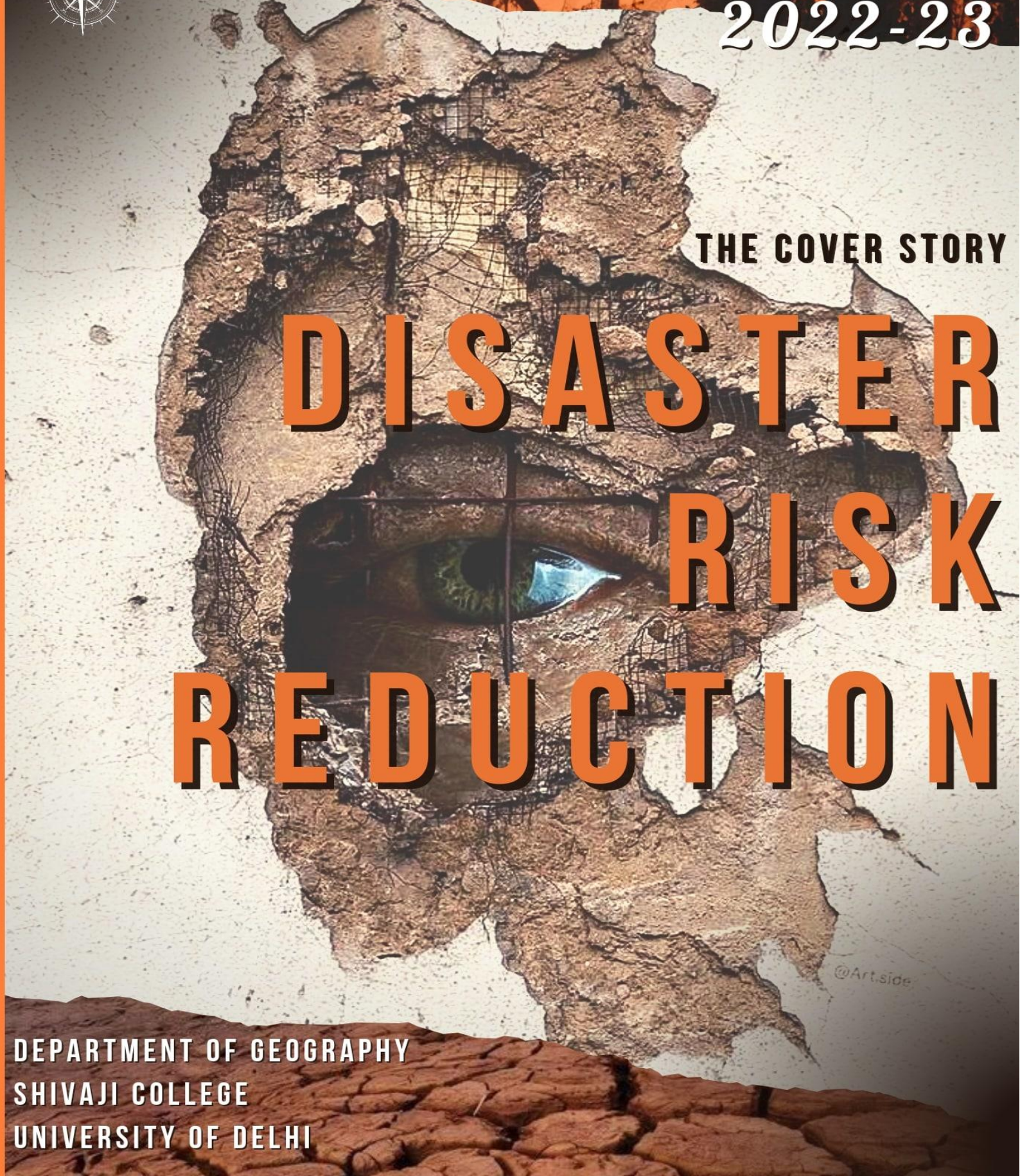
SHIVALIK

2022-23



THE COVER STORY

DISASTER RISK REDUCTION

DEPARTMENT OF GEOGRAPHY
SHIVAJI COLLEGE
UNIVERSITY OF DELHI

Department of Geography
Shivaji College, DU

New Delhi, 2023

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Principal's Message

It gives me immense pleasure to write a message for 'Shivalik-2023' an annual magazine published by the Department of Geography, Shivaji College. As we know the function of education is to teach one to think intensively and to think critically. In addition, intelligence plus character that is the goal of true education.

The world of 21st century is changing at an accelerated scale. It is a challenge for educators to cope with the changing world order and prepare their students for the future.

The magazine in hand would be a nice tool which will surely help you to get the glimpses of the yearlong activities and literary contribution of the students. I am sure the quality and variety of contents would not only be informative but also impressive and enjoyable. In this pursuit of excellence, I appreciate the relentless efforts of our faculty members for giving their best in bringing out the best in each student. I appreciate every student who contributed to the magazine and participated in extracurricular activities that helped in making learning fun.

I convey my best wishes to the Department of Geography for the grand success of the Geo-Fest: Shivalik-2023.

Prof. Shiv Kumar Sahdev
Principal

From the Desk of Teacher-in-Charge

Many years ago, an idea was born in our minds and it took the shape of a magazine. We called it SHIVALIK. I am glad we have been able to sustain the project. It survived COVID-19 by assuming an online avatar and has emerged stronger post-pandemic. As Stephen King said, "If you don't have the time to read, you don't have the time (or the tools) to write." We bring out this magazine to encourage our students to read and research, to question and to seek answers, because that is the key to good writing. I hope the articles contained in this edition will stimulate more thought and raise more questions.

Dr. Preeti Tewari
Assistant Professor

Message from the Student Advisor

It gives me immense pleasure to bring out the latest issues of our annual magazine, 'Shivalik 2023'. Learning is a continuous process from the minute we are born until we die." The Department of Geography provides a platform for every student to develop their learning skills through various platforms, and the departmental magazine is one of them. As you scan through the pages, it will enlighten you with the important milestones that department has achieved this year. Besides, our budding talents have expressed their thoughts, ideas, hopes, feelings, aspirations, and convictions in a creative way. This magazine will act as a source of guidance for the next batch of students in choosing activities of their choice for their futures in order to build their careers.

Dr. Prabuddh K. Mishra
Assistant Professor

Executive Editors: Dr. Prabuddh Kr. Mishra, Dr. Bharat Ratnu and Rashmi Singh

Message from the Student Editor

I am thrilled to announce our departmental magazine, Shivalik, on the theme of disaster risk reduction. This has been an important topic to cover, and I am confident that our team has risen to the occasion and produced a publication that will be informative and insightful for our readers.

I want to extend my heartfelt appreciation to all the writers, photographers, and editors who have contributed to this project. Their hard work, research, and dedication have helped to create a magazine that is not only visually stunning but also informative and thought-provoking. They have showcased the depth of talent and expertise within our department, and I am proud of the quality of work that has been produced.

I would also like to thank the faculty and council members for their support in bringing this publication to life. This magazine is a testament to the depth of talent and expertise within our department. I am confident that it will be a valuable resource for our colleagues, stakeholders, and anyone interested in the topic of disaster risk reduction.

Suhab Aktar Barbhuiya
Student Editor

From Alumnus' Pen

Shivaji College Geography Department is place where we spend the most precious moments of our lives. Our faculty members' accessibility crafted our college lives quite different from our school lives. They give more exposure to us and strengthen our self-belief. Our college teaches us independence and strengthens us to fight our own battles. They give us the initial push towards our career paths.

Our teachers were more like instructors in school, however once we got to college, our professors turned into bests pals, a bond they've still maintained even after 25 years of college. Our lecturers offered us the power to make choices which could have a considerable effect on our future.

On behalf of all batches from 1988 to 2023, I want to personally salute all our faculty members for their commitment to helping us all be better humans and professionals.

Accept our profound thanks for hosting a such a beautiful reunion meet to relive our college days. A simple thanks may not be adequate, but I'm still sending this note to express my heartfelt appreciation. We all appreciate the family-like atmosphere that has been created for us, with the clear message that college still cares about us. This is the Place of civility, friendship, and good cheer.

Mr. Ajay Khosla

Alumnus of Department of Geography (1990-93 Batch),

Shivaji College,

University of Delhi.

Annual Report: Department of Geography
(2022-23)

The Department of Geography, Shivaji College is teaching BA (H) and BA (P) and interdisciplinary courses to approximately 350 students cutting across all social science disciplines. Presently ten faculty members are providing their expertise to the students, and two non-teaching staff members are engaged in lab work. Five Ph.D and PDF scholars are pursuing their research under the supervision of department faculty. Two Innovation Projects is also being carried out by the faculty members of the department. Faculty members have participated in national and international seminars, workshops and conferences and have also contributed research papers in various journals and books. The department has a well-developed lab with a variety of instruments and GIS software and also runs a departmental library.

Various events and co-curricular activities viz; Orientation Programme, Fresher's Welcome, Alumni Meet etc., were organised in the current session.

S. No.	Date	Activity
1.	11-07-2022	Celebrated World Population Day
2.	30-08-2022	Workshop on Career Opportunities in GIS and Remote Sensing
3.	21-09-2022	Quizophile- Inter college quiz Competition
4.	28-09-2022	Seminar on "How to write a CV and Resume" with TIME
5.	02-10-2022 to 08-10-2022	Celebrated Wild Life week
6.	14-10-2022	Seminar on "Personal Interview"
7.	05-11-2022	World Tsunami Awareness Day
8.	11-11-2022	Induction Programme for Freshers.
9.	30-01-2023	Seminar on "Higher Studies Abroad" with TIME.
10.	11-02-2023	Departmental Alumni Meet 2023
11.	13-02-2023	Seminar on "Antarctica and it's Scientific Importance."

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India on the Move: Saga of Success

Prof. Tejbir Singh Rana, Shivaji College, University of Delhi.

India is bestowed with diverse natural and human resources. The geographical multiplicity of loftiest Himalayan mountains, fertile riverine plains, monsoonal climate suitable for crop biodiversity and rich forest covers offers opportunities for higher carrying capacity in the region. Withdrawal of world wars and colonial power from India in 1940s leads to the diffusion of technology and mechanization with increased literacy rate steered the development process in India. Rich natural resources of minerals, fossil fuel, fertile soils, perennial rivers, and climatic suitability for growing the crops became the threshold of development. After the independence, the visionary formation of five-year plans and problem area specific plans as flood area development plans, tribal area development plans and drought area development plans etc. resulted growth in three sectors as:

1. **Formation of infrastructure as roads, canals, dams, and buildings etc.**
2. **Overcoming the natural adversaries as disasters and hazards.**
3. **Raising the living standard of masses through equal opportunities in social welfare sector.**

India is located in monsoonal climatic conditions which is prone to seasonal endemic and pandemic diseases as malaria, filaria, dengue, acute encephalitis syndrome and sickle cell etc. With the diffusion of medical technology, India became able to completely eradicate small-pox and plague pandemics which leads to control the death rate and increased the absolute population size. Following table highlighted the various demographic indicators of India.

Table 1: Trends of Demographic Indicators of India.

S. No.	Census Year	Population size (in crores)	Decadal growth rate (in %)	Birth rate per 1000 population	Death rate per 1000 population	Population density. (Persons per sq. km. area)
1.	1901	23.83 Crore	----	----	----	71
2.	1941	31.86 Crore	14.22 %	45	31	103
3.	1951	36.10 Crore	13.31 %	40	27	117

4.	1971	54.81 Crore	24.80 %	42	23	177
5.	1991	84.43 Crore	23.50 %	26	09	267
6.	2011	121.08 Crore	17.64 %	23.5	7.5	382
7.	2021 Projected	139 Crore	14.87 %	----	----	464

Social parameters of India registered tremendous progress after independence. Breaking the barriers of casteism, feudalism, gender-based division of labour, rudimentary lifestyle as dowry and preference of male child-birth transition period is diminishing with increased literacy rate and diffusion of information technology. Female literacy brought phenomenal change in demography and social indicators of development in India. Increase in female literacy rate significantly brought down the population fertility rate and enhanced the women empowerment parameters.

The involvement of women in formal workforce sector empowered them economically, shifted their dependency from males and become decision makers of family institution. It improved the health parameters of children and gender-neutral approach of society.

Table 2. Trends of Social Parameters of India.

Census	Total Literacy Rate (%)	Male Literacy Rate (%)	Female Literacy Rate (%)	Sex Ratio No. of females per 1000 males.	Average Life Expectancy (years)
1901	5.35 %	9.83 %	0.60 %	972	25
1951	18.33 %	27.16 %	8.86 %	946	32.1
1971	34.45 %	45.95 %	21.97 %	930	45.6
1991	52.21 %	64.13 %	39.29 %	927	59.4
2011	74.04 %	82.14 %	65.46 %	943	67.5
2021 Projected	77.7 %	----	-----	948	70

Infrastructural Development

Vast geographical extent of more than 32.87 million sq. km. and more than 7 lakh dispersed villages in the country initially finds series of stumbling blocks in development process. Construction of all weather roads to connect the habitations in rugged terrains remained the herculean task for the planners and engineers. Subsequently, developing the school infrastructure, medical logistics and electrification networks registered significant progress in raising the living standard of the society. The infrastructural development become instrumental in economic growth through mass production in agricultural and industrial sector. The exchange of goods increased the trade at local to global level.

Table 3. Indicators of Infrastructural Development in India.

Year	Length of all-weather Roads (Lakh Km.)	No. of electrified villages (in Lakhs)	No. of primary schools (in Lakh)	No. of Primary Health Centers	Railways Running Track Length (Km.)
1951	3.99	0.07	2.09	725	59315
1971	9.14	0.75	4.10	5131	71669
1991	23.27	4.81	5.58	22243	78607
2011	46.76	5.08	7.48	24049	87040
2021	62.15	5.97 (100%)	8.47	30045	99235

There is phenomenal increase in infrastructural development across all sectors was registered since independence in India. The initial Five Years Plans (FYP) were targeting the high economic growth rate which gradually changed to sustainable development of society. To include the each and every section of society in development process, after 2000 all government schemes shifted towards 'Inclusive Sustainable Development'.

Food and Nutrition Security

Increasing population of India from 36.10 crore in 1951 to almost 139 crores in 2021 required assured supply of nutritious food to its population. The expansion of cropped area, expanding the irrigated net sown area, application of high yielding variety (HYV) of seeds, diffusion of mechanization in farm sector and institutional support of fertilizers and marketing system (APMC) remained instrumental in increasing the food grain production. Since independence, population size increased almost 3.7 times whereas food grain production

increased more than 6 times. The natural conditions as suitable crop growing weather conditions which includes temperature, rainfall, moisture; fertile alluvial and deltaic soils, availability of water for irrigation and vast plain topography provided base for mass production in farm sector.

Table 4. Trends of Development in Agricultural Sector in India.

Year	Net Sown Area (Mn. Ha)	Total Irrigated Area (Mn. Ha.)	Food Grain Production (Million Tons.)	Wheat Production (Mn. Tn.)
1951	118.75	20.8	50.8	6.46
1971	140.86	31.1	108.4	23.83
1991	142.87	48.0	176.4	55.13
2001	141.34	55.13	208.8	69.68
2021	140	64.7	307	107.9

The government policies as Integrated Rural Development Programme and Small Farmers Development Agency brought significant improvement in farm products. In India, farmers revolutionize the various farm sectors with mass production as:

1. **Green Revolution**: Food grains as wheat and rice.
2. **White Revolution**: Milk production (Operation Flood).
3. **Blue Revolution**: Fish production mainly freshwater.
4. **Yellow Revolution**: Oilseed production.
5. **Round Revolution**: Potato production.
6. **Golden Revolution**: Fruit/Honey production.
7. **Silver Fiber Revolution**: Cotton Production.
8. **Golden Fiber Revolution**: Jute Production.
9. **Silver Revolution**: Poultry/Egg production.
10. **Pink Revolution**: Onion production.

Economic Indicators

After independence, the role of public sector undertakings (PSU's) remained instrumental in strengthening the economy. Industrial framework of PSU's utilized the natural resources of nation for its value addition, multiplied the export and trade and offered mass employment for the multiplication of production of human resource. After the formation of WTO (World Trade Organization) and Globalization in 1990s private sector and FDI (Foreign Direct Investment) further boosted the super specialized industries as software, automobiles, and electronics etc. Apart from human resource progression and agricultural development in India,

industrial sector opened plethora of economic opportunities in tertiary/service sector. Altogether it increased carrying capacity of India with improved living standard, assured food supply, mitigating the natural disaster and hazards and registered phenomenal increase in per capita income.

