coming generation studying here with cultural and modern outlook.

While assessing the landscape environment of Gurukula Kangri Vishwavidyalaya it is clearly seen that it is a combination of culture heritage and scientific understanding. From having archaeological museum to zoological museum. But as great things are always hidden inside the shell the same is happening with the assets of Vishwavidyalaya. There is no such advertisement of Archaeological museum of Vishwavidyalaya on or near the campus near national highway. Also main campus is having one of the oldest libraries of India with lot of Vedic literature, a heritage to be indexed and available to local and other visitors and alumni's. We highly recommend some advertisement for archaeological museum and access of library facility for outside the Vishwavidyalaya visitors to see the heritage Gurukula is preserving. The beautification and green cover of the all the campuses are found good but require maintenance and time to time upgradation. Due to major plantation in last 3 – 4 years, the taxonomical labelling is recommended in all the campuses of Vishwavidyalaya majorly for the exotic plants which are native of this region. Also there is an inventory is recommended to be developed to have the data for overall biodiversity of Vishwavidyalaya in terms of flora and fauna.

For any kind of sustainable development, a landscape management plan is majorly required which should be implemented in the campus. While celebrating major environmental days by eco-club and other departments it is very essential that with a landscape plan all the plantation could be done for better and sustainable outlook. Another major thing which is recommended a Aerial-View Map of Vishwavidyalaya and its all campuses to show the exact beautiful architecture of the all the campuses.

S. No.	Name of Department/ Faculty	Overall Green Cover within Deptt.	Indigenous Trees/Plants	Exotic Trees/ Plants	Landscape Management Plan
I.	MAIN CAMPUS				
1.	Department of Philosophy	Yes	Yes	No	
2.	Department of Zoology & Environment Science	Yes	Yes	Yes	
3.	Department of Sanskrit	Yes	Yes	Yes	
4.	Department of Physics	Yes	Yes	Yes	
5.	Faculty of Management Studies	Yes	Yes	No	
6.	Department of Psychology	Yes	Yes	No	
7.	Department of Yogic Science	Yes	Yes	Yes	
8.	Department of Botany & Microbiology	Yes	Yes	Yes	
9.	Department of Pharmaceutical Sciences	Yes	Yes	Yes	No
10.	Department of Chemistry	Yes	Yes	Yes	
11.	DSW	Not Applicable	Not Applicable	Not Applicable	
12.	Swami Shradhanand Hostel	Yes	Yes	Yes	
13.	Pt. Lekha Ram Hostel	Yes	Yes	Yes	
14.	Pt. Guru Dutt Vidhyarthi Hostel	Yes	Yes	Yes	
15.	Corporate Affairs & Outreach Cell (CAOC)	Not Applicable	Not Applicable	Not Applicable	
16.	Senate Hall (Guest House)	Yes	Yes	Yes	
17.	Central Office	Yes	Yes	Yes	

18.	Vice Chancellor's Office	Yes	Yes	Yes	
19.	Faculty of Education	Yes	Yes	No	
20.	Department of History	NO	Yes	Yes	
21.	Archaeological Museum	No	Yes	Yes	
22.	Department of Mathematics	Yes	Yes	Yes	
23.	Dean Office; Faculty of Science	Not Applicable	Not Applicable	Not Applicable	
24.	Central Library	Yes	Yes	Yes	
II.	**KGC, Haridwar**				
6.	Environmental Science	Yes	Yes	Yes	No
7.	Physics				
8.	Microbiology				
9.	Chemistry				
10.	Ancient Indian History Culture & Archaeology				
III.	**FET, Haridwar**	Yes	Yes	Yes	Yes

F. GREEN AGENDA IN SYLLABUS

India is constantly dealing with the challenge of balancing its economic growth and environmental sustainability. While it has already begun the transitional process towards larger uptake of renewable energy and energy efficiency, several other challenges – air pollution, water and waste management to name a few – remain to be resolved. As India prepares to welcome its next government, highlighting the choices and decisions it should prioritize to ensure that India's growth story is rooted in sustainability.

This Green Agenda covers five thematic areas – air pollution, energy transitions, resource efficiency, water management, waste management.

Vishwavidyalaya is committed for environmental education and awareness to motivate the students and encourage them for environmental conservation and sustainable development and to develop the relationship between human beings and the environment and to develop capabilities/skills to improve and protect the environment. To improve this, Eco-club for the Vishwavidyalaya is developed in 2012, continuously working for the awareness and encouragement among the students understand the importance of environment and need of its conservation. Further as per the UGC, New Delhi Guidelines, all the bachelors' students of Vishwavidyalaya has to study the Environmental Studies paper for one semester. Vishwavidyalaya has Established Department of Zoology and Environmental Science with a degree of Masters in Environmental Science in 1995 to promote the Environmental studies and faculties of the department are continuously working on various aspects as their research work. Further under extension education department has designed the Diploma courses for Disaster management and Industrial health, safety and environment for the core understanding of the respective subject by the students and others who are looking forward to contribute to conservation of environment.

Education has been recognized as a necessary constituent for sustainable development all over the world. The function of education could also optimistically manipulate the administration of the stressed out natural resources through the integration of victorious procedures of environmental education. The environmental education offers students with the skills, experience and knowledge that are necessary to turn out to be victorious community leaders, and also making clever decisions pertaining to the administration of their natural resources1 . The globally evolved concept of environmental education is a continuing lifelong procedure. As it is mentioned by Tbilisi2 , environmental education is considered as an everlasting process. In that, the community and the individuals obtain awareness of their surrounding and acquire the skills, experiences, values, and knowledge. They also possess the willpower to act collectively and individually to resolve current and future environmental problems. Teaching the people at huge regarding the environment and its features would build up decisive thinking, problem solving and analytical capabilities in them. Also it would enhance insights and knowledge to progress the quality of human life on earth. India

being a diverse nation, geographically, economically, climatically and geologically, the environmental education here has to be necessarily location – specific. It is at the initial level, that major attention has to be paid to the school going children and women, (that is, around 50 % of the population). They are to be made conscious about family planning, rural development, sanitation, food and water contamination, fuel wood, nutrition, slum improvement, hygiene, fodder etc.

Sustainable Development Goals (SDGs) are the global priorities so as to help build a better world for all in the next 15 years from 2016 to 2030. There are 17 SDGs that include a number of significant issues for the globe comprising ending extreme poverty, ensuring all children receive a good education, achieving equal opportunities for all and promoting better practices for consumption and production that will help make the planet cleaner and healthier. They are possibly the most comprehensive list of global goals the world has ever committed to. The SDGs are global in nature and universally applicable, taking into account different national realities, capacities and levels of development and respecting national policies and priorities. One thing the SDGs make explicit is the promise to "leave no one behind". The SDGs are not independent from each other – they need to be implemented in an integrated manner. The ultimate goal in the SDGs is the most important - that of “Transforming the World”. And what else then education can change the world for better. As Nelson Mandela said: “Education is the most powerful weapon you can use to change the world”. The benefits of education permeate all walks of life right from the moment of birth. If we are to eradicate poverty and hunger, improve health, protect our planet and build more inclusive, resilient and peaceful societies, then every individual must be empowered with access to quality lifelong learning, with special attention to opportunities for girls and women. The evidence is unequivocal: education saves lives and transforms lives; it is the bedrock of sustainability. The role of education for achieving SDGs has been identified by the UN Open

Working Group which confirms that education is not only an end in itself but also a means to achieving a broad global development agenda. As the post-2015 goal-setting process continues, education has increasingly been discussed as not only a development goal in its own right, but also a key way of reaching other development goals. And for good reason: a country that provides free access to quality education for all its citizens is far more likely to reduce poverty, promote economic growth, lower child and maternal mortality and achieve social inclusion. Education can build lasting change – that is, sustainable change, because it is owned by the learner and reaches hearts and minds. According to the 2010 State of the World Report (published by The WorldWatch Institute), the Ecological Footprint Indicator, which compares impact of human actions on the ecology shows that humanity now uses the resources and services of 1.3 Earths . In other words, if humanity continue to live the way it is, it would require a third more of Earth's capacity than is available to sustain itself. In the coming years, the number of consumers is only going to increase. This would have a direct impact on the current resource base of the world which is already under tremendous stress and depleting at a faster rate than ever before because of the growing world population and ever expanding human aspirations. It is estimated that by 2050, the human population will be 9.07 billion of which 62 per cent of the people will live in Africa, Southern and Eastern Asia. The state of the environment is a reminder of what we as humans are capable of inflicting on nature, which is in perfect harmony with its elements. However, it also highlights the opportunities at hand to reverse the process of environmental decline and work for a present and future built on the principles of environmental justice, equity and humane development. In this regard, the role of education is critical as it is the cornerstone of a modern society. It not only determines the present level of progress of people of a society but also charts out the future course of advancement of the civilization. Therefore, in view of the current environmental crisis, the content of education requires restructuring. This would mean that education systems across the world would be required not only to make a person employment worthy, it would have to capacitate people with values that would help them understand their relationship with the society and environment and empower a person lead a life of contentment and satisfaction. In this context, education will have to go beyond mere transfer of information. Education is held to be central to sustainable development. Indeed, education and sustainable development are intimately linked, but the distinction between education as we know it and Education for Sustainable Development(ESD) is puzzling for many. ESD is a vision of education that seeks to balance human and economic well-being with cultural traditions and respect for the earth's natural resources.

Education in India is mainly a State subject and the responsibility is that of the Ministries of Education at the Centre and States.

Principles of Environmental Education:

1. To consider environment in its totality (natural, artificial, technological, ecological, moral, aesthetic).
2. To consider a continuous life process.

3. To be interdisciplinary in approach.

4. To focus on current, potential environmental situations.

5. To emphasize active participation in prevention and control of pollution.

6. To examine root cause of environmental degradation.

7. To provide an opportunity for making decisions and accepting their consequences.

Environmental Educational Programmes:

Environmental education helps students and general public towards:

a. Awareness i.e., acquire sensitivity to the total environment and its allied problems.

b. Skill i.e., acquire skills for identifying environmental problems.

c. Knowledge. To know conservation of natural resources.

d. Evaluation ability. To evaluate environs measures and education programmes in terms of social, economic, ecological and aesthetic factors.

e. Attitude and participation.

It involves a three-fold classification of environmental education:

1. Environmental Studies:

It is concerned with environmental disturbances and minimisation of their impacts through changes in social sciences.

2. Environmental Science:

It deals with the study of the processes in water, air, soil and organisms which lead to environmental damage.

3. Environmental Engineering:

It involves the study of technical processes used to minimise pollution.

Environmental Education among Students

The environment scenario of India is very wide indeed. At the first level, special attention must be paid to children. They are to be made aware of health, nutrition, sanitation, hygiene, development, water and food contamination, fodder and fuel wood etc. NGO's have to play a significant role in environmental education and awareness.

A. Formal Environmental Education*:*

The spectrum of EE has four major interrelated components, i.e., Awareness, real life situation, conservation and sustainable development.

1. Primary School Stage:

The attempt is made to sensitize the child about environs. Emphasis should be mostly (75%) on building up awareness, followed by real life situation (20%) and conservation (5%). Teaching strategy includes audio-visual and field visits.

2. Lower Secondary Stage:

At this level objective must be real life experience, awareness and problem identification. The contents are supplemented with general science. Teaching, practicals and field visits are to be done.

3. Higher Secondary School Stage:

The emphasis must be on conservation, assimilation of knowledge, problem identification and action skills. Contents may be science-based and action oriented work.

4. College Stage:

Maximum emphasis should be on knowledge regarding sustainable development and conservation. The content must be college based on Science and Technology. Teaching practical's and action-oriented field work is to be done. In the school education, NCERT has been playing vital role in designing syllabi, text books, guide books, charts and kits etc.

5. University Education:

EE at this level is being looked after the UGC. The university education has three major components— Teaching, Research and Extension. At post graduate level, four major areas are recognised environmental engineering, conservation and management, environmental health, social ecology.

B. Non-Formal Environmental Education:

This education is designed for any age group, participating in cultural, social, economic development of the country. They form clubs and arrange exhibition, public lectures, meetings, environmental campaigns. Following are the main constituents of this education.

1. Adult Education: Adults may influence the society to protect the precious environs by generating posters, slides, audio-visual and information pictures.

2. Rural Youth and Non-Student Youth: They may act as volunteers.

3. Tribals and Forest Dwellers: They are an important media to protect the forest wealth.

4. Children Activities: The National Museum of Natural History (NMNH) conducts spot painting, modelling and poster design about environment for children.

5. Eco-development Camps: Currently a set of a guide lines has been prepared by D.O. En to create awareness in youth and to acquaint them with the practice of sustainable development.

6. Non-government Organisations: There are more than 200 NGOs engaged in environmental protection.

7. Public Representatives: India has environmental forums for MPs and MLAs to discuss environmental problems facing the country. They stimulate public interest for saving the environs.

8. Training Executives: Regular courses should be arranged for environ activities among administrators.

9. Research and Development Programmes: Such R and D efforts are supported by D.O. Environment in Biosphere and Man.

10. Foundation Courses: The courses for the probationers selected for the IAS, IFS, IPS and cadets of three wings of Armed Forces need to be supplemented with foundation courses on environment relevant to their area of specialisation.

11. Development of Educational Material and Teaching Aids: Materials for media (T.V, radio, films, news -papers etc.), audio, mobile exhibitions, audio-visual materials must be operated by competent manpower. One such centre in India is Centre for Environmental Education, Ahmedabad.

12. Development of Trained Manpower: Department of Environment (DOE) must organise training programmes for the professors, technical personnel, lecturers and legal experts.

13. National Environment Awareness Campaign or National Environment Month: Commencing from 1986, DOEn conducts NEAC and NEM. From November 19th to December 18th every year is observed as NEM.