Table 5. Economic Indicators of Development in India.

Year	Per Capita Income (Rs./year)	Electricity Generation (Billion KWH)	Petroleum Consumption (Million Tn.)	Steel Production. (Mn. Tn.)
1951	255	5	0.31	1
1971	742	56	18.37	4.6
1991	5440	264	51.77	13.5
2001	16688	499	103.44	31.2
2021	135050	1356	214.00	94

Social welfare schemes of Government of India under inclusive sustainable economic development brought significant improvement in the livelihood of poorest of the poor. Food for all, house for homeless, assured employment under MG-NAREGA and Ayushman Bharat and parity in education through SWAYAM schemes are the epitome of socio-economic development of India. Diffusion of information technology and use of the mobile phones by the remotely inhabited people is the runway of take-off stage of society. Ease of Doing Business, Start Up India, Stand Up India, Gati-Shakti, Make in India and Atamnirbhar Bharat schemes have opened the multiple options for industrial production, export and employment in India.

Human Intervention in disasters and Repercussions by the Environment

Inika Garg & Kalash Tanwar, 2nd year, Dept. of Geography, Shivaji College

"DISASTERS ARE NOT NATURAL, THINK!"

"81% of millennials believe the world is warming, and 65% of millennials feel that humans are the number one cause of climate change".

Every aspect of life on earth has been influenced by humans in inventive ways. It influenced the development of mankind from our earliest ancestors to the people we are now. Indeed, we have gone a long way after approximately two million years of evolution. From improvements in human social behavior to daily accomplishments in the realms of science, technology, and medicine, we have extensively investigated and are continuously paving the path to find better solutions to tackle current issues to give society a higher standard of living. Even though we have made a significant contribution to the welfare of our society, we have overlooked or disregarded the reality that throughout time, we have been fooling with the environment in which we live and this degradation of the environment is mostly the result of human activity. The effects of human activities on the environment date back to the earliest forebears of our species. Since then, we have all altered the environment to suit our needs, and as a result, we are currently losing all the precious natural resources that are irreplaceable.

This article aims to better understand the pattern of environment-disturbing activities from scratch, where we talk about humans and their unsatisfying wants struggling with limited resources. Due to this, we face problems like scarcity and disasters.

Everyone understands if the environment is not nurtured with care, it comes back at us brutally no matter how intentionally or unwillingly we are playing or messing with it. This article also talks about how the environment can show us its strength through calamities and disasters and most importantly how it is all the consequences of our selfish deeds. Furthermore, how we can maintain a balance or have an approach for a stable biosphere?

Interference by Humans

Environmental processes have always been significantly hampered by human involvement. To fulfill our egotistical desires, we have planned for progress, but we have always attributed the negative effects on nature. Daily examples of pollution, global warming, and several other activities have made us aware of the consequences of giving in to our materialistic desires.

In light of the preceding context, the recent case of the Joshimath Sinking Crisis is an example of human interference in nature.

Joshimath Sinking Crisis (case study)

The 1300-year-old Himalayan town in the Chamoli district of Uttarakhand has a lot of religious significance. Tourists from all over the world visit this place as this is the route for one of the holy places of Char Dham Yatra and also for Hemkund Sahib.Around 10,00,00,000 people visited Joshimath in 2022 which

was significantly more than the figures for 2019.

Recently, three months ago TapovanVishnugad Hydro Power Project started in the town. As the town is located on the course of the Ganga flood plains and also lies in seismic zone v of the Himalayan region, the town was unable to sustain another major hydro project. Houses present there started to develop cracks in walls and ground, it seemed like Earth was splitting. This all happened because of Land Subsidence. Land Subsidence is a phenomenon where the land responds vigorously to some nature-harming events like disturbing the water cycle or land degradation. Environmentalist Chandi Prasad Bhatt said that "Failure of successive governments to act on expert warnings seems to be at the root of the Joshimath crisis". The government has started evacuation plans in the area as it is no longer safe to live there until some strong methods are implemented.

According to recent data, the Supreme Court had denied hearings related to this case. But, as the rehabilitation process has already started there is an urgent need to address this issue. Lakhs of people are associated with the sanctity of this town and evacuation there is a big step. With the references of geologists, seismologists, geographers, and scientists' disaster reduction is on the edge of implementation. It is hoped that the situation gets better soon with the support of the government and the town gains its importance like before.

The Reactions by Nature

Gandhiji had observed this "Nature has enough to meet our needs but not our greed" The natural resources that makeup "PanchMahabhuta" include the human world, the flora, and the animals that exist around us. These are the five natural elements (land, water, fire, air, and sky) that sustain life on earth. But regrettably, the use of nature for economic gain has upset this delicate equilibrium that has kept humanity united.

Are humans responsible for natural calamities?

Yes, since the start of the industrial revolution, we have grown more accustomed to enjoying ourselves by creating or inventing items that make our lives easier. Thus, humans started to easily exploit our planet and its resources for our gain. This milking and ill-treatment of natural resources leads to our contribution or makes us responsible for natural disasters. Therefore, it is certain that the intensity of natural calamity is directly proportional to human actions. The Intergovernmental Panel on Climate Change released a study in February 2007 that said it was "very likely" that humans were to blame for climate change. A prominent indicator of this is deforestation, which has led to an increase in disasters like climatic imbalance, floods, droughts, erosion, and landslides. Natural catastrophe frequency and impact have increased over the past 15 years as a result of the worsening climate issue but this pales in contrast to the response of nature to all this exploitation. Population displacement is one of the most immediate repercussions of natural disasters. Many people are forced to leave their homes and seek safety in other areas when countries are hit by earthquakes or other strong natural disasters. Many local communities suffer such severe economic resource losses that recovery is challenging, if not almost impossible.

The quantity and frequency of natural catastrophes that have been documented, their effects, and the harm

they do to local and global economies and people are all dramatically rising. Natural catastrophes frequently devastate vital agricultural infrastructure and resources, altering production cycles, trade flows, and means of subsistence. This has an impact on food security and further disturbs the value chains. Catastrophes such as earthquakes, landslides, floods, fires, droughts, and hail storms may impede global economic expansion, particularly in countries where agriculture and food production still contribute significantly to GDP.

Solutions and Actions

1. Risk Realization- Actions to reduce disaster risk will be taken while acknowledging that disaster risks can be generated by development activities and that risk reduction must be accomplished within the development paradigm through the development of risk-informed policies, development planning, resource allocation, targeting, implementation, monitoring-review, and communication.
2. Corpus Funds for business continuity planning - We can set up corpus funds for business continuity plans that outline how certain functions or services will be provided in the event of a disaster and how the organization expects to resume normal operations as promptly as possible. We currently have corpus funds for disaster risk reduction, but we should also take steps to develop better and more quickly through a constant flow of money as part of our strategy.
3. The governance of Disaster Risk Reduction will be carried out by all line departments as well as non-governmental organizations like civil society organizations, citizen's groups, village committees, farmer groups, and so on who may occasionally be better positioned to take decisions about localized risks. Disaster Risk Reduction is multi-stakeholder and multi-level. Actions to reduce the risk of disaster will be taken while acknowledging the need for inclusive, group-wide efforts to reduce risk creation and manage produced hazards. In addition, no issue can be solved without using a public-private partnership model approach, thus the government should create PPP models to speed up the rehabilitation and reconstruction process and collaborate with the private sector to increase the influx of funds and benefit society.

4. Resilience in Development- **Development should be such that it protects us from disaster, development should not be such that it becomes a disaster.** Actions to reduce disaster risk will be done to enhance resilience within the development, with the understanding that resilience is not a fixed end state but rather a dynamic collection of circumstances and processes. Developing should be done, but with consideration for the boundaries and limits of disaster-prone places. Additionally, excessive development activity must not be done in disaster-prone areas or anywhere near them because in doing so, we are essentially calling catastrophe.
5. Investing in the future through a focus on schools and seismic reinforcement - Actions to decrease the risk of disasters will be done in recognition of the fact that investing in children and young people lowers risk not only in the present but also ensures the future by fostering a

culture of risk reduction. This might be accomplished by placing a strong
6. Madhyamik Shiksha Abhiyan. Additionally, to guarantee the security of facilities that are necessary, such as educational institutions, medical facilities, food storage facilities, and banks, and to increase the strength, stability, and shock resistance of these structures. We may and must use seismic reinforcement structures.

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emphasis on Indian schools through government initiatives like Rashtriya

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Heat Waves and Cold Waves

Harshit Pandey, 3rd year, Dept. of Geography, Shivaji College

Extreme weather conditions refer to abnormal weather patterns that occur outside of the normal range of variations for a particular region. These conditions can include severe storms, heat waves, droughts, and flooding. One of the most significant impacts of extreme weather conditions is the damage they can cause to infrastructure and communities. High winds, heavy rainfall, and flooding can damage or destroy buildings, roads, and bridges. Droughts can lead to crop failures and wildfires, while heat waves can cause heat stroke and other heat-related illnesses. Extreme heat waves and cold waves are both weather phenomena that can have serious impacts on human health and the environment.

Heat waves are prolonged periods of excessively hot weather that can have severe effects on both human health and the environment. They are prolonged periods of hot weather, often accompanied by high humidity. They can lead to heat exhaustion, heat stroke, and even death. The elderly, young children and individuals with pre-existing health conditions are particularly vulnerable to the effects of heat waves. One of the main effects of heat waves on human health is an increased risk of heat stroke, which occurs when the body is unable to regulate its temperature properly. Additionally, heat waves can exacerbate air pollution, making it harder for people with respiratory issues to breathe. To protect against the effects of heat waves, it is important to stay cool and hydrated by drinking plenty of water and avoiding strenuous activity during the hottest part of the day. It is also important to wear light-colored, loose-fitting clothing, and to avoid spending too much time in direct sunlight.

In India, heat waves typically occur during the summer months of April through June, but they can occur at other times of the year as well. One of the main causes of heat waves in India is the rising temperatures due to climate change. The average temperature in India has been steadily rising in recent years, and this trend is expected to continue. This means that heat waves are likely to become more frequent and more intense in the future. Another major cause of heat waves in India is the urban heat island effect. This occurs when cities and other urban areas are significantly warmer than the surrounding rural areas due to the heat absorbed by buildings, roads, and other man-made structures. This can make heat waves in urban areas even more dangerous than those in rural areas. Heat waves in India can have serious health consequences, particularly for vulnerable populations such as the elderly, children, and those with existing health conditions. Heat stroke, dehydration, and heat exhaustion are all common health problems associated with heat waves.

According to the National Disaster Management Authority (NDMA), heat waves in India have claimed more than 4,000 lives in the last 15 years. The 2015 heat wave was particularly deadly, with more than 2,500 deaths reported across the country. The states of Andhra Pradesh and Telangana were the worst affected in 2015, with more than 1,400 deaths reported in each state. Other states affected by the heat wave included Odisha, West Bengal, and Maharashtra. In 2016, a total of 1,111 deaths due to heat

wave was reported from various parts of the country. In 2019, the heat wave affected various parts of the country, with Rajasthan, Gujarat, and Maharashtra being the worst affected states. In 2020, due to the Covid-19 pandemic, there was a decrease in the number of deaths due to heat waves, but it's still a concern. It is worth noting that these numbers are likely to be an underestimate of the true number of deaths caused by heat waves in India, as many deaths may not be officially reported or attributed to heat waves.

Some measures to take to keep ourselves safe from the disastrous effects of heat waves are:

1. Stay Cool: Stay indoors in air-conditioned spaces or shaded areas during the hottest parts of the day. If air conditioning is not available, use fans or other cooling devices to stay cool.
2. Stay Hydrated: Drink plenty of water, even if you do not feel thirsty. Avoid alcohol and caffeine, as they can dehydrate the body.
3. Wear Light, Loose Clothing: Wear lightweight, light-colored, and loose-fitting clothing to help stay cool.
4. Protect Your Skin: Use sunscreen to protect your skin from the sun's harmful rays. Wear a wide-brimmed hat or other head covering to protect your head and face.
5. Be Alert to Warning Signs: Be aware of the warning signs of heat-related illnesses, such as heat exhaustion and heat stroke, and seek medical attention if they occur.
6. Take Care of Vulnerable Populations: Take extra care to protect vulnerable populations, such as the elderly, children, and those with existing health conditions, from the dangers of heat waves.
7. Get involved in Climate Action: Support and advocate for policies that reduce greenhouse gas emissions and promote sustainable urban development practices to slow down the effects of climate change that contribute to heat waves.
8. Be Prepared: Have a plan in place in case of a heat wave emergency, including a list of emergency contact numbers, a supply of water and non-perishable food, and a battery-operated or hand-crank radio to stay informed about weather and other important information.

Cold waves, on the other hand, are prolonged periods of cold weather, which can lead to hypothermia, frostbite, and other cold-related health issues. They can also cause damage to infrastructure, such as bursting pipes and road closures due to snow and ice. A cold wave is a weather phenomenon that occurs when a mass of cold air invades an area and causes temperatures to drop significantly below normal for a prolonged period. Cold waves can have a significant impact on both people and the environment, and can even lead to death in extreme cases. One of the most dangerous effects of a cold wave is hypothermia, which occurs when the body's core temperature drops below normal. Symptoms of hypothermia include shivering, confusion, drowsiness, and in severe cases, coma or death. People who are most at risk of hypothermia include the elderly, young children, and those with medical conditions such as diabetes or heart disease. Another significant impact

of cold waves is on infrastructure and transportation. Cold temperatures can cause roads and bridges to freeze, making them dangerous for travel. Cold waves can also damage crops and disrupt power and gas supplies. While cold waves are a natural phenomenon, climate change may be contributing to their severity and frequency. As global temperatures continue to rise, cold waves may become more intense and occur more frequently. Therefore, it is important to take steps to reduce greenhouse gas emissions and slow the pace of climate change to mitigate the potential impacts of cold waves.

Extreme cold weather in India is a growing concern as temperatures drop well below normal levels during the winter months. One of the primary causes of cold waves in India is the movement of cold air masses from the Himalayas and the Arctic. These cold air masses can push southward and settle over India, leading to a drop in temperatures that can last for several days. High-pressure systems can also trap cold air near the surface, exacerbating the effects of cold air masses. Extreme cold weather can have a significant impact on the health of citizens, particularly those living in poverty or without access to proper heating. Cold-related illnesses, such as hypothermia and frostbite, can be life-threatening if left untreated. The cold weather also poses a risk to the elderly and young children, who are more susceptible to the effects of the cold. The agricultural sector is also greatly affected by the extreme cold weather. The prolonged period of cold temperatures can damage crops, leading to decreased yields and financial losses for farmers. In addition, the cold weather can make it difficult for animals to survive, leading to decreased milk production and other issues.

The Indian government has taken steps to address the issue of extreme cold weather by assisting those affected. This includes providing warm clothing and blankets to the poor, as well as setting up emergency shelters for those without proper heating. Additionally, the government has implemented programs to help farmers mitigate the effects of the cold weather on their crops and livestock. Despite these efforts, however, the extremely cold weather continues to pose a significant challenge for many people in India.

Cold Waves are deadlier than heat waves especially in the case of India, as per the Indian Meteorological Department (IMD), nearly 60- times more deaths were recorded. cold waves claimed 722 lives and heat waves 12. There also has been a rise in the number of cold waves by about 2.7 times from 2017-2020. There were as many as 152 deaths in the year 2020 due to cold waves in comparison to just 2 deaths as a result of heat waves.

Some steps to stay safe from cold waves could be:

1. Stay informed: Keep track of weather forecasts and updates from local authorities to stay informed about upcoming cold waves.
2. Dress warmly: Wear warm clothing, including a hat, gloves, and a scarf, to protect yourself from the cold.
3. Stay indoors: Try to stay indoors as much as possible during a cold wave, especially during the coldest hours of the day.
4. Heat your home: Use heaters, fireplaces, or other forms of heating to keep your home warm.

5. Insulate your home: Seal any gaps or cracks in your home's windows and doors to keep cold air out.
6. Keep hydrated: Cold weather can dehydrate you, so it's important to drink plenty of water to stay hydrated.
7. Take care of vulnerable people: Check on elderly family members, friends, and neighbors to make sure they are warm and safe during a cold wave.
8. Take care of animals: Bring pets indoors during cold waves and make sure livestock have access to warm shelters and plenty of food and water.
9. Be prepared for power outages: Keep warm blankets, flashlights, and a battery-powered radio on hand in case of a power outage.
10. Be aware of the risks: Know the signs and symptoms of cold-related illnesses, such as hypothermia and frostbite, and seek medical attention if you or someone you know is affected.