14. World Environmental Day: All Govts. in the states, UTs, universities, schools, colleges, academic institutions and voluntary organisations organise suitable activities on World Environmental Day, i.e., 5th June of each year. DOE supports the function financially.

C. Environmental Information:

DOE had set up a programme, i.e., Environmental Information System (ENVIS) in 1982. It is a decentralised system using distributed network of data bases for collection of environmental information. ENVIS network with DOE consists of 10 ENVIS centres on diverse areas of environment. It is established in specialised and reputed institutions in the country.

Importance of Environmental Education:

i. How to handle environmental issues.

ii. How to lead a better life with less pollution.

iii. How to prevent the ecological crisis.

iv. How to ensure socio-economic development and make this earth a better place to live in for the present and future generations.

S. No.	Name of Department/ Faculty	Environmental Education in Syllabus	Green Research/ Environmental Conservation Activities	Animals used in Experiments	Ethical Committee
I.	MAIN CAMPUS				
1.	Department of Philosophy	Yes	Yes	No	No
2.	Department of Zoology & Environment Science	Yes	Yes	No	No
3.	Department of Sanskrit	Yes	Yes	No	No
4.	Department of Physics	Yes	Yes	No	No
5.	Faculty of Management Studies	Yes	Yes	No	No
6.	Department of Psychology	Yes	Yes	No	No
7.	Department of Yogic Science	Yes	Yes	No	No
8.	Department of Botany & Microbiology	Yes	Yes	Yes	Yes
9.	Department of Pharmaceutical Sciences	Yes	-	No	No
10.	Department of Chemistry	Yes	No	No	No
11.	DSW	Not Applicable	Not Applicable	Not Applicable	Not Applicable
12.	Swami Shradhanand Hostel	Not Applicable	Not Applicable	Not Applicable	Not Applicable
13.	Pt. Lekha Ram Hostel	Not Applicable	Not Applicable	Not Applicable	Not Applicable
14.	Pt. Guru Dutt Vidhyarthi Hostel	Not Applicable	Not Applicable	Not Applicable	Not Applicable
15.	Corporate Affairs & Outreach Cell (CAOC)	Not Applicable	Not Applicable	Not Applicable	Not Applicable
16.	Senate Hall (Guest House)	Not Applicable	Not Applicable	Not Applicable	Not Applicable

17.	Central Office	Not Applicable	Not Applicable	Not Applicable	Not Applicable
18.	Vice Chancellor's Office	Not Applicable	Not Applicable	Not Applicable	Not Applicable
19.	Faculty of Education	Yes	No	No	NO
20.	Department of History	Yes	No	No	No
21.	Archaeological Museum		No	No	No
22.	Department of Mathematics	Yes	Yes	NA	NA
23.	Dean Office; Faculty of Science	Not Applicable	Not Applicable	Not Applicable	Not Applicable
24.	Central Library	Not Applicable	Not Applicable	Not Applicable	Not Applicable
II.	**KGC, Haridwar**				
11.	Environmental Science	Yes	YEs	Yes	YEs
12.	Physics			Not Applicable	Not Applicable
13.	Microbiology				
14.	Chemistry				
15.	Ancient Indian History Culture & Archaeology		No		
III.	**FET, Haridwar**	Yes	No	Not Applicable	Not Applicable

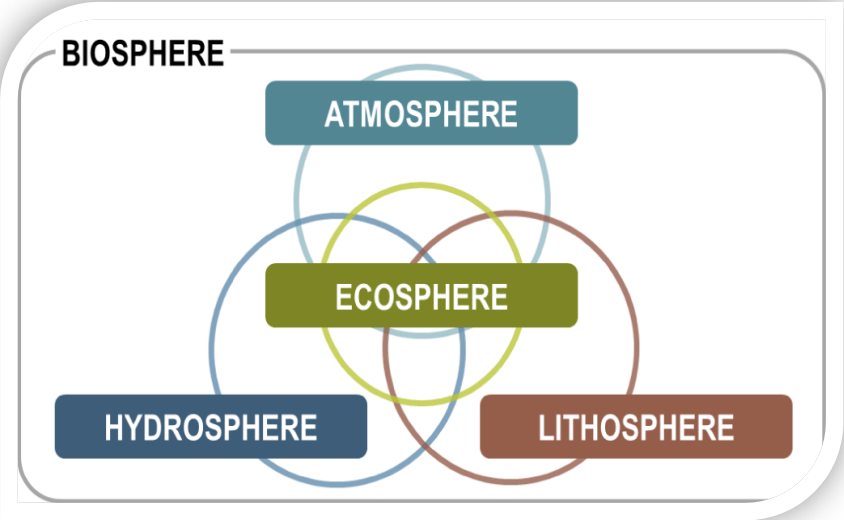
G. TRANSPORTATION

An efficient transport sector is important for economic development and for the wellbeing of people. However, transport activities can generate various negative environmental impacts. The OECD has carried out recent studies to identify instruments and other approaches for reconciling transport and environmental policies.

Outdoor air pollution kills more than 3.5 million people across the world every year, and causes health problems from asthma to heart disease for many more.

This is costing societies very large amounts in terms of the value of lives lost and ill health.

The issue of transportation and the environment is paradoxical in nature since transportation conveys substantial socioeconomic benefits, but at the same time transportation is impacting environmental systems. From one side, transportation activities support increasing mobility demands for passengers and freight, while on the other, transport activities are associated with **environmental impacts**. Further, environmental conditions have an impact on transportation systems in terms of operating conditions and infrastructure requirements such as construction and maintenance.

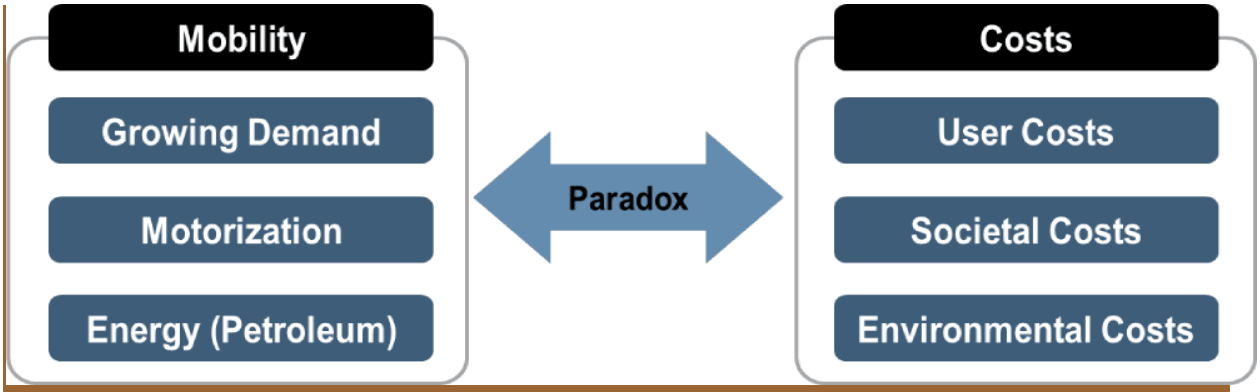


The growth of passenger and freight mobility has expanded the role of transportation as a source of emission of pollutants and their multiple impacts on the environment. These impacts fall within three categories:

- **Direct impacts.** The immediate consequence of transport activities on the environment where the cause and effect relationship are generally clear and well understood. For instance, noise and carbon monoxide emissions are known to have direct harmful effects.

- **Indirect impacts.** The secondary (or tertiary) effects of transport activities on environmental systems. They are often of higher consequence than direct impacts, but the involved relationships are often misunderstood and more difficult to establish. For instance, particulates which are mostly the outcome of incomplete combustion in an internal combustion engine are indirectly linked with respiratory and cardiovascular problems since they contribute among other factors to such conditions.
- **Cumulative impacts.** The additive, multiplicative or synergetic consequences of transport activities. They consider the varied effects of direct and indirect impacts on an ecosystem, which are often unpredictable. Climate change, with complex causes and consequences, is the cumulative impact of several natural and anthropogenic factors, in which transportation plays a role. The share of transportation in global CO2 emissions is increasing. 22% of global CO2 emissions are attributed to the transport sector, with this share is around 25% for advanced economies such as the United States.

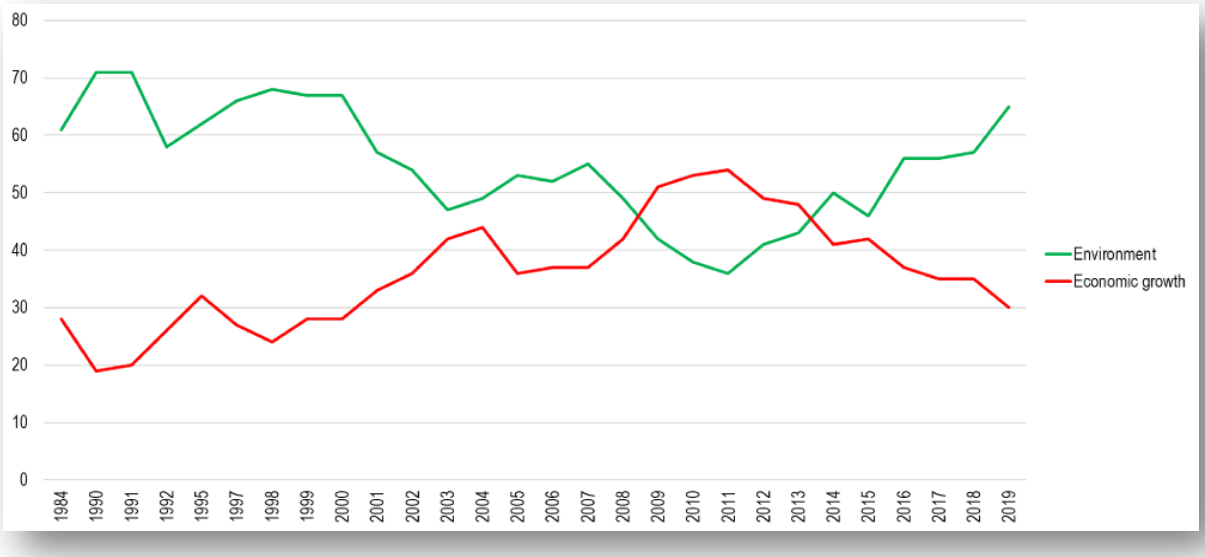
The complexities of the impacts have led to much **controversy** in environmental policy, the role of transportation and mitigation strategies. This is made even more complex by the fact that priorities between environmental and economic considerations shift in time, which can have an impact on public policy. The transportation sector is often subsidized, especially through the construction and maintenance of road infrastructure, which tend to be free of access. Sometimes, public stakes in transport modes, terminals and infrastructure can be at odd with environmental issues. If the owner and the regulator are the same (different branches of the government), then there is a risk that regulations will not be effectively complied to.



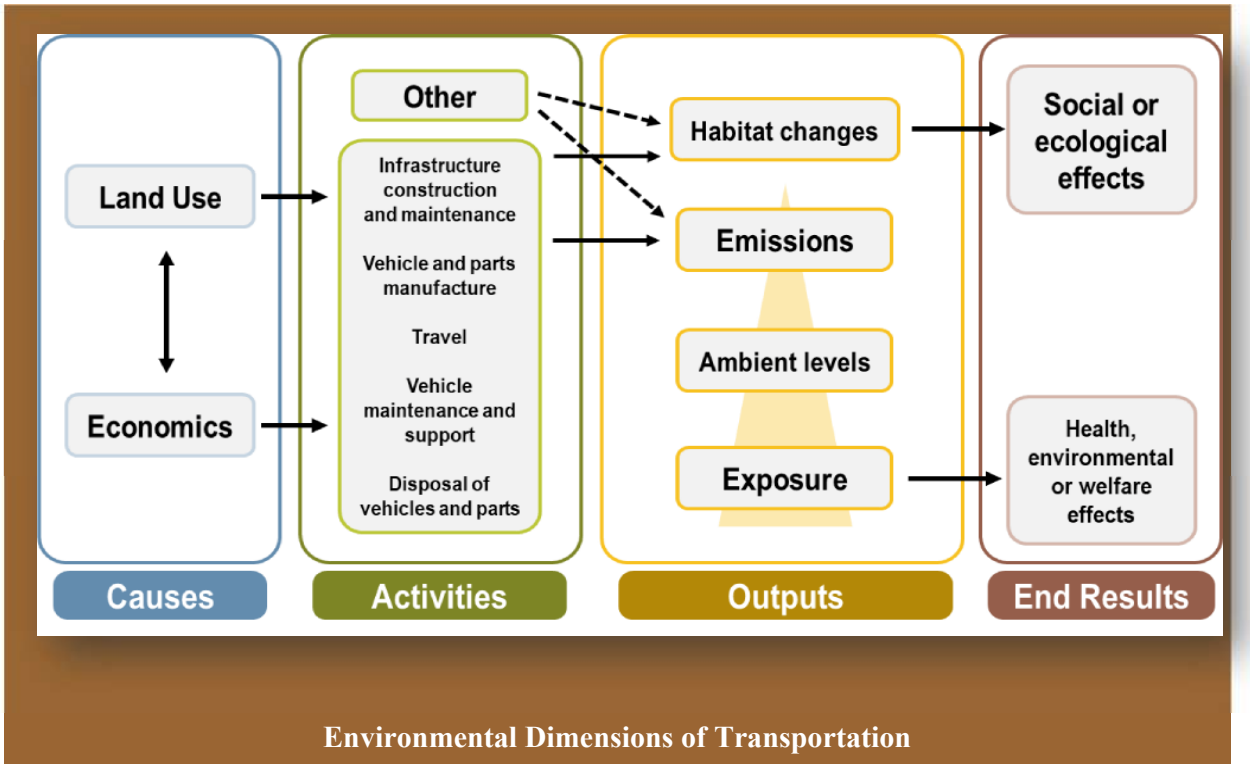
The Paradox of Mobility and its Costs

Total costs incurred by transportation activities, notably environmental damage, are generally not fully assumed by the users. The lack of consideration of the **real costs of transportation** could explain several environmental problems. Yet, a complex hierarchy of costs is involved, ranging from internal (mostly operations), compliance (abiding to regulations), contingent (risk of an event such as a spill) to external (assumed by the society). For instance, external costs account on average for more than 30% of the estimated automobile ownership and operating costs. If environmental costs are not included in this appraisal, the usage of the car is consequently subsidized by the