In conclusion, extreme weather conditions such as heat and cold waves can significantly and have a far-reaching impact on communities and economies. Climate change is a major contributor to these conditions' increased frequency and severity. Adaptation measures can help reduce the impact of extreme weather, but addressing the underlying causes of climate change is necessary for long-term solutions.

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Natural Disasters: Science behind the Amalgamation of Tragedies

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A disaster is an event associated with large-scale destruction. It occurs naturally or due to human-caused reasons. A natural disaster is an event that occurs naturally and is not human-driven, resulting in great loss of human life, property, the environment, etc. A natural disaster may be caused by large-scale weather or climatic changes or due to events like earthquakes, volcanoes, avalanches, and the list goes on. No spot on the Earth is free from natural disasters, however, certain regions are prone to them, which include the Pacific Ring of Fire, and the Himalayan region like Tibet, Nepal, Bhutan, and the northern parts of India.

"Science must begin with myths and the criticism of myths". The words of Karl Popper persuaded us to rethink the myths that existed about natural disasters. The most prominent of these was the Greek mythology about natural disasters, which was based on the relationship of Greek gods with natural disasters. To give you an idea of that, they used to believe that earthquakes occurred when the Greek God was angry. Luckily, we live in a post-modern society and have scientific proof of the natural disasters that occur. Not only that, but today the place, time, and date of the natural disaster can be forecast. Let's now discover why various natural disasters are caused.

Earthquakes

An earthquake, simply put, is a sudden shaking of Earth's topmost layer, i.e., the lithosphere. But what causes the shaking of these plates? Here steps in the theory of plate tectonics, the theory that solidified in the 1960s and explains the movement of the 60-mile-thick lithosphere steps in the theory of plate tectonics, the theory that solidified in the 1960s and explains the movement of the 60-mile-thick lithosphere. The lithospheric plates are not stationary, but they show a gradual movement, say 1 cm to 5 cm a year. Faults tend to occur where these plates grind against each other. Faults on either side of the fault bend to accommodate this movement. Stress builds up each time the movement occurs, and over time, the rocks on either side lose their strength. At this point the fault ruptures, rocks return to their original shapes, and the stored energy is released as shock waves, causing an earthquake. In scientific terms, this phenomenon is known as the elastic rebound theory. Earthquakes can vary in intensity; some are so weak that they can't even be felt, while some are so intense that they cause outrageous destruction to life and property. Let's try to understand the phenomenon more clearly by citing the example of the San Andreas Fault. In California, there are two plates: the Pacific Plate and the North American Plate. The Pacific Plate consists of most of the Pacific Ocean floor, and the North American Plate consists of most of the North American Continent. The main line of boundary between the two plates is the San Andreas Fault. The Pacific Plate grinds towards the North American Plate at a rate of about two inches per year. Parts of the fault overcome this creep, resulting in minor tremors, while in other parts

where the creep is not so constant, the strain gathers over hundreds of years and produces epic earthquakes when it finally releases.

Volcanoes

A sudden eruption from a vent on the Earth is called a Volcano in layman's language. But what paves the way for such eruptions is the question. The Earth's interior is so hot that some rocks melt down and get converted into magma. Since these molten rocks are less dense than the surrounding solid rocks so they flow upwards and gather into magma chambers. Some of the magma escapes through the fissures and is known as lava. Volcanoes are usually considered less destructive than a volcano depending on the composition of the lava. If the lava is less viscous then it tends to flow faster. Eruptions with such lava form gaseous clouds over the vent. An example of such a volcano is Hawaii's volcano. While viscous and thick lava flows slower and sometimes is not able to escape the vent. In such conditions pressure builds and the vent erupts suddenly after a while. Such volcanoes are comparatively destructive and an example of such a volcano is the eruption of Washington's Mount St. Helens. The mention of volcanoes goes in vain without mentioning **Mauno Loa** of the Pacific Ocean. The word in Hawaiian means largest mountain. Mauno Lao is one of the five volcanoes that form the Island of Hawaii and is considered the largest volcano on earth.

The Pacific Ring of Fire

The Pacific Ring of Fire or the Circum-Pacific Belt is a horseshoe-shaped path along the Pacific Ocean. This area is significantly known for being seismically active. There are about 450 active volcanoes in this region. Statistically speaking this makes up 75% of the Earth's active volcanoes and about 90% of the earthquakes occur in this region. The scientific cause behind This occurrence is the presence of subduction zones and the transform boundary between the Pacific Plate and the North American Plate for volcanoes and earthquakes, respectively. At the subduction zone, one plate slides underneath the other, a process known geologically as subduction. When the rock is subducted, it melts and becomes magma, creating conditions ripe for a volcanic eruption. The transform boundary generates a large number of earthquakes as tension in the earth's crust builds up and is released.

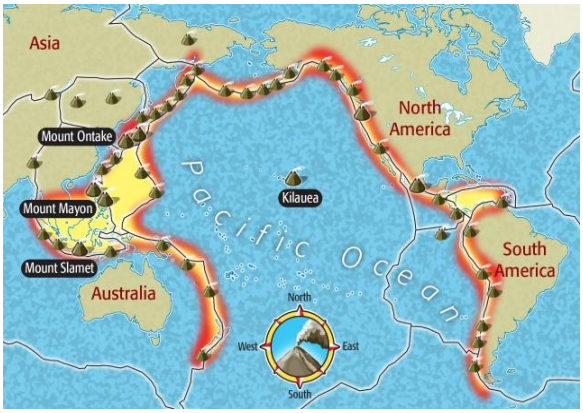

Figure 1: Pacific Ring of Fire. Source: Wikipedia

Tsunami

It would not be incorrect to say that a tsunami is an effect of an earthquake. A tsunami occurs when the seafloor displaces due to an earthquake. As the seafloor displaces, so does the oceanic water, and thus gigantic waves are produced that travel at the speed of jet planes. As they approach, the waves slow and increase in height. The Indian Ocean Tsunami of 2004 is worth mentioning here, as it was one of the most destructive tsunamis in human history. On the morning of December 26, 2004, an

earthquake of magnitude 9.3 broke out off the coast of Sumatra and continued for about 10 minutes. This caused a colossal tsunami in the Indian Ocean. The tsunami inundated the coastlines of more than 11 countries around the Indian Ocean. More than 226,000 people perished, and more than 1 million were left homeless.

Tornadoes and hurricanes

Having discussed the disasters associated with the earth's surface, let's now discuss the disasters related to wind. This includes tornadoes and hurricanes. When the winds are moving in different directions, at different altitudes, and at varying velocities, such a condition paves the way for the wind to spin. For a tornado to form, there also needs to be spinning air near the ground. A hurricane is a special type of tropical cyclone that moves at a speed of 74km/h. It is a low-pressure system surrounded by a high-pressure system that condenses and moves at a high speed, bringing heavy rains and squalls along with devastation. Hurricanes are larger and stronger than tornadoes, and thus they cause more destruction.

Floods

Reasons causing floods encompass several factors, such as intensity and duration of rain, topography, soil type, and ground cover. Prolonged rainfall over several days, intense rainfall over a short period, or a debris jam causes a stream or river to overflow and flood the surrounding area. We often hear of the term flash flood. What is it? A flash flood is a flood that occurs within 6 hours of rainfall or after a dam or levee failure. Such floods are hard to detect and catch people unprepared. One of the examples is the Kelly Barnes dam failure in 1977.

As woods are being cleared and fields are being overshadowed by commercial buildings, the land is becoming less impervious, causing a six percent rise in the occurrence of floods.

There are several other naturally occurring disasters: landslides and avalanches, which occur when a mass of snow or earth materials falls, topples, rolls, or slides down due to gravity; wildfires, which can start with a natural occurrence such as a lightning strike or a human-made spark. However, it is often the weather conditions that determine how much a wildfire grows. Wind, high temperatures, and little rainfall can all leave trees, shrubs, fallen leaves, and limbs dried out and primed to fuel a fire.

How to Prevent Disasters?

Lately, science and technology have developed to the point where we can foresee natural disasters and prepare for them, if not completely control them. GIS (Geographic Information System) is used to create detailed maps of the areas affected by a disaster to identify safer routes for evacuation as well as potential locations for relief camps. Technology is already available for responding to and mitigating the impacts of disasters. For example, advancements in communication technology have allowed first responders to coordinate their efforts more effectively. New construction techniques are being developed to withstand the forces of earthquakes and hurricanes.

No matter how much we develop, be it technology or communication, we can never overpower nature. Human-made disasters have even conquered natural disasters in terms of the destruction they produce. Even the occurrence of natural disasters has outnumbered the statistical figures of recent years due to the unsustainable practises of humans. Now

is the time that we change and start acting toward the prevention of nature, for we have to embrace change if the alternative is a disaster.

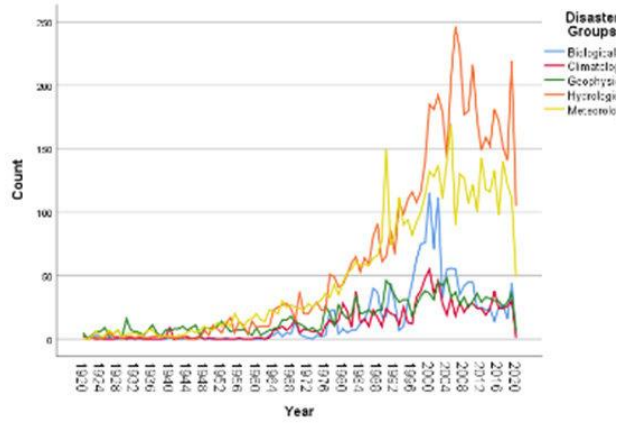

Figure 2: Nature and count of earthquakes along with their year of occurrence. Source: Nasa.gov

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Do Natural Disasters only affect Humans?

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The very heading of this article poses a question to us, something that we don't generally think about. We all know that a natural disaster is a negative impact caused to the environment due to natural hazards and calamities like earthquakes, floods, droughts, cyclones, etc.

These disasters cause a lot of damage to human life in the form of house losses, livelihood losses, and losses of assets and income. Every day, in some other corner of the world, there's news of some loss of human life. Large tracts of human habitation are cleared up in a fraction of a second due to these disasters.

People sympathise and express their grief over the loss of fellow humans, but do we think about others who get affected?

By others here, I mean the plant and animal kingdoms. Lakhs and lakhs of innocent animals face the consequences of these disasters and lose their lives. Nobody talks about their suffering or even pays attention to this loss. The same goes for the plant kingdom. We may not get emotional about this loss, but the destruction of plants also has a huge impact on human life.

Animals living in wild habitats are particularly vulnerable to natural disasters. Earthquakes, hurricanes, tsunamis, and forest fires have devastating effects on animal lives. Many of them die by drowning, burning, being buried alive, being crushed to death, or being smashed by trees or other heavy objects. Many others sustained major injuries, including cuts, wounds, and major impacts on eyes, limbs, wings etc. Disasters create other problems for them apart from injuries, like malnutrition or food poisoning due to the consumption of contaminated food and water. Strong volcanic eruptions and forest fires can cause a temporary change in climate in the area, posing a threat to the survival of native plants and animals. Tsunamis, storms, and floods can cause huge damage to marine life and underwater plants, directly or indirectly posing a threat to their survival through the deposition of debris and other harmful materials in ocean beds. All of this contributes to health problems for marine life while changing the circulation of water, which further affects nutrient availability and water temperature.

Talking specifically about animals, their chance of survival at the time of disaster is affected by various factors, which include: specific adaptations that the species possesses; the stage of life they are at; whether or not it is breeding season; whether the species is migratory or not; and the particular habitat that they live in. Other factors may include their physical condition or ability to take care of themselves. Animals with sharp eyesight, hearing, or other strong senses are more likely to escape disasters, as are birds that can fly away and larger animals that can run quickly. Small animals may drown more easily, have their burrows and holes destroyed due to floods or heavy rains, or be crushed or burned when they are trapped with no way to escape. Animals may be displaced, either because they moved to safer areas or because they were swept away by high winds or high-intensity flood waters. When displaced animals are crowded in a smaller area, the chances of malnutrition

due to a food shortage and an outbreak of diseases increase.

Earthquakes and Tsunamis

According to the United States Geological Survey (USGS), each year there are 15-20 major earthquakes worldwide with a magnitude of 7.0 and over a thousand that measure above 5.0. Earthquakes not only shake the land but also cause shaking in the seabed, which results in tsunamis. This itself states how much damage they can cause to plant and animal life, be it due to the falling of rocks or other heavy objects or creating drifts in landmasses. When tsunamis strike, birds and other small creatures can be washed into the water and be unable to get back to dry land. Sea birds and fish may be buried alive in sand or debris and suffocate if washed ashore due to tsunamis. Taking an example from the 2015 Nepal earthquake, we see that most of the livestock was concentrated in rural areas, disconnecting them from the mainland and making rescue difficult. The movement of animals was restricted, and they were not taken for grazing since people were busy saving their lives. Besides domesticated livestock, a large number of street dogs were also injured and infected due to a lack of healthcare. Many animals had broken limbs and crushed bones due to injuries from falling heavy objects. Even weeks after the quake, many of them were left unattended, with thousands of cattle, goats, and poultry dogs starving without feed until organisations and groups for animal welfare stepped forward.

Volcanoes

Volcanic eruptions can sometimes last for months, releasing toxic lava and ash that cause explosions and heat nearby water, which can cause the death of marine life. Eruptions can easily kill entire terrestrial and marine life in an area, and volcanoes accompanied by earthquakes and landslides can pose even greater threats. Ash deposited by volcanoes contains harmful chemicals and sharp edges that affect plant and animal life. Moreover, grasslands and other food sources are destroyed due to this ash. Volcanoes also result in temporary climatic changes.

Storms

Winds, rain, and debris brought by storms kill many plants and animals, damaging their habitats and shelters. Strong winds can dislocate birds, bats, frogs, and other small or baby animals. Bird nests and shelters of other tree-dwelling animals can easily get blown away, and even if they hide in tree cavities during stronger storms, they are at risk of dying due to the falling of trees. Some who may even survive may get separated from their groups or flocks.

Floods

Smaller animals are more vulnerable to drowning or dying due to floods. Burrowing animals such as rodents lose their shelters due to rushing water or due to blockage by debris. Leaves and debris can also harm marine life by blocking sunlight, reducing oxygen levels as they rot, suffocating fish, and blocking their gills. Larger mammals who can swim may also suffer from various diseases due to prolonged exposure to water, something for which their bodies are not ready. Overwatering of the roots of trees causes them to rot, which leads to the falling of trees and other plants. We can see the 2013 Uttarakhand floods as an example, where a huge number of mules and horses who used to carry pilgrims to the shrines of Kedarnath temple, Gangotri, etc. lost their lives due to landslides or drowning in flood waters.

Moreover, the lack of any kind of treatment or rescue camps for animals in the area made the situation worse. Many villagers who were directly dependent on their livestock also suffered when there was a shortage of fodder and clean drinking water for their domesticated animals.

Fire

A single wildfire can kill millions of animals and plants. The flames and smoke of forest fires kill most of the animals in their path to escaping. Large mammals and birds are more likely to survive because they can run and fly, respectively, to higher grounds where land is wet, or else move to streams or lakes. Small mammals and other small creatures are again in the most disadvantaged position. Hiding in tree hollows, logs, or dens is not a good idea because fire does not leave anything in its way and causes the dens to heat up like ovens. Fleeing larger mammals may also die due to smoke inhalation, burns, exhaustion, and various other reasons. Moreover, the long-term effect of forest fires includes the loss of any form of fodder due to the burning of all forms of vegetation. Injured and frightened animals are also more susceptible to threats like predation. The Australian bushfires can be seen as an example that killed nearly 3 billion animals, including mammals, birds, and reptiles. Moreover, the fires caused rising temperatures and extreme heat, which made the survival of wildlife more difficult.

Droughts

They cause all sorts of vegetation to dry up, thus resulting in the non-availability of food. Drying of water bodies and rivers causes deaths due to thirst, further killing the aquatic life that loses its shelter, i.e., water, due to extreme drought conditions. Many plants and animals died from the extreme heat wave and dehydration.