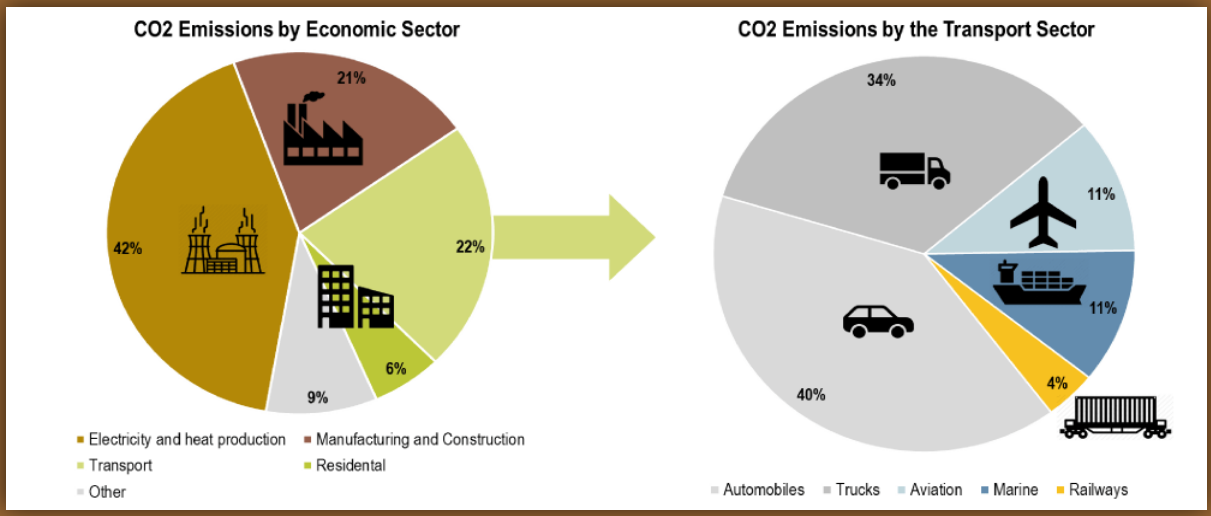
society and costs accumulate as environmental pollution. This requires due consideration as the number of vehicles, especially automobiles, is steadily increasing.



Public Preferences for Priority between the Economy and the Environment, 1984-2019



Environmental Dimensions of Transportation



Global Greenhouse Gas Emissions by the Transportation Sector

The Transport – Environment Link

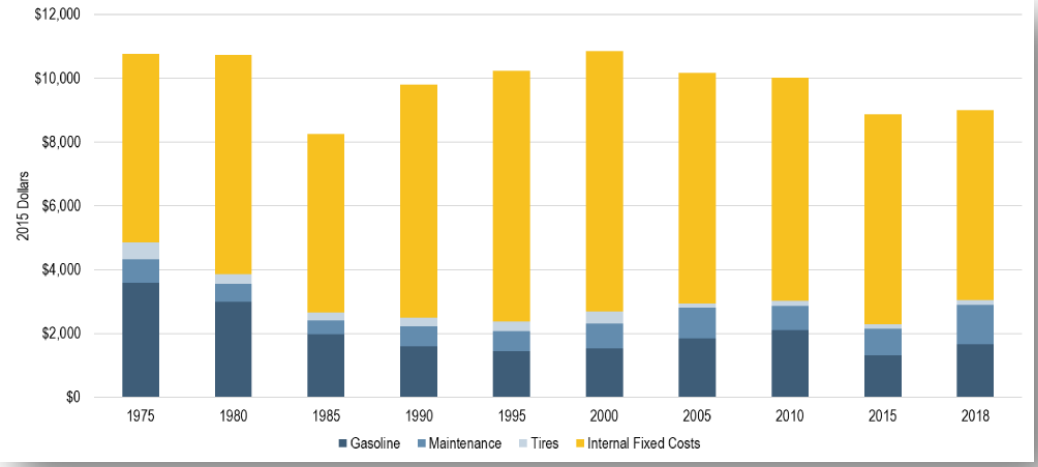
The relationships between transport and the environment are **multidimensional**. Some aspects are unknown, and some new findings may lead to changes in environmental policies. Historically, transportation was associated with very few negative environmental impacts because of the modes used and the low mobility levels. For instance, the construction of large navies composed of sailships was responsible for a level of deforestation in Western Europe and North America from the 16th to the 19th centuries. Urbanization in the 19th century and the reliance on horses created problems concerning the disposal of manure. Further, industrialization and the development of steam engines lead to pollution (e.g. sooth) near ports and rail yards. Still, these issues remained marginal and localized.

It is however only in the 20th century that a comprehensive perspective about the links between transportation and the environment emerged, particularly with the massive diffusion of transportation modes such as the automobile and the airplane. At the same time, manufacturing and marketing concepts such as **planned obsolescence** incited the design of modes such as the automobile and products (that are transported) that can continuously be replaced. The 1960s and 1970s were crucial decades in the realization of the negative environmental impacts of human activities and the need for regulations.

From an infrastructure perspective, the first comprehensive environmental regulation, the **National Environmental Policy Act** (NEPA), was set in 1970 and required all federal agencies of the US government to make environmental impact assessments of their actions. Since an agency such as the Department of Transportation is an important provider and manager of transportation infrastructure, this legislation had substantial impacts on how transportation is assessed to be linked with environmental issues. One clear consequence was the growth in the length and the complexity of approving transport infrastructure projects to ensure they meet

environmental standards. Opponents of a project could also use the regulatory framework to delay, or even cancel its construction and on occasion change its design parameters (e.g. size). An unintended consequence was that the complexity of environmental regulations tend to impair innovations and incite current providers to keep existing infrastructure and facilities for the concern to trigger an uncertain environmental review with a new project. In time, this slowed down the development of transport infrastructure and substantially increased their costs.

From an operational perspective, the Clean Air Act of 1970 set clear air quality standards and expectations for both stationary (e.g. a power plant) and mobile (e.g. an automobile) sources of air pollutants. For transportation, it immediately set emissions standards for a list of acknowledged pollutants such as carbon dioxide, volatile organic compounds and nitrogen oxide. The outcome was a rapid decline of air pollutant emissions by the transportation sector through better engine technology. The Clear Water Act of 1977 provided a similar regulatory environment concerning water pollution and the ability to build infrastructures over wetlands.



Average Cost of Owning and Operating an Automobile, 1975-2018

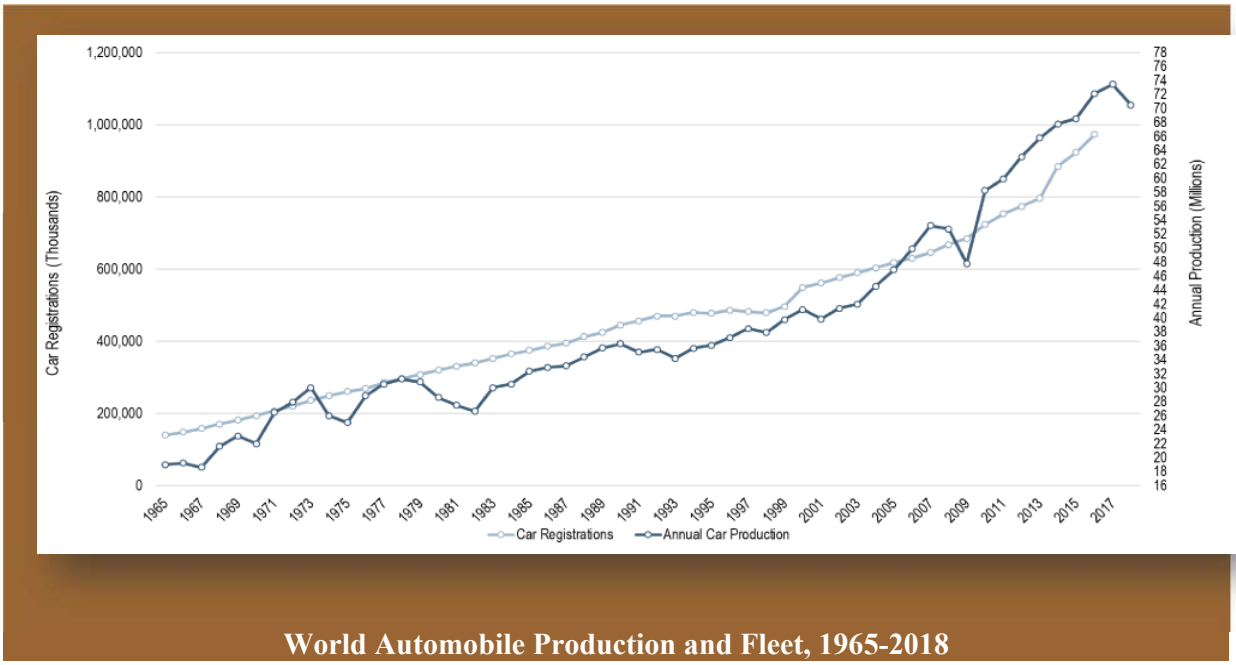
The 1990s were characterized by a realization of **global environmental issues**, epitomized by the growing concerns between anthropogenic effects and climate change. Transportation also became an important dimension of the concept of sustainability, which has become a core focus, ranging from vehicle emissions to green supply chain management practices. These developments require a deep understanding of the reciprocal influence between the physical environment and transport infrastructures and yet this understanding is often lacking. The main factors considered in the physical environment are geographical location, topography, geological structure, climate, hydrology, soil, natural vegetation and animal life.

The environmental dimensions of transportation are related to the **causes**, the activities, the **outputs** and the **results** of transport systems. Establishing linkages between environmental dimensions is a difficult undertaking. For instance, to what extent carbon dioxide emissions are

linked to land use patterns? Furthermore, transportation is embedded in environmental cycles, notably over the carbon cycle where carbon flows from one element of the biosphere, like the atmosphere, to another like the ecosphere, where it can be accumulated (permanently of temporarily) or passed on. The relationships between transport and the environment are also complicated by two observations:

- **Level of contribution**. Transport activities contribute among other anthropogenic and natural causes, **directly, indirectly and cumulatively to environmental problems**. In some cases, they may be a dominant factor, while in others their role is marginal and difficult to establish.
- **Scale of impact**. Transport activities contribute at different geographical scales to environmental problems, ranging from local (noise and CO emissions) to global (climate change), not forgetting continental / national / regional problems (smog and acid rain).

Establishing environmental policies for transportation thus must take account of the **level of contribution** and the **geographical scale**, otherwise some policies may just move the problems elsewhere and have unintended consequences. A noted example are environmental policies in advanced economies inciting the relocation of some activities with high environmental externalities (e.g. steel making) in developing economies. This transfer the problem from one location to another. Still, such as transfer usually involves new equipment and technologies that are usually having a lower environmental impact. Even if an administrative division (municipality, county, state) has adequate environmental enforcement policies, the geographical scale of an environmental impact (notably air pollutants) goes beyond established jurisdictions. This has become salient in the disposal of waste such as electronic goods that are transferred to developing economies with lower environmental regulations to be disposed or recycled.



World Automobile Production and Fleet, 1965-2018

The structure of the transport network, the modes used, and traffic levels are the main factors of environmental impact of transportation. Networks influence the spatial distribution of emissions (e.g. centralized versus diffuse networks), while modes relate to the nature of the emissions and the traffic to the intensity of these emissions. In addition to these environmental impacts, economic and industrial processes sustaining the transport system must be considered. These include the extraction and production of fuels, vehicles and construction materials, some of which are very energy intensive (e.g. aluminum), and the disposal of vehicles, parts as well as the provision of infrastructure. They all have a life cycle timing their production, utilization and disposal. Thus, the evaluation of the link between transport and the environment without the consideration of **cycles in the environment and in the product life** alike is likely to convey a limited overview of the situation and may even lead to incorrect appraisal, policies and mitigation strategies

This is one of the most important aspect which needs to be considered thoughtfully. At present our audit shows that almost 90% of the faculty members are using their own vehicles for transportation for to and fro. Similarly, a good number of students are using two wheelers for coming Vishwavidyalaya Campus Though at present there is sufficient parking facility available and at the same time their ample green area is available in campus which is working as a sink for the pollution coming out of these vehicles. However, in coming time frame if the situation remains same there are chances of ambient air getting polluted.