Human beings utilize public and private resources for the reduction of risks and threats caused by nature. Most human deaths from natural disasters are due to collapsing buildings. Animals also lose their shelters and parts of their habitat that are necessary for their survival, but they don't have any access to any technological resources. Whether or not an animal can cope with a natural disaster and its aftermath depends on factors that are mostly beyond its control. Hence, we see that animals suffer a lot during these natural disasters, and making relief efforts for them along with human beings can be seen as a step forward towards compassion for the animal kingdom. A few things that we can do are: if we live in a disaster-prone area, we should make sure to have a plan in place for our pets and other domestic livestock in the nearby area to help them evacuate; we should be prompt in helping at the time of the disaster; we can donate to organisations and NGO's helping animals affected by disasters; and lastly, looking at the plant kingdom, the least we can do is to plant more trees and plants suitable according to the soil and climatic conditions of the particular area, which can give them a slight edge of survival at the time of a disaster.

Concluding this article, I would only request that people not be completely selfish at times of danger and think at least a bit about other forms of life on this planet who can't even express their grief and suffering, and urge everyone to give a deep thought to the title of this article: "do natural disasters only affect humans".

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2004 Indian Ocean Tsunami

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On December 26, 2000, a major earthquake hit Sumatra, Indonesia, with a magnitude of 9.1–9.3. Which gave rise to the tsunami. This day is known as the Boxing Day tsunami after the Boxing Day holiday. It is one of the deadliest natural disasters in history. It struck the coasts of multiple countries in south and southeast Asia.

On December 26, 2000, one of the earth's major tectonic plates, the Indo-Australian, collided with the smaller Burma plate; as a result, the denser Indo-Australian plate was subducted beneath the Burma plate. This movement was responsible for the deep focus of the earthquake that forced the ocean floor upwards, causing a tsunami. The major plate was subducted beneath the Burma plate, which has the tip of Sumatra and the Andaman and Nicobar Islands. The plates moved at a rate of 6 cm per year, which caused the displacement of water and generated tsunamis.

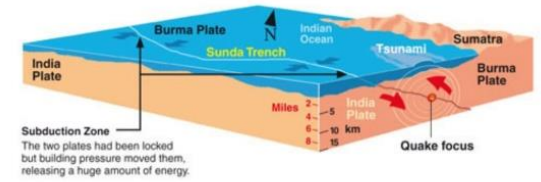

Figure 1: Subducted Indo- Australian plate. Source: ResearchGate.net

The actual duration of the earthquake on the rupture and fault was approximately 3–4 minutes. The rupture proceeded at a rate of 2.8 km/s, beginning off the coast of Aceh and proceeding northwest. The northward rupture occurred more slowly than the northward one, at 2.1 km/s.

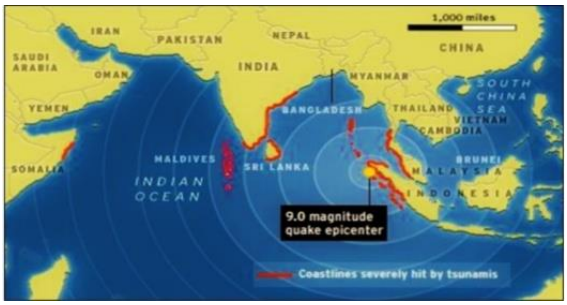

Figure 3: The epicenter of the Sumatra earthquake and areas. Source: Wikipedia.org

As a result, the sea floor lying over the thrust fault was uplifted by several meters, and the water overlying the plate was vertically displaced, which gave rise to the tsunami. Low-amplitude waves are produced at 900 km/h. Whenever the wave reached shallow water areas, it shortened due to frictional force. As it slowed, it gathered into surges and came crashing down on populated coastal areas.

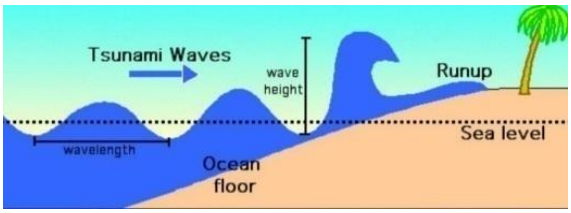

Figure 4: Increase in the height of waves. Source: uscc.gov

The tsunami waves reached a height of up to 30 meters.
According to geological estimates, this tsunami was the third of its kind, and aftershocks were observed as far away as Alaska. As many as 14 countries were affected. 2,27,898 people died, and many more went missing. The worst-hit country was Indonesia.

Countries	Deaths
Indonesia	1,67,540
Sri Lanka	35,322
India	16,269
Thailand	8,212
Somalia	289
Maldives	108
Malaysia	75
Myanmar	61
Tanzania	13
Bangladesh	2
Seychelles	2
South Africa	2
Yemen	2
Kenya	1

Table 1: The death toll of each country. Source: bbc.co.uk

The tremors were so powerful that the whole planet vibrated, and no place on earth escaped tremors. It caused a loss of several million dollars to the economy, affecting the fishing and tourism industries and resulting in a low GDP. It also caused environmental and health losses. It generated lots of waste, causing water pollution and flooding that led to health problems and endemic diseases. Total material losses from the tsunami were estimated to be 10 million dollars. Dead bodies littered the streets, and the inundation of saltwater damaged soils, vegetation, and crops. The earthquake and tsunami destroyed buildings and changed the landscape of many coastal areas of the Indian Ocean. In some areas, uplifting caused the coral reefs to rise above their surface. And in some areas, shorelines disappeared into the tsunami. The tsunami broke the communication networks and damaged coastal railway services, and port and harbour facilities. It caused damage to crops, the removal of topsoil, and the uprooting of trees. Long-term damage to mangrove forests and other coastal vegetation.

Figure 5: Uprooted trees. Source: chellany.net

Tsunamis are always present in the Indian Ocean and are a natural threat due to active tectonic plate movements. The early tsunami warning system is important for disaster management. To effectively communicate with the people of the region. The tsunami devastated the lives of many people.

Figure 6: Before and after satellite images of the town center of Banda Aceh, Sumatra. Source: evergreen.edu

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Nepal Earthquake, April 2015

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Nepal is one of the most vulnerable countries to the impact of disasters. Ranked 4th, 11th, and 30th in terms of relative vulnerability to climate change, earthquakes, and flood risk, respectively, Nepal is exposed to various hazards such as drought, avalanches, storms, landslides, forest fires, and earthquakes.

On April 25th, 2015, a severe earthquake called the Nepal Earthquake or the Gorkha Earthquake struck near the city

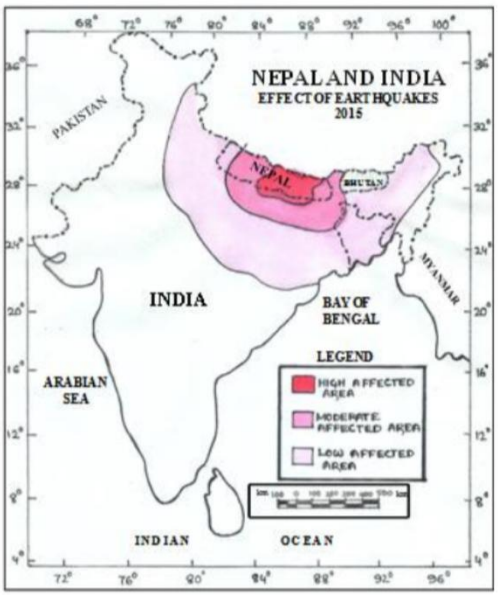

Figure 1: Nepal Earthquake with its epicenter. Source: Wikipedia

of Kathmandu, Nepal. The earthquake measures a magnitude of 7.8 on the Richter scale, with an epicenter of 81km northwest of the city of Kathmandu. About 9,000 people were killed, many thousands more were injured, and more than 600,000 structures in Kathmandu and other nearby towns were either damaged or destroyed. It was the worst natural disaster to hit Nepal since the 1934 Nepal–Bihar border earthquake. The quake measuring 7.8 on the Richter scale, which was followed by 97 aftershocks of magnitudes 3.0–6.9 on the Richter scale, caused heavy casualties in Kathmandu and injured a thousand others. Other than Nepal, the earthquake had an impact on India. It was also felt in the northern and northeastern parts of India, China, Tibet, Bangladesh, and as far away as Pakistan.

Causes of the Earthquake

The earthquake of Nepal and India along the Himalayan belt was caused mainly by the collision of the Indian plate and the Eurasian plate. Deep foci and high magnitudes of earthquakes are caused along the convergent plate boundaries because of the collision of two convergent plates, namely the Eurasian and Indian convergent plates. The subduction of the Indian plate below the Eurasian plate caused the Nepal earthquake in the belt of the Himalayas. On April 25 and May 12, 2015, earthquakes occurred on the northern boundary of the Indian plate, which is underthrusting the Eurasian plate. The main cause of Nepal earthquakes is attributed to the northward movement of the Indian plate. The Indian Plate is moving towards the north-northeast direction at an average rate of about 4.5–5 cm per annum, which causes stress. On April 25, 2015, the stress built up as the Indian and Eurasian plates slid under one another, causing an earthquake. The epicentre of these two earthquakes has lay on the boundary of these two plates. The earthquake was triggered at a depth of 10 kilometers. The 188 aftershocks measuring around 3.0 to 6.9 magnitudes on the Richter scale were at depths of 10-50 kilometers. After the

major earthquake, the earth's plates lost their equilibrium. The aftershocks are nature's way of helping the earth get back to equilibrium.

Impacts of the Earthquake

The earthquake had a huge impact on the inhabitants of the affected area. Earthquakes had several impacts like infrastructural damage, deaths etc.

1. Infrastructure

Several buildings, most of them old, collapsed in the densely populated Kathmandu valley. Kathmandu's Darbar square, a UNESCO world heritage site, was damaged in the quake. Harsh damage took place to parts of the palace complex in Vasanthapura Square. The site palaces and temples of the city were a warren of narrow lanes and historic structures. Kathmandu residents ran onto the streets and other open spaces, throwing up clouds of dust and wide creaks opened on paved streets and the building's wall.

2. Death toll:

Original reports of casualties following the early- morning earthquake put the death risk in the hundreds, but, as the day wore on, reports had the total number of losses surpassing,000 and nearing,900 by the end of the day. Within two weeks after the main earthquake passed, deliverance brigades had reached all the remote townlets in the earthquake zone, and a more accurate picture of the earthquake's mortal cost surfaced. The deaths of roughly 4000 people (which included losses in the near corridor of India, China, and Bangladesh) were verified, with nearly,800 injured and some 2.8 million people displaced by the earthquake. One United Nations(UN) report mentioned that further than eight million people (further than one- fourth of Nepal's population) were affected by the event and its fate. The earthquake also touched off an avalanche on Mount Everest that killed at least 19 rovers and stranded hundreds more at Everest Base Camp and camps advanced up the mountain. The United States Geological Survey(USGS) originally estimated profitable losses at nine percent to 50 percent of gross domestic product(GDP), with a stylish conjecture of 35 percent. Original damage estimates ranged from $5 billion to $10 billion. The frugality coming from the sightseer assiduity in Nepal was greatly affected. Response to the earthquake incontinently after the earthquake, the Nepalese government declared a state of exigency, and soon nearly the entire Nepalese army was aiding in deliverance and recovery work. Nepal also called on the transnational community for aid. The UN snappily established the" Nepal Earthquake 2015 Flash Appeal" fund, whose thing was to raise an estimated$ 415 million for Nepal's earthquake relief. By some two weeks after the earthquake, more than$ 330 million had been either handed directly or pledged. India, China, and several other countries snappily responded by transferring in aid and deliverance brigades. The delivery of relief services to the people in need during the first many days after the earthquake passed, still, was complicated by the closeness of numerous townlets from the being transportation network, traffic at Kathmandu's transnational field, and a deficit of heavy exchanges, copters, and other vehicles able of transporting inventories. In addition, canopies and temporary harbors were made for the people who lost their houses. Half a million canopies were handed to the homeless. The earthquake contributed to making numerous of the megacity's thoroughfares nearly

impenetrable, hampering sweats by saviors to reach people still trapped in the debris. The debris was gradationally cleared.

Conclusion

An earthquake is a natural disaster that cannot be averted or directly prognosticated, but with the help of several tools, we can prognosticate the earthquake, like its original temblors, and colorful systems are being developed and are in use to reduce the damage from this disaster. still, no perfect fashion has yet been developed to prognosticate the earthquake. Making an exact vaticination about the circumstance of temblors in an area over time is still a tricky proposition. Seismologists are concentrating further and further on the aspect of earthquake soothsaying. When we'd be suitable to prognosticate earthquakes directly grounded or other unusual marvels, it would save numerous lives and reduce property damage.

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Mining: A Cause of Environmental Disasters

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Mining can be described as the digging of the earth's surface for extracting the underlying resource. This is a highly controversial topic that is constantly debated for the nature of the work included in it and the various harmful effects it has on humans as well as the environment. About 40,000 to 20,000 years ago, the first known metal was discovered by man. It was a coal mine in southern Africa. But, mining did not become a significant industry until more advanced civilizations developed 10,000 to 7,000 years ago (1). The differences between the many kinds of mines, especially open-pit and underground mines, are many. Working in the mining industry in any capacity is hard work that demands exceptional concentration and talent to stay safe in an environment of heavy materials, heavy equipment, and hard work. Ensuring the work is safe and efficient is part of the mine operator's job and the stakeholders' jobs; performing well and within the safety parameters are the workers' jobs, in an open pit mine and an underground mine. Mining has generated considerable wealth, reduced poverty, and improved the quality of people's lives through the provision of natural resources. Modern society would not function as we know it without mining and mineral commodities. As such, minerals are crucial to society and are likely to remain so into the foreseeable future. However, mining can have a detrimental impact on people, society, and the environment. Over the years, mining has become much safer. Numerous measures have been and are being put in place to improve the safety of the miners and the environment in which they work. However, the reality is that mines can still be unpredictable. Disasters have no time of arrival, and accidents can happen at any time.

From mine cave-ins and gas explosions that could kill in an instant to poor air quality in confined spaces that cause long-term health problems, Mining offers a lot to be wary of.

To follow the topic of this article, one must know what the various types of mining are.

There are two types of mining: open-pit and underground. Open-pit mining is done on the earth's surface. Such a type of mining is the most common, more economically efficient, and relatively safer (than its counterpart) for humans and the environment. Underground mining is done beneath the ground, as the name suggests. This type of mining is done with the help of vertical shafts. Deep holes are dug at first with the help of vertical shafts with proper ventilation, and the movement is then carried on by specially designed elevators. There's an obvious distinction between open-pit mines and underground mines that leads to the main difference. Open-pit mines allow heavy machinery and workers to do their jobs in the open, usually with more maneuverability. Open pit mines don't have to safeguard against the loss of air and cave-ins, but they do have their own set of strict safety guidelines that save lives. While there isn't as much of a danger of cave-ins, rock slides, and other hazards due to the structural integrity of

the material the miners work in are still present.

Underground mines of course have many potential hazards, and it can be more difficult to find problems before they become emergencies due to the difficulty supervisors and stakeholders have at times communicating with workers and inspecting problems with safety or work operations. Underground operations usually cause many more difficulties than normally occur in open-pit mines, but without constant supervision and strong safeguards, either type of mine can be dangerous for workers.

Mining has always been in the news, but most of the time for the wrong reasons. Mining is always attracted to issues of displacement, cave-ins, human safety, and environmental degradation. Open-pit mining has its own set of problems in terms of environmental safety.

Some of the environmental hazards relating to open pit mining are:

Air pollution

Mining operations in quarries cause air pollution by releasing gases and solid particles. The spread of the substance through the air and its accumulation near the sources of removal is very intensive. A large amount of dust enters the atmosphere from the enrichment factories. Much of its sources are also drilling and blasting operations in quarries, loading and unloading operations, the movement of heavy vehicles on dirt roads, and certain types of ore processing. Air saturation with dust occurs due to the waving of open dumps and other exposed places. Serious problems are caused by the arrival of heavily dusty air from quarries as a result of explosions, excavation, and handling operations. At the same time, the amount of dust transported can be estimated at 1.0–2.5 million tons.

Water depletion as protection of quarries from flooding

The greatest difficulties in mining are due to the inflow of groundwater. Only in exceptional cases is 1 km3 of groundwater pumped out annually. Very significant work on dewatering is carried out in the mining of ores and minerals. The area covered by water loss in the Kursk Magnetic Anomaly (KMA) reached 250 thousand hectares. The discharge of pumped-out and sewage-treated water leads to a significant increase in the water content of streams and rivers. The flow of small and medium rivers into the low water increases by 1.5–3 times. In particular, in the Kursk region, due to pumped groundwater, especially from undrained aquifers, the water content of some rivers has increased dramatically. For example, the average annual flow of the river Oskoltsa increased by 21–108% and that of the river Cherni by 20–30%. And this happened even though both rivers are "hung" in significant areas above the depression funnels.