S. No.	Name of Department/ Faculty	No. of Vehicles with the Members of Deptt.	Members using public transport (%)	No. of Members using bicycles	No. of members pooling the Vehicles
I.	MAIN CAMPUS				
1.	Department of Philosophy	6	No	Yes	No
2.	Department of Zoology & Environment Science	10	1	1	No
3.	Department of Sanskrit	All	No	Yes	No
4.	Department of Physics	10	No	2	No
5.	Faculty of Management Studies	21	03	02	No
6.	Department of Psychology	5	No	Yes	No
7.	Department of Yogic Science	4	No	1	No
8.	Department of Botany & Microbiology	15	Nil	04	04
9.	Department of Pharmaceutical Sciences	50	10	3	10
10.	Department of Chemistry	15	No	1	No
11.	DSW	N/a	No	No	No
12.	Swami Shradhanand Hostel	20	No	No	No
13.	Pt. Lekha Ram Hostel	20	No	No	No
14.	Pt. Guru Dutt Vidhyarthi Hostel	10	No	No	No
15.	Corporate Affairs & Outreach Cell (CAOC)	3	3	No	No
16.	Senate Hall (Guest House)	6	No	No	No

17.	Central Office	58	No	2	No
18.	Vice Chancellor's Office	10	No	2	No
19.	Faculty of Education	04	Nil	Nil	2
20.	Department of History	No	No	NO	Yes
21.	Archaeological Museum	No	No	No	no
22.	Department of Mathematics	19	20	01	Nil
23.	Dean Office; Faculty of Science	3	No	No	No
24.	Central Library	08	No	2	No
II.	**KGC, Haridwar**				
16.	Environmental Science	4	2	1	No
17.	Physics	2	No	No	Yes
18.	Microbiology	4	1	No	No
19.	Chemistry	5	No	No	No
20.	Ancient Indian History Culture & Archaeology	1	Yes	No	Yes
III.	**FET, Haridwar**	74	25	No	Yes

ECO - CLUB

We all know that we are part of the environment we live in. And the solution to many environmental problems lie in our attitude towards environment. Be it awareness to keep our surroundings clean or the realization to conserve natural resources by re-using and recycling wherever possible, they all are attitudinal. On the surface it looks simple. But changing the attitudes of 100 crore people is not going to happen overnight. The best way to attempt to bring about a change in the attitudes in the society is through student. They have no vested interests. They are impressionable. They are our future. They are the single most important influence in any family. With this realization the Ministry of Environment, Forests & Climate Change, Government of India has decided to launch the National Green Corps Programme (NGC) in all Districts of our vast country.

Environment Club is beneficial to a university for many reasons but it will never reach its full potential if only one or two members of staff and a few students are involved.

ECO club is helping to promote, monitor and operate the environment activities of the institute but the whole institute community need to be involved in some capacity and more students and staff need to be encouraged to be involved in the programmes operated and monitored by the club. The entire institute community need to fully understand the true importance and value of the club and the programmes they develop and run. All too often environment clubs in institutes are seen as a token gesture .....allowing an institute to say they have such a club and that the institute cares about the environment. The true importance and benefit from having such a club is lost.

The institute environment club should be seen as the driving force behind all environmental and sustainable activities at the institute. Organising, Publicizing, Promoting, Monitoring all environmental/sustainability events, activities and programmes. The students should be the driving force behind the eco club not the staff. An ECO club is very important as it establishes a focal point for all environmental/sustainability activities and programmes in the institute and creating a sustainable campus in keeping with the principals of the governments programmes.

Teachers, staff and parents need to be encouraged to become actively involved in the clubs activities. One person, one teacher cannot cover all the potential activities of the Eco Club.

It should be the responsibility of the club to devise, run and monitor institute wide activities such as the reducing, reusing and recycling programmes, energy saving schemes, promotional events. The students should report the outcome and/or findings of the programmes/activities to the staff and senior management.

It is my experience that sometimes people young and old are concerned over making a long term commitment to the club. My view is to explain that they can become involved whenever they can or for specific events, programmes and activities.

There are a number of important reasons for having a strong Environment Club.

- The club is a monitoring group for ALL of the institutes environmental/sustainability activities. (Monitoring and developing reports, planning and implementing activities; assisting staff in monitoring related programmes and holding regular meetings. This will take a great deal of the day to day pressure for running these activities off the staff of the institute.)
- It is a wonderful way for the young people to develop a sense of ownership, institute pride, adding to the community spirit.
- It gives students a real sense of responsibility for their place of learning.
- It helps students develop their personal skills such as communication (verbal and written), as they will have to write and present reports. They will have to work with a number of adults such as staff as well as people from outside organisations. Through these activities they will become more articulate, more confident, more creative and develop a sense of purpose as they are able to develop their ideas into practical activities for the club and the institute.
- It must be remembered that some of their activities may not work but this should in no way diminish from the aims and objectives of the club. If an activity does not work it should not weaken the aims and direction of the environmental aspect of the institute community. It is my experience that if everyone is patient and if the activities are well thought through then most if not all the activities will succeed.

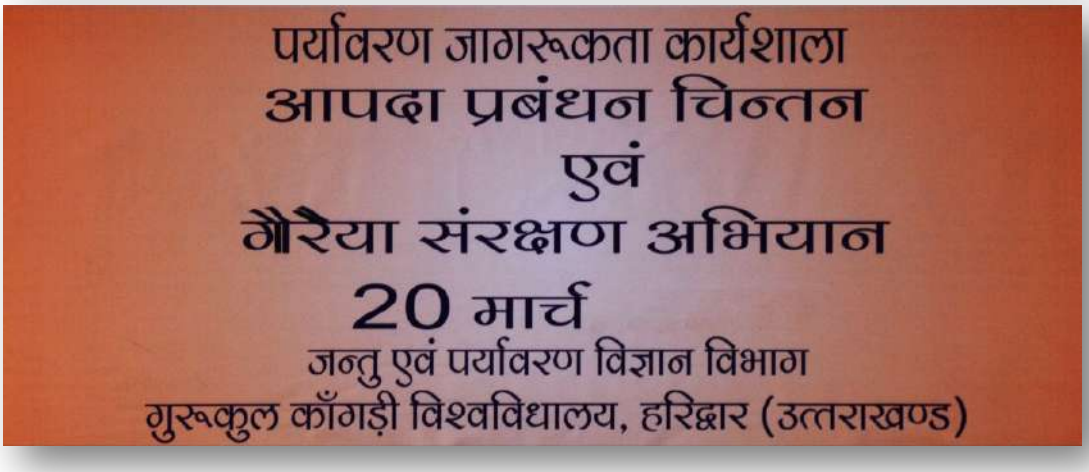
AIMS AND OBJECTIVES OF ECO-CLUB

The aims and objectives envisaged under the Eco - Club programme are as under:

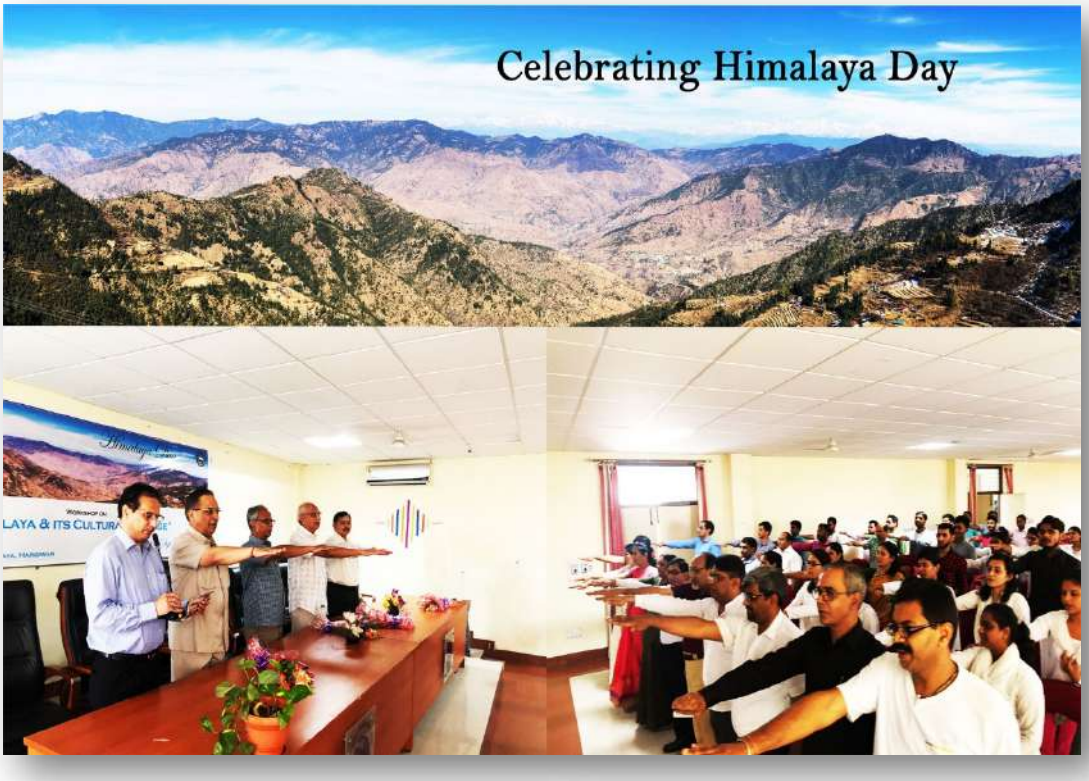
- To understand environment and environmental problems and environmental education opportunities for students.
- To utilize the unique position of students as conduits for awareness of the society at large.
- To facilitate student's participation in decision making in areas related to environment & development.
- To bring student into direct contact with the environmental problems being faced by the society they live in and make them think of solutions.
- To involve student in action based programmes related to environment in their surroundings.
- To bring student into direct contact with the environmental problems facing the society they live in and make them think of solutions encouraging them to orient themselves in action based programmes.

ACTIVITIES


1 CRORE HAATH SAATH SAATH
HUMAN CHAIN FOR SAFER ROADS
ONE CRORE HATH SATH SATH
HUMAN CHAIN FOR SAFER ROADS


पर्यावरण जागरूकता कार्यशाला
आपदा प्रबंधन चिन्तन
एवं
गौरैया संरक्षण अभियान
20 मार्च
जन्तु एवं पर्यावरण विज्ञान विभाग
गुरूकुल काँगड़ी विश्वविधालय, हरिद्वार (उत्तराखण्ड)

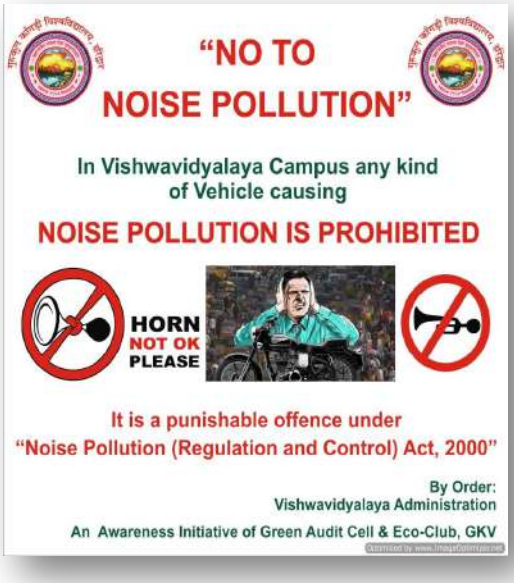

AWARENESS WORKSHOPS
FIREWORKS:
Ill effects & health Hazards



Participation of Vishwavidyalaya in Swachh Bharat Mission

Tree Plantation activities in Vishwavidyalaya#

Clean Ganga Drive organized by Vishwavidyalaya


"NO TO
NOISE POLLUTION"
In Vishwavidyalaya Campus any kind
of Vehicle causing
NOISE POLLUTION IS PROHIBITED
HORN
NOT OK
PLEASE
It is a punishable offence under
"Noise Pollution (Regulation and Control) Act, 2000"
By Order:
Vishwavidyalaya Administration
An Awareness Initiative of Green Audit Cell & Eco-Club, GKV


"NO PLASTIC ZONE"
In Vishwavidyalaya Campus any kind of
Plastic Use is PROHIBITED
SAY NO
TO PLASTIC!
#Beat Plastic Pollution
By Order:
Vishwavidyalaya Administration
An Awareness Initiative of Green Audit Cell & Eco-Club, GKV


ध्वनि प्रदूषण
को कहे "ना"
परिसर में बिना साइलेंसर की मोटरसाइकिल या
अन्य वाहन जो ध्वनि प्रदूषण करते हो,
"ना" चलाएँ
HORN
NOT OK
PLEASE
"ध्वनि प्रदूषण (विनियमन व नियंत्रण) अधि-नियम,
२०००" के अंतर्गत यह कृत्य दंडनीय अपराध है।
आज्ञा से:
विश्वविद्यालय प्रशासन
प्रचारित एवं प्रसारित
ग्रीन ऑडिट प्रकोष्ठ एवं इको क्लब, गु० कां० वि०


प्लास्टिक को कहे "ना"
विश्वविद्यालय परिसर मे
प्लास्टिक का प्रयोग वर्जित है।
SAY NO
TO PLASTIC!
#BeatPlasticPollution
आज्ञा से:
विश्वविद्यालय प्रशासन
प्रचारित एवं प्रसारित
ग्रीन ऑडिट प्रकोष्ठ एवं इको क्लब, गु० कां० वि०

RECOMMENDATIONS

On the basis of the present audit report, the committee has come to following conclusions/ suggestions:

- To conserve the energy and use of renewable energy the rooftops of all the buildings must be installed with solar power plats
- Though efforts are being made by Vishwavidyalaya to install solar lights however it needs to be done at larger scale so as to use the solar power in place of electricity.
- To recycle and reuse the sewage wastewater, it is highly recommended to install a sewage treatment plant in the Vishwavidyalaya campus
- There is a high need of implementing the water harvesting system in old buildings as well as in the new developing infrastructure facilities.
- Although the number of LED are found more than the previous year audit but, it is recommended to replace all the tube lights and CFL with LED lights.
- To maintain the air quality of the campus there should be awareness drive to reduce the number of vehicles being used by student's/ faculty members.
- It is recommended that a solid waste dumping site to be created in Vishwavidyalaya campus, along with involving Municipal Corporation of Haridwar District, so that all solid waste collected and taken to designated place.
- It is recommended that all the trees in the Vishwavidyalaya campus must be labeled with botanical and common names with mentioning its use.
- It is the need of hour to conduct time to time workshops/ lectures to create awareness among the students and staff.
- To reduce the carbon foot print it is suggested that use of bicycle within the campus be encouraged.