Disruptions in the lithosphere (year) With attenuation of erosion, the washing out occurs mainly in the middle part of the slopes (0.4–0.7 cm/year).

Landslides

This is the most dangerous and widespread form of destruction of slopes and dumps' ledges. In the practice of mining, landslides with a volume of hundreds of thousands or tens of millions of cubic metres are known. Sometimes landslides in front of the dumps cover areas that are tens of times higher than those occupied by the dumps themselves. Slumping is often preceded by other phenomena, for example, sloughing or the plastic flow of underlying rocks. Often, the slide is accompanied by sloughing. In this case, there are complex

landslides—landslides of sloughing, plastic flow, etc. By the volume of the slipped masses, small landslides (hundreds of thousands of m3), medium (tens of thousands of m3), large (hundreds of thousands of m3), and very large (millions of m3) are distinguished. Cracks often begin with slippage along the cuts of the quarry, with the surfaces weakening the outskirts at first and then slowly gliding into the central part.

Rock bumps and bursting

Rock bumps and bursting occur as a result of the instantaneous unloading of elastic deformations of high-strength rocks in places of maximum concentration of stresses and their redistribution in connection with excavations, usually at depths of more than 200 m. Sudden outbursts of rocks, water, and gases take place at the intersections of the excavations of tectonic disturbances at depths exceeding 100 m.

Endogenous fires.

These disasters are the result of spontaneous combustion or burning of coal seams, oil shale, or peat bogs in mining operations or simply due to negligence by the miners. Underground fires lead to the burnout of significant volumes of combustible rocks and are accompanied by the collapse and displacement of geological bodies, significant air pollution, and the guaranteed loss of human lives.

Coal dust and permafrost landscapes.

The increased amount of coal dust near quarries in the permafrost zone is because frozen coals are more fragile, which causes increased dust formation during their breakdown. The greatest separation of coal dust occurs when loading frozen coal for transport on the surface. As a result, the territory around mines and quarries within a radius of 15-20 km is clogged with coal dust. Melting snow cover occurs here earlier than usual, and the depth of thawing soils increases by 2.5–3 times compared with the norm. All this causes the formation of lakes and increased swamping of the territory. Pollution of surface water leads to the destruction of in-situ flora and fauna. Such a violation of the natural cycle of substances, in the end, causes a very strong degradation of the landscape. The process of underground mining is even more fatal than its counterpart.

Effect on terrain and landform

Underground mining has led to dewatering, groundwater hydrochemistry change, hydrodynamics change, subsidence, land use change, soil pollution, and air pollution. By mining under the high phreatic water level, groundwater can flow into the subsidence area and form many wetlands of different sizes. In the Wild In an arid region, mining collapse transforms flat grassland into a basin with a steep slope. Mining under reservoirs and rivers can change the riverbed, which affects lake and river hydrology, hydrographic habitat, flooding control, and highway traffic.

Effect on the water environment

effect on the water environment refers to surface water and groundwater quantity and quality evolution. To ensure the safety of coal mining, a large amount of groundwater was pumped and drained to the ground surface. A large amount of draining water first consumes the static electricity, and as they remove the pillars, they are toeing the line of collapse. mining. They are some of the most widely

reported incidents that happen all over the world.

Mine explosions

Mines are often home to many dangerous gases, including carbon monoxide, hydrogen sulphide, methane, carbon dioxide, etc. Due to the confined spaces, the gases are never able to exit the mines and remain trapped. They build up within the mine. Due to their combustible, explosive, and toxic characteristics, they tend to react similarly. Severe gases are released due to drilling, blasting, etc. Methane gas tends to occur in the coal drilling area as it is trapped in the coal layers.

Conclusion

Mining life isn't for everyone. Miners work long hours, frequently far from home, in one of the most physically demanding positions out there. While it's up to the directors, the directors, and the other stakeholders to install the efficient designs for an underground or open-hole mine with the safety of the workers in mind along with the effectiveness of the job itself, it's up to the workers themselves to get the job done every day. Mining is vital to the world. Over a hundred of years mining, this has multitudinous terrain hazards. But not all hope is lost. The ever-perfecting technology has acted as a boon to the hazardous materials industry. With time, new machines and technology have been introduced to this sector. For illustration, the automated underground mining system and the methane control and origin system prevent mining accidents. An automated underground mining system is a machine that is the most promising technology to help prevent fatal mining accidents similar to drilling, firing, lading, and hauling at deep resistance and is performed using unmanned vehicles and machines operated from a remote position. piecemeal from effectiveness and productivity, the biggest advantage of mine robotization is the fact that humans can be kept out of harm's way. This system has also reduced the possibility of environmental hazards in underground mining by a stunning 60%. For detecting methane gas position, the coal mining equipment is recommended to be fitted with methane control and origin systems to enable the machines as well as the electricity to be automatically shut off once the methane position reaches 1.5 ops. Recently-installed ground detectors—grounders exercising radio frequency identification (RFID) technology—can be installed in any part of a deep underground coal mine, transmitting readings wirelessly to the surface. The fact that human lifestyles are dependent on multiple uses means that it is hypothetically impossible to stop mining. In such situations, the word "sustainable" crosses our minds. Although it is easily said, its implementation is constantly debated, delayed, and transformed due to the ever-changing human demand because, ultimately, mining is done only to satisfy the human demand for the required mineral. Environmental disasters occur in this process.

With such risks and chances of permanent damage to mother Earth involved, one can only ask, "What amount of mining is enough to cater to human demand and still be enough to help preserve mother Earth"?

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Psychological Issues after a Disaster

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From the past to the contemporary world, disasters are an inevitable truth of life. Every year, millions of people and communities are affected by disasters, which disrupt their mental, economic, and social well-being and development. The United Nations International Strategy for Disaster Reduction (UN-IDSR) defines disaster as a serious disruption of the functioning of a community or a society causing widespread human, material, economic, or environmental losses that exceed the ability of the effected community or society to cope using its own resources. The World Health Organization (WHO) defines a disaster as a sudden ecological phenomenon of sufficient magnitude to require external assistance. These disasters can be natural, like cyclones, earthquakes, landslides, and tsunamis, or man-made by human actions like terrorism, military conflicts, and industrial accidents.

Generally, the effects of disasters are measured in social and economic terms, but there is no comparison to the emotional and mental sufferings an individual or community undergoes post-disaster. Psychological distress among individuals is as common as socio-economic distress; the difference is that socio-economic causes can be fulfilled by passing time, but sometimes psychological issues get more severe through passing time, like anxiety, insecurity, and depression. There are a lot of reasons or factors that lead to psychological issues, such as socio-economic loss, the death of near and dear ones, disruption in a balanced life, environmental loss, etc.

Psychological issues after a disaster are more drastic among children, women, and senior citizens. In children, they may experience symptoms like anxiety, sleep disruption, distressing dreams, difficulty concentrating, and anger outbursts, and they can continue to experience them for the rest of their lives if they are not recognised and treated well. PTSD (post-traumatic stress disorder) can result from this impact on children.These psychological issues affect children more as they understand less about the situation and have less experience coping with difficult situations.

The biggest industrial disaster was "the Bhopal gas leak disaster". Studies show that there has been an increase in psychopathological symptoms leading to dysfunction in the day-to-day activities of individuals. The victim, who was exposed directly or indirectly to the disaster, showed prolonged behavioural and cognitive symptoms for which psychological rehabilitation was needed. Researchers conducted a study of the gas-exposed population nine years after the disaster.In this study, some victims were subjected to detailed neurological testing, including vestibular and peripheral sensory function tests and short-term memory tests. In this study, a high proportion of participants reported a wide variety of neuropsychiatric symptoms such as abnormal taste, smell, balance, headache, faintness, and difficulty staying awake. The neurological examination showed that

many study participants have central, peripheral, and vestibular neurological diseases. A study was led by Ruma Galgalekar, a scientist at the NIREH; she examined 1,048 new-borns of those who were exposed to the gas as children. The newborns also included the grandchildren of pregnant women exposed to the gas. All of the infants were compared to another 1,247 newborns born to women not exposed to the gas. " Congenital malformities in the progeny of the exposed were at 9.%, and those in the unexposed group were at 1.3%.

So, to conclude, disasters not only disrupt the quality of life but also create a significant burden of mental health conditions on an individual and the community. Study and effective interventions should be given during the post-disaster period to improve the mental health effects of the disaster. Rehabilitation plans should be made keeping in mind the socio-cultural context of the individual or community and the needs of the affected population. So, the mental health of an individual or community is empowered in a holistic way. What do you think about how we, as a society, can help empower people with psychological issues after a disaster?

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The Phenomenon of Arctic Amplification

By Yuvraj Sinha, 3rd year, Dept. of Geography, Shivaji College

In August 2022, researchers at the Finnish Meteorological Institute published their study in the Communications Earth & Environment journal, concluding that the Arctic is heating four times faster than the rest of the planet. The warming is more concentrated in the Eurasian part of the Arctic, where the Barents Sea, north of Russia and Norway, is warming at an alarming rate—seven times faster than the global average. Previous research had indicated similar trends in terms of Arctic warming. All the recent research holds the phenomenon of Arctic amplification responsible for the rise in the rate of warming in the Arctic region.

In this article, we will discuss this phenomenon and its implications in the long term.

WHAT IS ARCTIC AMPLIFICATION?

Arctic amplification refers to the feedback loop created in response to human-induced climate change in the Arctic ecosystem, which reinforces and intensifies the implications of climate change in and around the ecosystem. One implication of human-induced climate change either reinforces and intensifies the other or gives birth to new climate-associated problems. The outcomes of the phenomenon include a rise in the rate of ice sheet melting and a warming of the ocean water.

The phenomenon is the culmination of several feedback loops, like ice-albedo feedback, permafrost feedback, and ocean heat transport feedback.

Ice-Albedo Feedback Loop

Albedo refers to the fraction of light that is reflected by a body or surface. The higher the albedo, the more energy is reflected. And the lower the albedo, the less energy is reflected. The albedo of a surface depends on the colour of the surface. Surfaces with light colours have a higher albedo, whereas darker surfaces have a lower albedo and hence absorb more energy. Ice sheets in polar areas reflect a large fraction of incoming insolation and thereby help in maintaining global temperature balance. But due to the global temperature rise, ice sheets and glaciers in polar regions are melting at a rapid pace. As ice sheets melt, the surface covered by them reduces with the simultaneous increase in the surface covered by water. Water has a low rate of albedo and absorbs more insolation than ice sheets, which further contributes to the rise of global temperatures and increases the pace of ice melting.

Permafrost Feedback Loop

"Permafrost is any ground that remains completely frozen—32°F (0°C) or colder—for at least two years straight." *(www.nasa.gov)* These permanently frozen grounds are most common in regions with high mountains and near

the North and South Poles. "It consists of soil, gravel, and sand, usually bound together by ice." *(National Geographic)* As the temperature in the Arctic region increased, permafrost began to thaw and melt. The melting of permafrost exaggerates the effects of climate change in two ways: one, by contributing to sea level rise. Two, by contributing to an increase in the proportion of GHGs. Frozen permafrost acts as the abode of numerous dormant microscopic organisms. The melting of permafrost causes the activation of micro-organic action on a large scale. The melting of permafrost and the subsequent inundation of the ground surface give way to the rotting of previously present organic matter on the surface. This provides a breeding ground for new microscopic organisms.

Both outcomes of permafrost thawing and melting add large amounts of carbon dioxide and methane to the atmosphere. The growth of previously dormant microorganisms might give way to new infections and viruses.

Ocean Heat Transport Feedback Loop

The Beaufort Gyre is the clockwise-flowing cold water oceanic current found in the Arctic Ocean. While moving, it collects freshwater discharged by glaciers and ice sheets and from other sources like rain and river discharge. As it revolves around the mass accumulation of ice, it separates and acts as a barrier between warm currents coming from the Pacific and the ice reserve. But the pace of ice melting has increased in recent years, substantially increasing the proportion of cold water in the gyre and thereby strengthening it both in terms of its pace and the area under its influence, leading to large-scale intermixing of warm and cold water. Such mixing contributes to the further increment of seawater temperature and the resultant increase in the rate of ice melting.

Consequences of Arctic Amplification

Following are some of the consequences of the phenomenon:

Many pieces of research have shown that the temperature in the Arctic is increasing quite dramatically. Between 1980 and 2020, the pace of the rise in surface air temperature in the region was found to be faster than that of the rest of the world. The autumn of 2020 was recorded as being the warmest ever for the Arctic region since 1900. The minimum extent of Arctic ice has also decreased.

The Greenland Ice Sheet (GIS), the second-largest reserve of ice after Antarctica, is diminishing rapidly. Between July 15 and July 17, 2022 (only 3 days), 18 billion metric tonnes of ice were lost. The melting of the GIS has already begun to lead to phenomenal sea level rise in the North Atlantic Ocean. In 2019, the Atlantic Ocean recorded a 1.5-meter rise in sea level.

The increase in temperature in the Arctic is resulting in a weaker polar jet stream in the Northern Hemisphere. Weaker jet streams mean prolonged stalling and intensification of storms at a place other than their usual active movement in higher latitudes and prolonged droughts in mid-latitudes.

Threat to biodiversity For example, excessive heating results in a lack of

availability of lichens for reindeer in the tundra region." *(The Hindu)*

The global climate is changing rapidly and poses an existential threat to human beings and other species on the planet. Phenomena like Arctic amplification only contribute to exaggerating the challenges associated with the climate we face today. We must keep in mind that we do not have a planet B where we could go and forget about the environmental challenges we face here. We cannot simply ignore the fact that our planet is under great stress, caused by us. Therefore, we should get ourselves out of the slumber of ignorance to deal with the massive challenge of climate change; otherwise, phenomena like Arctic amplification would accentuate the challenge to the extent that we, as humans, would not be able to save ourselves.

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Ancient Natural Disasters

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Our beloved planet Earth is truly a marvel, dwelling in the universe. It is one of the very few celestial bodies that exist in space that have suitable conditions to amass the profusion of the numerous life forms that are found here. But this throng of diversified life forms has to face several challenges in order to survive. One of the major ones amongst these is the challenge of natural disasters. Natural disasters have always been highly destructive, owing to their sporadic, highly unpredictable, and spontaneous nature.

Did you know? Natural disasters aren't a recent phenomenon; they have been occurring over the Earth's surface and disrupting life here since the times in which life itself started occurring!

So, let's go back in time and learn about some of the incidents of natural disasters that took place in the ancient era.

Toba Catastrophe

The Toba catastrophe was one of the first natural disasters whose occurrence was verified by the presence of sufficient scientific data. This was a super volcano eruption, which is dated to have taken place approximately 74,000 years ago, as suggested by the potassium-argon dating tests. According to the Toba Catastrophe Theory, the huge amount of particulate matter released during this eruption caused a subsequent volcanic winter on the planet for around 6–10 years.

This eruption took place at the present-day Lake Toba, in Sumatra, Indonesia.

The Volcanic Explosivity Index (VEI) of this eruption is said to be 8, which is the highest on the scale, with some suggesting even 9, which is beyond the scope of the scale. The amount of lava, including the ash fall, generated during this eruption is said to have a mass of 7 1015 kg, or 2800 km^3 in volumetric terms.

As a result of this eruption, an ash layer of around 15 centimetres was deposited over the whole of South Asia, and the Indian Ocean, Arabian Sea, and South China Sea were left covered in a blanket of volcanic ash. Some of the deep-sea deposits layer found in the South China Sea further increase the known extent of this eruption and turn the volumetric figure of the eruption at 2800 km^3 into an understatement. Based on new methodology, the volumetric eruption figure is quoted to be around a whopping 13,200 km^3! It is also said that the major migration of early human settlers from Africa (which is said to be 'the cradle of mankind') took place after this incident.

Mount Tai Earthquake

The famous earthquake of Mount Tai was the first ever recorded earthquake in history. Though not much is known about this incident, it gets a mention in the *Ji Tomb Annals*, which is an ancient Chinese chronicle that has records of all the events that took place starting from around 2600 BC until 299 BC. This earthquake devastated almost the entire Shandong province of China and is tentatively dated to have occurred in either 1831 BC or 1740 BC, during the 7th

year of the reign of King Fa of the Xia dynasty.

This earthquake was a result of the active Tanlu fault zone, which to date is the epicentre for most of the seismic activities taking place in Eastern China.

Minoan Eruption

The Minoan eruption was a catastrophic volcanic eruption that took place around 1600 BC and devastated Santorini Island, near Greece. It had a VEI of 7. The amount of ejecta released during this eruption is thought to have an estimated volume of 100 km^3, making it one of the largest volcanic events in Earth's history. This eruption generated a 60-meter-thick layer of white tephra in the surrounding region, delineating it from the soil beneath and thus giving a clear image of the ground level before the eruption. This layer of tephra has three distinct bands, which are indicative of the fact that this eruption took place in different stages.

In the first major phase of this eruption, intense magmatic activity took place, leading to the deposition of a layer of pumice and ash with a thickness of 7 meters. The second and third phases involved pyroclastic surges (a phenomenon in a volcanic eruption in which a fluidized mass of turbulent gas and rock fragments is ejected from the volcanic crater or fissure) and lava fountaining. The third stage was also characterised by the initiation of the process of caldera collapse. The fourth and last major phase involved a deluge of various volcanic activities, including lithic-rich base surge deposits, lava flows, ash-fall deposits, and even mudflow floods. This phase involved the completion of the process of caldera collapse, leading to destructive mega tsunamis!

This eruption was a Vesuvius eruption, which led to its highly destructive nature. However, the lack of presence of any human remains suggests that the preliminary volcanic activity caused the population to flee from the place. This eruption is also said to have caused a volcanic winter, as seen in the Tambora eruption of 1815.

Malian Gulf Tsunami

The Malian Gulf Tsunami flooded the coasts of Greece and Mali in the hush summer of 426 BC. A Greek scholar of the time named Thucydides sought to inquire about the causes of the tsunami and concluded that it was the result of an earthquake. And, do you know? He was the first known person in history who correctly interpreted that the occurrence of a tsunami was the result of preceding geological activity.

The epicentre of the seismic activity that caused this tsunami is yet to be discovered, but it is thought to be along the crustal motion of the fault lines in the Euboean Gulf. The earthquake causing this tsunami also affected the course of the Peloponnesian war, which was fought between Athens and Sparta in a bid to establish their hegemony over the Greek world.

CymbrianFlood

The Cymbrian Flood, which occurred in the Jutland peninsula of Denmark between 120 BC and 114 BC, was yet another humongous influx of seawater onto the land. The coastline of the region was permanently altered as a result of this flood. It also had a lot of social

impact in the region and is thought to have led to the migration of the Cimbri, Ambrose, and Teuton tribes southward, which later on led to the Cimbri War between the migrant tribals and the Romans. The exact cause of this flood is a mystery that has yet to be unravelled.

Hatepe Eruption

The Hatepe eruption, which is also referred to as the Taup eruption or Horomatangi Reef Unit Y eruption, is so named due to its characteristic pumice tephra layer. and is thought to be the most major eruption in New Zealand in the past 20,000 years. It is also the most recent major eruption of the Taup volcano. The exact date of this incident is a matter of controversy, but the currently accepted date is 232 10 AD. Moreover, the volume of ejecta released during this eruption is thought to be around 120 km^3, out of which 30 km^3 was released within a few minutes during the eruption, thus making its intensity comparable to that of the Minoan eruption of the 2nd millennium BC.

This eruption involved a lot of varied volcanic activity and took place in several stages. However, six major marker horizons in the region of the eruption were identified by scientists. This volcano displayed the eruptive styles of weak phreatomagmatic Vesuvius eruptions and massive pyroclastic flows throughout the duration of the eruption. It also resulted in the expansion of Lake Taup. Moreover, it also affected the soil type of the region, rendering it the Tephra soil type, which is deficient in many vital minerals, like cobalt, which caused related deficiency illnesses in the livestock of the region.

Crete Earthquake

The Crete earthquake was another incident of turbulent seismic activity in ancient history and had occurred during the early hours of July 21, 365 AD. It was an undersea earthquake; it is thought to have had a moment magnitude of 8.5, and its epicentre was near the island of Crete in Greece. The seismic moment of this earthquake is thought to correspond to around 1 1022 N•m, which is the highest ever out of all the incidents of seismic activity experienced in the region. This earthquake resulted in a 10 m upliftment of the corals near the Crete island and massive tsunamis, thus indicating that the earthquake was a result of the seismic activity on a steep fault in the Hellenic deep sea trench.

This earthquake resulted in a massive tsunami in the region, which devastated the southern and eastern coasts of the Mediterranean Sea, including the regions of Libya, Alexandria, and the Nile Delta, killing thousands and catapulting ships 3 km inland! Such was the intensity of the tsunami that followed the earthquake.

So, here we discussed some of the major natural disasters that devastated various parts of our planet during the ancient era; they give us an insight into the history of the earth and how the ancient civilizations responded to earthquakes, and many of them attributed such incidents to the wrath of supernatural powers over the planet. They also help us find geological evidence for many of the fault systems, giving us a deeper look into the perplexingly arcane interiors of our equally mystic planet.

From the Joshimath Incident in Uttarakhand to the massive floods in China, from the recent earthquakes in the highly geologically active northern region to the cyclones of Odisha, natural

disasters continue to challenge life on the planet and especially influence the entire horde of the human population. Which natural disaster is going to strike our planet next? Could it be the doom of our planet.

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Why Joshimath is Sinking?

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Joshimath is also known as "Jyothimath". It is a hilly town in the state of Uttarakhand, and it is on the Rishikesh-Badrinath national highway. The town of over 20,000 people is on a fragile mountain slope. It is situated on the middle slopes of a hill bounded by the Karmanasa and Dhaknala streams on the west and east and the Dhauliganga and Alaknanda rivers on the south and north, respectively. The Uttarakhand town of Joshimath, which is located at the foothills of the Himalayas, has been making headlines because the ground of the small region is reportedly "sinking," with cracks visible on the walls of the houses and structures. A government official said that over 3000 people have been affected so far. This particular issue has not appeared all of a sudden; it has been there for the past 50 or so years and for decades as well. In fact, there was a report that was published in 1976, the M.C. Mishra report. According to this report, unregulated development in this particular area can have long-term consequences and can also disturb the structures in this part of the region. Despite these reports, we did not learn, and today we are the ones facing repercussions. Joshimath is set up in a place that is built on weak debris ground and is not sitting on a rock as many other cities do. This is not something that's been discovered now; it was discovered almost 50 years ago, in 1976, so that is 48 years ago. In a report by the MC Mishra Committee, they pointed out that the area is an old landslide zone and stands on a deposit of sand and stone; this is not the main rock, and because of this, it is not suitable for the township. The report by a M.C. Mishra-led panel warned against the removal and blasting of boulders along the hillside, but as you know, a lot of construction is going on; the Chardham highways are going on, and now there are other plans. also What is happening in Joshimath is predicated on 1976, but at that time, I think we are busy with so-called development. It is located in an area prone to landslides, according to a study by the Uttarakhand State Disaster Management Authority (USDMA). The study also pointed out that eco-tectonic and geomorphic factors coupled with meteorological characteristics render the Joshimath region highly vulnerable to subsidence. The seismic zone map shows that Zone V is prone to earthquakes. The town is also very close to the main geological fault lines, the Main Central Thrust (MCT) and Pandukeshwar Thrust (PT), which also cause the problem. Joshimath town does not have a sewage or wastewater disposal system. On-surface anthropogenic activities have blocked natural water drainage systems, forcing water to find new drainage routes, which has led to a reduction in the shear strength of the overburden soil and a loosening of the soil. Unplanned development activities without due regard to bearing capacity have contributed to aggravating slope instability in the last couple of decades. The running streams from Vishnuprayag and sliding along the natural streams are the other reasons behind the city's fate. In a country like India, if there is a big disaster, the first thing our politicians do anywhere, or any party, is to sanction money to the family. They know the family is poor, so they offer relief for the family because that's also a way of buying the people's silence and calming down

the headlines. You can give people a bit more money or may be more than what building a new place will cost and shift the people to that place, which looks safer for now, and let them build again; that will be a patchwork and Band-Aid solution and not a good idea in the long run. Now the question arises: what can be done to save Joshimath? The first step would be a complete shutdown of all development projects right now and the urgent need to reallocate all the people to a safer place, then to rethink the area and focus on planning. The next step would be drainage planning; the area should be studied properly and then redeveloped. The state government should have taken scientific studies more seriously at that time; the report already predicted the future if they did it in 1976, and we are not facing anything like this now. At last, there should be proper coordination between the state government, civil bodies, and local people, as well as with military organisations like the Border Road Organization (BRO) for future development while keeping nature in mind to save Joshimath. At last, I would like to conclude that perhaps nature is giving us a grave reminder that we are messing up its existence in the form of our development. We need to work with nature, not against it.

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Effect of Climate Change on Disaster

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India is one of the countries with the highest disaster risk. India has a population of 1.2 billion people, and just 2% of its landmass is arable. Nearly 59% of India's land area is vulnerable to earthquakes of moderate to very high intensity; over 40 million hectares (12%) are at risk for flooding; about 8% of its 7516 km of coastline is at risk for cyclones and exposed to tsunamis and storm surges; 2% of the country is vulnerable to landslides; and 68% of its arable land is vulnerable to droughts. Up to 27 of the 35 states and union territories are disaster-prone. Most catastrophes in India are related to water.

Climate change is anticipated to make the severity worse in the future. India will be notably affected by the expected rise in precipitation and rainfall, the melting of the glaciers, and the rising sea levels, which will lead to more hazardous occurrences and an increase in the frequency of floods, cyclones, and storm surges. Even though it is impossible to forecast the frequency or timing of extreme events in the future, there is evidence that the danger of damage from cyclones, floods, and drought is rising and will continue to rise. The food security of India, the water shortage, and the prevalence of diseases like malaria are all predicted to worsen due to climate change.

Extreme weather patterns have already undergone some alterations. As a result of global warming, nearly all geographical areas have seen an increase in the number of hot days and a decrease in the number of cold or frosty days. The measurements also show an increase in heavy precipitation episodes at mid- and high-northern latitudes. The frequency and severity of droughts have increased in several areas during the past few decades, such as sections of Africa and Asia. The hydrological cycle has generally become more intense, which fits these trends.

According to predictions, throughout almost all geographical areas, the number of hot and very hot days will continue to increase, while the number of cold and very cold days will continue to decline. Additionally, it is expected that many locations will experience an increase in the intensity and frequency of extreme precipitation events, as well as a decrease in the return period of these events, leading to an increase in the frequency of floods and landslides. The mid-continental regions will get dryer, which is expected to raise the possibility of summer droughts and wildfires. The following discussion offers a brief overview of how climate change is affecting catastrophes as their intensity continues to increase:

Cyclones

With two hurricane seasons—during the southwest and northeast monsoons—India has an 8000 km long coastline. The east coast of India is particularly vulnerable to storms and flooding since it is in the path of tropical cyclones that originate in the Gulf of Bengal. The National Institute of Oceanography (NIO) and Government of India's forecasts on the effects of climate change

on sea level showed a rise in the frequency of cyclones in the Bay of Bengal, especially in the post-monsoon season, as well as an increase in the highest wind speeds associated with cyclones and a rise in the number of high surges. Tropical cyclones, which pose a threat to Bangladesh and the eastern coast of India, could also become stronger.

Effect on Cyclones with an example of an Amphan Cyclone:

Rapid intensification

According to numerous studies, a rising number of tropical cyclones are intensifying rapidly, or "rapid intensification," and these changes are related to climate change. Increased ocean temperatures brought on by greenhouse gas emissions increase the likelihood of rapid intensification because warm ocean waters are one of the factors driving it.

A storm rapidly intensifies if its highest sustained wind speed rises by 30 kts (about 55 km/h) in a day. At a rate more than twice as fast, Cyclone Amphan grew stronger. Because it becomes more difficult to predict how a storm will behave and take precautions before it hits landfall, rapid intensification poses a concern. With sustained climate change, rapid intensification is predicted to become far more common this century. According to one analysis, intensification rates that occur once every century today might occur every five to ten years by the year 2100.

Temperature and storm strength:

Heat that is readily available powers cyclones. The potential energy that cyclones may access is increased by warming waters, thereby raising their power threshold or speed limit.

Increased sea surface temperatures can lead to faster storm winds. Ocean temperatures have risen globally as a result of climate change, and the observed intensity of the greatest storms has risen globally during the past few decades. This pattern was supported by research that came out the same week as Cyclone Amphan and found that the proportion of the strongest storms is rising by around 8% per decade. Due to the climate, the Bay of Bengal's water reached record high temperatures in May. The storm had access to more energy as a result of the warmer sea surface temperatures.

Drought:

Drought threatens 68 percent of the nation's net sown area. The Himalayan Glacier Ranges' ongoing melting would significantly reduce the amount of water available in Uttar Pradesh and Bihar's downstream lowlands. According to climate change projections made by the United Nations Framework Convention on Climate Change (UNFCCC), Luni and the west-flowing rivers of Kutch and Saurashtra, which make up nearly one-fourth of Gujarat's land area and 60% of Rajasthan, are anticipated to endure significant physical water scarcity.

Coastal zones:

In the context of Indian coastal zones, some of the major climate-related concerns include erosion, flooding, submersion, and deterioration of coastal ecosystems, such as mangroves and

salinization. These are frequently brought on by or made worse by tropical cyclones and sea level rise. Tropical cyclones, sea level rise, and changes in the amount of precipitation and temperature are the main climate-related concerns in the coastal zone. Increased sea levels are projected to have a big effect on India's coastal population and agricultural output. In India, it is estimated that 7.1 million people will be forced to relocate due to a one-meter sea level rise, and 5,764 km2 of land will be lost. Land loss and population displacement, increased flooding of low-lying coastal areas, and loss of produce and employment due to inundation and salinization are only a few of the varied effects projected as a result of sea level rise.

Rainfall intensity:

Due to carbon emissions, the planet's atmosphere is warming. Because a warmer atmosphere can contain more water, cyclones can produce more intense rainfall, raising the risk of flooding. Scientists have established a direct connection between human-caused climate change and the rise in atmospheric moisture. As a result of global warming, there have been more record-breaking rainfall occurrences globally in recent years. Scientists anticipate that as climate change continues, cyclone-related rainfall will also rise. This increased intensity of rainfall will cause an increase in the occurrence of landslides, floods, mudflows, earthflows, etc.

Rising sea levels, growing storm sizes, and increasing storm wind speeds can all contribute to an increase in storm surge caused by climate change. Due to human-caused carbon emissions, sea levels have already risen by around 23 cm, greatly extending the range that storm surges can travel. In recent years, the North Indian Ocean has experienced a faster rate of sea level rise than other regions.

Conclusion:

Extreme weather conditions or disasters will occur, as they have in the past and as they will in the future. However, given that the environment in which they occur has changed as a result of climate change, it is expected that the frequency and intensity of disasters will shift. The effects of humans on the climate system are obvious. Whether or not specific incidents may be linked to human influence, the goal must be to lessen the catastrophic effects of natural catastrophes.

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Man Made Disasters

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Man-made hazards are disruptions of a massive scale over a short or long period of time, caused by human action or inaction. These disasters cause economic damage, loss of life, health emergencies, etc. Some of the disasters include the following:

1. Chernobyl Disaster and Meltdown

The explosion at Chernobyl is one of the world's most infamous man-made disasters — and with good reason. It started innocently enough, with engineers performing a routine experiment that was supposed to find out if the plant's emergency water cooling would work during a power outage.

The test had been carried out previously, but on this occasion, there was a power surge, and engineers couldn't shut down Chernobyl's nuclear reactors. Steam built up in one reactor, the roof was blown off, the nuclear core was exposed, and radioactive material was released into the atmosphere.

Workers and firefighters were hospitalized, and 28 people quickly passed away from acute radiation exposure. It took nearly two weeks and military intervention to extinguish the fires.

Crucially, it took more than a day for the 50,000 residents of nearby Pripyat to be evacuated. Following this, the government established a 19-mile (30-km) "exclusion zone" and built a containment dome over the top of the site.

In the years following the incident, studies estimate that thousands of people have succumbed to cancer because of the radiation. It's one of the most expensive disasters in history, too, and it's estimated that containment and clean-up efforts will continue until 2065.

2. Attack on November 26

Mumbai terrorist attacks of 2008: multiple terrorist attacks that occurred on November 26–29, 2008, in Mumbai (Bombay), Maharashtra, India. This was also known as the 26/11 attack.

The attacks were carried out by 10 gunmen who were believed to be connected to **Lashkar-e-Taiba**, a **Pakistan**-based terrorist organization. Armed with automatic weapons and hand grenades, the terrorists targeted civilians at numerous sites in the southern part of Mumbai, including the Chhatrapati Shivaji railway station, the popular Leopold Café, two hospitals, and a theatre. While most of the attacks ended within a few hours after they began at around 9:30 p.m. on November 26, the terror continued to unfold at three locations where hostages were taken—the Nariman House, where a Jewish outreach centre was located, and the luxury hotels Oberoi Trident and Taj Mahal Palace & Tower.

By the time the standoff ended at the Nariman House on the evening of November 28, six hostages as well as two

gunmen had been killed. At the two hotels, dozens of guests and staff were either trapped by gunfire or held hostage. Indian security forces ended the siege at the Oberoi Trident around midday on November 28 and at the Taj Mahal Palace on the morning of the following day. In all, at least 174 people, including 20 members of the security forces and 26 foreign nationals, were killed. More than 300 people were injured. Nine of the 10 terrorists were killed, and one was arrested.

3. The Bhopal Disaster

On December 2, 1984, there was a gas leak at a pesticide plant in Bhopal, India, according to The Atlantic (opens in new tab). It was caused by malfunctioning safety systems, and a runaway increase in pressure saw 40 tonnes of a chemical called methyl isocyanate leak into the atmosphere. That's a huge amount of toxic material, and the plant was surrounded by densely packed housing, so more than 600,000 people were exposed to the deadly cloud.

The people living around the plant were not informed quickly, and hospital staff were given conflicting information about the situation. Innocent people suffered from coughing, eye irritation, burns, breathlessness, and vomiting, and thousands of people died within hours, as Live Science has previously reported. Thousands of animals passed away, too.

Longer-term studies since the accident have confirmed that many thousands of people are still affected by eye, lung, and psychological damage—and, even today, it's hard to say exactly how many people have suffered.

4. The Aberfan Colliery Slip

Big man-made disasters don't often happen in Britain, which made the Aberfan colliery slip even more shocking. The Welsh Valleys village of Aberfan grew up around the nearby coal mine that was established in 1869. By 1966, the settlement had grown, and the village was surrounded by seven huge spoil piles—waste material from mining.

That's not necessarily a problem, but in October 1966, the village of Aberfan was hit by more than six inches of rainfall, which caused the seventh spoil pile to subside. At 09.15 GMT on October 21, 1966, a vast quantity of saturated debris broke free from the pile and travelled towards the village at speeds between 11 and 21 miles per hour (approximately 17 and 34 kilometres per hour) and in waves up to 30 feet (9 metres) high, according to the Smithsonian magazine.

The result was devastating. 144 people lost their lives in the ensuing avalanche—tragically, 116 children were among the dead, according to the Independent (opens in new tab). The fast-moving material demolished a primary school (elementary school) and damaged a nearby secondary school (high school), and 18 nearby houses were destroyed**.**

Thousands of volunteers travelled to Aberfan to aid rescue efforts, and the Prime Minister and Queen Elizabeth both visited in the days following the incident, according to the BBC. The Aberfan disaster remains one of the UK's worst mining incidents.

5. Sevaso Disaster

This industrial accident took place at a chemical plant north of Milan, Italy. On July 10, 1976, the factory was producing a chemical called 2,4,5-trichlorophenol,

which has been used as a chemical weapon and in weedkillers, according to the journal Chemosphere.

On that day, a chain reaction ruptured the reactor, which, in turn, caused six tonnes of toxic chemicals to burst into the sky.

The cloud settled over 6 square miles (18 square kilometers) of the surrounding area, including the town of Seveso, according to the journal Environment International. Children were hospitalised with skin inflammations, hundreds of residents suffered from skin conditions, and huge areas of land were evacuated. Thousands of animals died or had to be slaughtered to prevent toxins from entering the food chain.

The Seveso disaster has had a long-term impact, too. Since 1976, studies have found that more local residents died from cardiovascular and respiratory diseases, and certain types of cancer increased in frequency in the affected areas.

6. Californian Wildfire

Climate change has seen wildfires become a far more common threat around the world, and 2018 saw huge areas of California affected by some of the worst fires in recent memory. More than 100 people died in more than 8,500 fires across California, and the fires destroyed more than 24,000 buildings and burned two million acres of land.

Most of the fires in California took place in July and August, and the government declared a national disaster.

There's no doubt that the fires were a man-made disaster. The years that preceded the fires saw an increase in temperatures due to climate change, and that killed plenty of trees in California — and those dead, dry trees provide ample fuel for fires to spread.

Scientists predict that this kind of disaster is only going to become more common because of climate change, so California's extreme weather may soon feel normal. Sadly, it has significant health effects on people too.

7. The Exxon Valdez Oil Spills

The shimmering, crystal-bright realm of Alaska's Prince William Sound, where wide blue waters are overlooked by jagged, snow-sprinkled mountains, is a picture of unspoiled natural beauty. So the world reacted in horror when this delicate ecosystem fell victim to one of the worst ever oil spills in 1989. Just after midnight on March 24, the vast Exxon Valdez tanker ploughed into a reef, ripping the hull open and letting almost 11 million gallons of crude oil out into the water. Before long, more than 1,000 miles of the picturesque coastline had turned black, spelling disaster for the animals of the region.

It was a disaster so great that even Exxon didn't mince words, with one company spokesman saying, "The clean-up is not proceeding well. Believe me, that is an understatement. We have a mess on our hands." The ship's captain, Joseph Hazelwood, was initially suspected of being drunk on the job but was eventually acquitted of those charges in court. Meanwhile, thousands of animals, from birds to otters to killer whales, perished in the black waters of the once-pristine sound, and the ecosystem has never fully recovered.

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Climate Change: The Changing Trend of Natural Disasters

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Over the past two decades, evidence has mounted that the global climate is changing, and that anthropogenic greenhouse gas emissions are largely to blame. While changes in average conditions can have serious consequences by themselves, the main impacts of global Climate change will be felt due to changes in climate variability and weather extremes.

Anthropogenic climate change, or 'global warming', is caused by increasing concentrations of greenhouse gases. These gases trap the heat in our

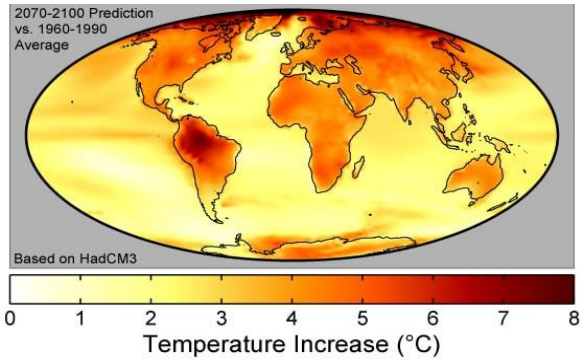

Figure 1. Global warming prediction upto year 2100. Source: Wikimedia Commons

atmosphere by preventing radiation from escaping into space. The main greenhouse gas, carbon dioxide (CO_2), is emitted when fossil fuels, like coal and oil, are burned. Since the industrial revolution, Fossil fuel use has increased very quickly. Due to these emissions, as well as changes In agriculture and land use, atmospheric greenhouse gas concentrations have risen sharply. For instance, the concentration of CO_2 in the atmosphere has increased by around one-third, from 280 parts per million (ppm) in 1750 to 368 ppm in 2000. It has been estimated that by the end of the century global temperature will increase by 1 to 5°C.

It is not just that only temperature will change due to climate change, impact the

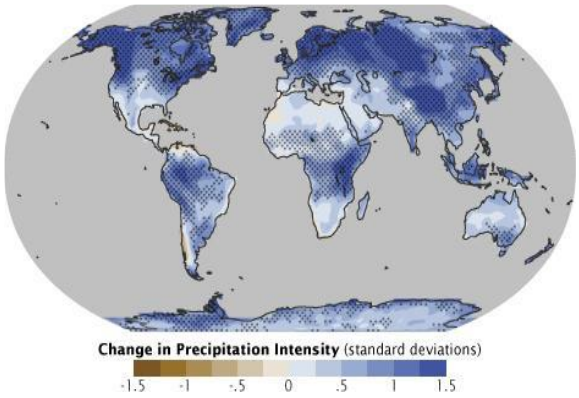

Figure 2. Worldwide change intensity of precipitation due to global warming. Source: Nasa.gov

amount of precipitation will also vary from place to place. Climate change will also cause a rise in global sea level. This rise is caused by two processes: (i) the increase in sea water

temperature, which leads to water dilatation and increased sea volumes; (ii) the melting of continental icecaps in mountain regions and at high-latitudes. The rate of sea level rise is extremely uncertain, because of our poor

understanding of the mechanisms at play – especially regarding the melting of continental icecaps. Estimates lie between 25 and 100 cm of sea level rise by 2100.

Generally, climate change should be considered as a change in the frequency Of weather events: no single event can be considered as a consequence of climate Change, only the repetition of some types of event can be attributed to climate Change**.**

Effect of climate change on natural disasters

The large-scale changes in temperature, precipitations and other meteorological variables that models project suggest that all extreme events related to these variables (droughts, floods, heat waves, cold spells, etc.) will be affected.

1.River flow

The changing pattern of precipitation will also lead to change in the river run off . This change may lead to high risk of floods. In some regions, however, flood risks will decrease as precipitations diminish. But in other regions, flood risks will increase with potentially large economic consequences. In particular, climate change is likely to have a positive impact on the most Intense precipitation

The rise in average sea level will however make hurricanes more dangerous. Indeed, hurricanes create "storm surges", i.e. temporary rises in sea level due to Lower air pressure and wind effects. The combination of a higher

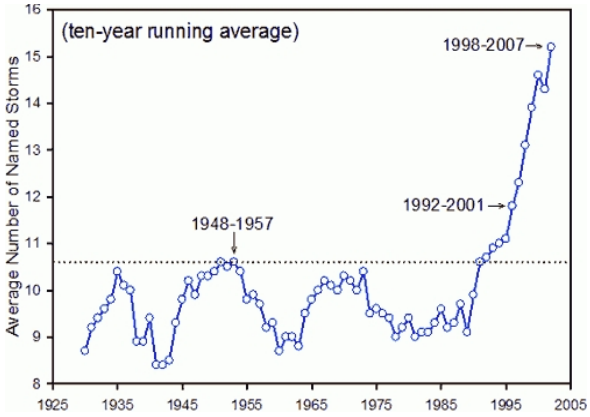

Figure 3: The increasing frequency of Atlantic Tropical Storms. Source: The Current

in many places (Min et al. 2011), with serious consequences on flash floods and river floods.

2.Coastal floods

Climate change will cause a rise in sea level, which will increase the flood risk from Storm surges. In fact, it is likely that the largest losses from sea level rise will not be due to a rise in mean sea level, but from its short-duration extremes. These risks are already large, as illustrated by the disastrous consequences of the Tropical cyclone Sidr in Bangladesh in 2007, or the destructions caused by hurricane Katrina in New Orleans in 2005.

3.Tropical cyclone

Tropical storms are present in tropical regions and are particularly destructive. The Strongest of them are referred to as hurricanes in the North Atlantic and typhoons in the Pacific. According to estimates, There is an increase of 40–90 % in the frequency of very intense (categories 4 and 5) hurricanes. Also, they Find rainfall rates that increase by 20 to 30 % in the hurricane's inner core.

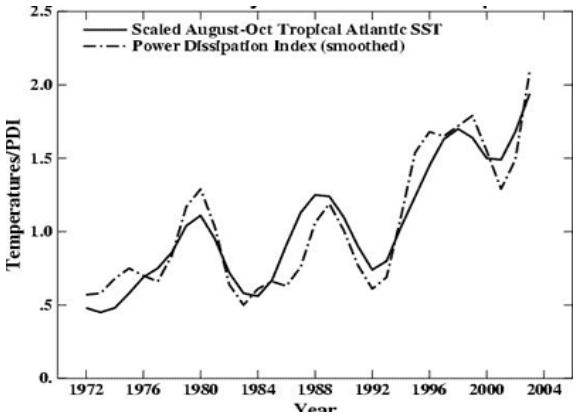

Figure 4: Relationship between Hurricane intensity and sea temperature. Source: wind.mit.edu

average sea level with temporary rise due to storm can have dire impacts through coastal floods.

There is a large uncertainty on the future of hurricanes and tropical Cyclones. A best guess today is that the number of tropical storms may decrease In the future, but that the number of the most intense storms may increase, Especially in the North Atlantic.

Hence, while climate Change may be exacerbating the hazards, the key solution to the problem lies in addressing known vulnerabilities to cyclones as they currently occur. On top of that, risk reduction programmes May need to factor in sea-level rise, which results in much higher storm surge damage Due to a particular cyclone. Such an effect, which will particularly affect low-lying Coasts and islands, can already be factored into coastal zone management and infra-Structure planning. Furthermore, cyclone preparedness programmes could utilise seasonal Tropical cyclone forecasts, which incorporate at least some of the effects of global Climate change.

4. Droughts

Water availability does not depend only on precipitations. An increase in water Scarcity may arise from (i) changes in the annual amount of precipitations; (ii) from The deepening of the precipitation seasonal cycle, as more precipitation is projected In winter and less in summer; (iii) from increased evaporation due to higher temperature.

The evolution of droughts will vary depending on the location. It is likely, However, that many locations where droughts already are an issue will see the situation worsen. Examples of such locations are the Mediterranean basin, The South-eastern Europe, South Africa, Australia, Central America. Some regions That currently experience regular water-stress are however expected to see a Improvement in water resources, like East Africa.

5. Heatwaves

It is virtually certain that heat waves will become more frequent and more Intense in the future. In most climate models and in most emission scenarios, the Summer of the 2003 heat waves, which provoked more than 70,000 deaths, becomes an “average” summer in Europe. According to some emission scenarios, at the end of the twenty-first Century a summer like 2003 would be considered a cold one .

However, heatwaves only become disasters due to societies’ inability to respond Properly to the meteorological conditions. Consequently, the best way to deal with the Increasing risks of heatwaves is to improve preparedness and early warning. Heatwaves Can be predicted at least three days in advance, and societies must be ready to read that Signal and take action. This requires better interaction between the institutions that produce weather forecasts and those who need to act on them, including joint discussion on When a heatwave warning needs to be issued—based on the effects of the weather rather Than meteorological statistics.

Conclusion

Climate change will not increase all extreme events everywhere. But climate Change is very likely to increase some extreme events and hazards, in some Regions. For hazards for which detailed analyses are available, it is often the Most

intense events that are found to increase in response to climate change. The impact of climate change mitigation on extreme events will also depend On the type of extreme events: sea level rise is a very slow process that cannot be reversed or even slowed down rapidly, and climate change mitigation takes a long Time to reduce risks from coastal floods. On the other hand, temperature reacts more Rapidly to reduced emissions, and climate change mitigation can reduce heat wave Risks over a few decades.

Disaster risk reduction and more robust development planning are crucial in adapting to the increasing risks associated with climate change. This is particularly important in the face of mounting vulnerability to natural hazards, as reflected, for instance, In rising numbers of people affected and escalating levels of economic damage. In Almost all cases, climate change is just an additional factor to consider, which can Be embedded in existing risk reduction strategies.

To benefit from good information on such local information on climate change, Organisations working on disaster risk reduction and development will need to establish linkages with new partners, such as national meteorological offices or global centresOf expertise on climate research. In addition, some methods and tools for disaster risk Assessment may need to be adjusted to address better hazard trends.

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Nepal Earthquake, 2015

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The April 2015 Nepal Earthquake, also known as the Gorkha Earthquake, shook Nepal on April 25 at noon with a magnitude of 7.8, taking over 8,800 lives and leaving 23,000 injured. The epicentre of the earthquake was near Lamjung, about 50 miles northwest of the capital Kathmandu.

It was the worst natural disaster to strike Nepal since the 1934 Nepal-Bihar Earthquake. Now we'll first see what is an earthquake...

What is an earthquake?

It is basically any sudden shaking of the ground caused by the passage of seismic waves through the earth's crust. These seismic waves are produced when some form of energy stored in the earth's crust is suddenly released and masses of rock that are straining against one another suddenly 'fracture' and 'slip'. Earthquakes mostly occur along geologic fault lines. And this same mechanism happens during the earthquake.

The earthquake in Nepal was a result of a convergent plate margin between the Eurasian and Indian tectonic plates. Nepal is located on the top of the plate margin; the Indian plate is converging with Eurasia at a rate of about 2 inches per year towards the north- northeast because of this convergence of plates.

Impacts of Earthquake:

- **Infrastructural Impacts**

Centuries-old buildings were destroyed at UNESCO World Heritage sites in the Kathmandu Valley, including some at the Changu Narayan Temple and Dhar. The top of the Jaya Bageshwari Temple in Gaushala and some parts of the Pashupatinath Temple, Swyambhunath, Boudhanath Stupa, Ratna Mandir, inside Rani Pokhari, and Durbar High School have been destroyed.

Figure 1. Epicentre of Earthquake. Source: Research Gate

Thousands of houses were destroyed across many districts of the country.

- **Socio-Economic Impacts**

It was the worst earthquake ever recorded in the history of Nepal. Hundreds of thousands of people were made homeless, with entire villages flattened. Harvest were reduced or lost that season. Economic losses were estimated to be between nine percent and fifty percent of GDP (according to the United States Geological Survey USSG). Tourism is a significant source of revenue in Nepal, and the earthquake led to a sharp drop in the number of visitors.

There were a number of efforts made by governments and various NGOs in order to improve the conditions in Nepal. These were:

- India and China provided over $1 billion of international aid.
- Over 100 search and rescue responders, medics, and disaster and rescue experts were provided by the UK, along with three Chinook helicopters for use by the Nepali government.
- A $3 million grant was provided by the Asian Development Bank (ADB) for immediate relief efforts and up to $200 million for the first phase of rehabilitation.
- Many countries donated aid. £73 million was donated by the UK (£23 million by the government and £50 million by the public). In addition to this, the UK provided 30 tonnes of humanitarian aid and eight tonnes of equipment.

There were innumerable efforts made by various societies to restore the lives of people in Nepal who had suffered a lot. They didn't even lose their homes, but many of them have lost loved ones, and this pain cannot be healed by any compensation.

It's been 8 years, but still, we have glimpses of the destruction that terrorised Nepal on April 25, 2015.

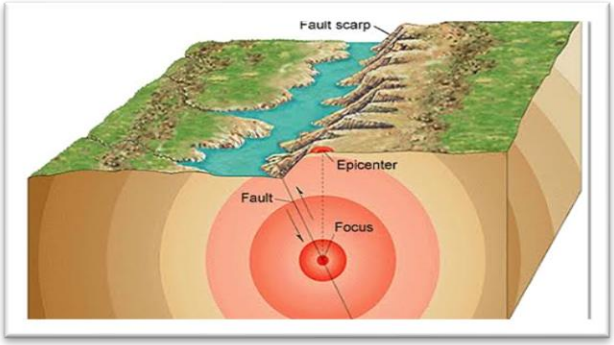

Figure 2. Location of Focus and Epicenter. Source: The New York Times.

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Pre Disaster Management Strategies

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Humanity, as a social animal, has its own needs and desires. They extract resources from the earth and use these resources to meet their needs and desires. But when the rate of extraction accelerates and exceeds the rate of degeneration of the resources for the social well-being of such a large population, it creates a problem.

Excessive interference in the natural environment or ecosystem degrades it. According to one of the geographers, 'Thomas Griffith Taylor, the environment also sets some limits to change in it, but when these limits are crossed by humans, the environment reflects back to humans in the form of earthquakes, volcanoes, floods, etc., which for our convenience we called "disasters.

Disasters are serious disruptions to the functioning of a community that exceed its capacity to cope using its own resources. Disasters are not only caused by humans; they are also caused by natural factors, which are caused by various endogenous forces that are occurring deep beneath the earth's surface. These activities are always destructive and cause major problems such as loss of human or animal life, damage to homes and habitats of large portions of animals, disruption of essential services, and negative impacts on livelihoods, the environment, and the economy.

But it is not necessary that all disasters are dangerous. Disasters such as floods, avalanches, tsunamis, earthquakes, and volcanic eruptions are not necessarily dangerous, but they are phenomena that occur as part of the earth's normal environmental cycle and process. For example, mountain chains like the Himalayas and the Andes are formed by tectonic plates moving underneath each other and against each other. When this same tectonic plate activity causes earthquakes, tsunamis, and volcanic eruptions that become disasters when they affect human life For example, the Ring of Fire in the Asia-Pacific Region is renowned for its volcanic eruptions and earthquakes caused by tectonic movement, including activity between the Pacific, Indian, Australian, and North American plates.

To measure the intensity of disasters and to predict the possibility of one, the scientists developed various scientific instruments and methods. For example, the Richer scale and modified Mercalli scale are used to measure the magnitude and intensity of earthquakes, while the enhanced Fujita scale evaluates tornadoes and their level of impact.

Disasters are sudden calamities and unfortunate events that bring with them great damage, loss, and devastation to human life as well as property. We can reduce their intensity by controlling or keeping in check the human activities that can cause disasters, but we can't stop the disasters that are caused by natural processes. Hence, to minimise and reduce the loss of human life and property, proper planning and scientific knowledge are essential to curtail the

devastating effects of disasters by adopting and executing pre-disaster management strategies.

There are three stages of disaster risk management, which are collectively called the disaster management cycle. Broadly, there are six phases in the disaster management cycle: prevention, mitigation, preparedness, response, recovery, and reconstruction.

While prevention, mitigation, and preparedness include pre-disaster activities that focus on reducing human and property losses caused by potential hazards, response and recovery are the initiatives taken in response to a disaster with the purpose of achieving early recovery and rehabilitation of affected victims and communities.

If we look at them individually, then disaster prevention and mitigation include the activities that are undertaken to prevent the adverse effects of a disaster in the short and long term. On the one hand, they include political, legal, administrative, and infrastructural measures. On the other hand, they include educating vulnerable communities and influencing their lifestyles and behaviours in order to reduce their disaster risk.

Disaster preparedness is to prevent losses and damage in case of a disaster; this includes the preparedness of all civic bodies such as the civil administration, fire brigades, hospitals, police, etc.

Despite all these strategies, various safety measures should be employed so that people can protect themselves to some extent from the disaster.

We cannot stop natural disasters, but we can arm ourselves with knowledge; so many lives wouldn't have to be lost if there was enough disaster preparedness.
Petra Nemcova

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Earthquake

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What is an earthquake?

An earthquake is an intense shaking of the earth's surface. The shaking is caused by movements in Earth's outermost layer.

Why do earthquakes happen?

The Earth is actually very active just below the surface, despite the fact that it appears to be a rather solid planet from the surface. The crust of the earth is solid, the mantle is hot and nearly solid, the outer core is liquid, and the inner core is solid. The lithosphere is an area made up of the rigid upper mantle layer and the solid crust. The lithosphere does not surround the entire planet in a single piece like an eggshell. Tectonic plates, which are enormous puzzle pieces, are actually what make it up. As they move about on the viscous, or slowly flowing, mantle layer below, tectonic plates are continually shifting.

The crust of the Earth is strained by this constant movement. Faults are formed when tensions become very high. The movements at the faults are a result of the movement of the tectonic plates. A fault line causes the Earth's crust to suddenly move, causing an earthquake.

The epicentre is the place where an earthquake first occurs. The epicentre of an earthquake is frequently where shaking is at its strongest. Nonetheless, hundreds or even thousands of miles from the epicentre, an earthquake's vibrations can still be felt and picked up.

How do we measure earthquakes?

Seismic waves, which are vibrations that flow through the earth, carry an earthquake's energy. Seismometers are tools used by scientists to measure seismic waves. A seismometer picks up seismic waves below it and records them as zigzag patterns.

Seismometer data can be used by scientists to pinpoint the time, place, and strength of an earthquake. The rocks that the seismic waves passed through are also described in this report.

Types of earthquakes?

- **Tectonic Earthquakes**

These are the most common earthquakes recorded worldwide, and they are caused by rocks moving along a fault plane. As the energy collected within plate border zones is released, it is produced by plate movement. Volcanic earthquakes often have smaller magnitudes than tectonic earthquakes.

- **Volcanic Earthquakes**

A volcanic earthquake is occasionally considered a unique class of tectonic earthquakes. They, though, are only found in places where there are active volcanoes. Volcanic earthquakes differ from other types of earthquakes in that they are deep, tectonic occurrences that happen along large faults. These can last for weeks or months prior to the eruption and are significantly less destructive.

It is caused by sudden channel openings in crustal rocks, an excessive buildup of gas pressure in the crust, quick shifts in magma circulation, and ceiling collapses of underground channels that have been emptied of magma.

- **Collapse Earthquakes**

Sometimes the roofs of underground mines fall in places with high mining activity, causing mild tremors. Collapse earthquakes are those. These are little earthquakes that occur in mines and caves below ground and are brought on by seismic waves generated by rock explosions on the surface. This occurs when the mine's generated stress is in motion as a result of massive chunks of rock exploding off the mine face and creating seismic waves. Massive terrain slides can also cause collapse from earthquakes.

- **Explosion Earthquakes**

The explosion of chemical or nuclear devices has the potential to cause earth tremors as well. Explosion earthquakes are what people term these vibrations. Since the 1950s, a few nuclear explosions fired underground have caused sizable earthquakes. Huge amounts of nuclear energy are released when a nuclear device detonates underground in a borehole.

Earthquakes' Impact on Society

Geophysical risks are among the most frequent and potentially life-threatening of all natural hazards. Earthquakes, (dry) mass movements, and volcanic activity are typically thought of when discussing "geophysical hazards," since they are "an unanticipated and frequently sudden event that causes considerable damage, destruction, and human suffering" (1). As a result, there are natural hazards that cause natural disasters that cause vulnerabilities. These factors typically include urban development in risky areas, population growth, environmental degradation, changes in land use, poor governance, climate change, as well as poverty and inequality.

changes in temperature), and climatological hazards (drought, wildfires, and glacial lake outbursts). What most of them have in common is the damage they cause, may it be material damage, loss of lives, or something else. However, the damage caused by some natural hazards can be greater and also produce larger costs in the long run, which is the case for geophysical hazards, especially earthquakes.

The National Earthquake Information Center records around 20,000 earthquakes annually and over 55 earthquakes per day; in 2021, for instance, there were almost 2,200 earthquakes with a magnitude greater than 5.0. As a result, earthquakes are among the most frequent natural disasters, with serious social, economic, and environmental repercussions.

The Social Impact of Earthquakes

The social impact of earthquakes is likely the most significant of all the effects described because strong seismic events frequently result in numerous injuries and fatalities. The Center for Research on the Epidemiology of Disasters (CRED) estimates that 125 million people were affected by earthquakes between 1998 and 2017, while 747,234 people died—a statistic that is significantly higher than that of other disaster types. Yet, when discussing the societal effects of seismic

occurrences, it's not just the loss of life that is worrisome; it's also the possibility of infrastructure destruction or catastrophic damage to numerous dwellings. People lose their possessions in earthquakes and end up homeless. Since 1900.

This number is rising as a result of the world's population density [2] and general expansion. The disruption of essential resources, such as clean water, as a result of damage to water pipes is another social issue brought on by earthquakes.

Yet, they are only the immediate effects. The topic of health should be included when discussing the long-term effects that earthquakes have on civilization. In the month following an earthquake, it was noted that earthquakes not only result in an increase in direct mortality but also a decline in health and long-term care insurance.

Nonetheless, the percentage of fatalities following earthquakes has decreased. The widespread application of cutting-edge technical techniques is one of the potential causes of this development. The adoption of high levels of seismic zonation by the governments of the nations with elevated seismic risk, as well as the control and education of people attempting to build non-engineered structures, could further reduce the number of earthquake-related deaths.

The Economic Impact of Earthquakes

The economic effects that earthquakes can have, which can be both short-term and long-term, are closely related to the social effects they have on society. However, the short-term effects of earthquakes typically include the destruction of businesses, industries, and necessary infrastructure. Of course, the economic impact depends on the country's economic standard and the condition of its infrastructure. Also, problems like looting might occasionally be seen. Moreover, the loss of roads, railways, and other transportation-related infrastructure has a detrimental impact on the economy because it complicates business relationships.

There are long-term economic effects that accompany the short-term effects that earthquakes typically have. Long-term economic effects frequently necessitate rebuilding of housing, transportation networks, or infrastructure. As reconstruction typically requires significant investment in the damaged area, this is time- and money-consuming. "Therefore, the expenses on economic development reduce, which leads to income losses." According to a study conducted by the Center for Research on the Epidemiology of Disasters (CRED), there was at least $661 billion in direct economic damage caused by earthquakes between 1998 and 2017.

The Environmental Impact of Earthquakes on Society

While earthquakes typically have a much bigger social and economic impact than other natural disasters, there is another effect that should be taken into account: the environmental impact. The environmental effects of earthquakes can also be fairly severe, although sometimes they are not as obvious as the social effects or as expensive as the economic impact. From the perspective of the environment, moderate to strong earthquakes can devastate both natural

and man-made landscapes, raise the danger of gas pipes exploding and causing fires, and contaminate entire regions.

Also, earthquakes put forests and their wildlife in peril and can result in other natural disasters like landslides or tsunamis that can wipe out the entire flora and fauna. Strong seismic occurrences can have long-term effects in addition to the immediate effects. "The destruction of important monuments, both natural and man-made, is one of an earthquake's more major worldwide or long-term environmental effects. Also, things like biodiversity are in danger.

The Relationship Between Individual Earthquake Impacts

Despite the fact that each of the aforementioned quake effects has the potential to cause severe short- and long-term harm, they are all connected and affect one another. This holds true for both their connection to the effects on the environment and the social and economic impacts. Social consequences like fatalities and injuries have a negative influence on the neighborhood's economy. In this case, we're talking about insurance and treatment costs, but a decline in the working population also has a negative effect on the economy because it frequently requires a substantial workforce to reconstruct the infrastructure and services following an earthquake.

Reduced GDP per capita, which results in an overall decline in quality of life, is another socioeconomic effect of earthquakes. The environmental damage that an earthquake can inflict, which raises the risk of sickness among the populace and has a notably negative influence on people's health, also lowers the quality of life. Landscape damage, which is dangerous for agriculture in particular and has economic repercussions, is another environmental impact. Moreover, companies are at risk from the environmental effects of earthquakes since the necessary resources may be destroyed in fires or floods that result from an earthquake. The effects of earthquakes are generally a complex subject because their components are interconnected.

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Amidst the Chaos, We Rise

Suhab Aktar Barbhuiya, 3rd year, Dept. of Geography, Shivaji College

India, a land of diverse cultures and terrain,
Faces a myriad of disasters, both natural and man-made pain.

From the mighty Himalayas to the Indian Ocean shores,
Disasters strike with a ferocity that often leaves us in awe.

Earthquakes rumble, shaking the ground beneath our feet,
Leaving destruction and loss that's hard to beat.

Floods inundate the land, wreaking havoc on homes and crops,
Leaving behind a trail of destruction that never stops.

Cyclones and storms lash along the coastline with fury.
Taking lives, and causing damage beyond our imagery.

Droughts and famines leave people in dire need,
Forcing them to migrate, in search of work and feed.

Wildfires scorch the forests, destroying flora and fauna,
Leaving behind a desolate land that's barren and somber.

Terrorism and wars, man-made disasters that we dread,
Leaving behind a trail of destruction, and the innocent dead.

But amidst the chaos and despair, there's hope,
The human spirit is resilient and able to cope.

Communities come together to help those in need,
Braving the odds and showing remarkable speed.

For India, a land of strength and diversity,
We shall rise again, hand in hand, with unity.

रे रे मानव हो सावधान

Harshit Choubey, 3rd year, Dept. of Geography, Shivaji College

आज हम जिस दौर में खड़े हुए हैं वह प्रकृति और मनुष्य का कटु संबंधों का दौर है प्रकृति आज भयावह रूप धारण करके संपूर्ण मानव जाति के सामने खड़ी है प्रकृति बार-बार आभास करा रही है कि हे मनुष्य देख तेरी औकात क्या है अंधाधुन प्रकृति का दोहन करने वाले आज भी समय है सुधर जा ।

इन विचारों को समाहित करती मेरी यह कविता है जो सावधान करती है और यह कविता आपको समसामयिक परिस्थिति से अवगत कराएगी

रे रे मानव हो सावधान

रे रे मानव को सावधान

तू रावण बनकर उछल रहा

प्रकृति सीता को कुचल रहा

तू सोच रहा लंका रक्षित

माना अब तक तू चल रहा

खुद चेत।द्वार पर नही राम

जो तुझे आज अवसर देगा

केवल चल कर आया कमान

ये मात्र मृत्यु का वर देगा

अस्तित्वहीन जिसके बिन तू

उसके आँगे तेरी क्या शान

वो धरती है तू कोल खान

रे रे मानव हो सावधान

रे रे मानव को सावधान

ये प्राकृति आज उल्लंघित है

कल क्या होगा, क्या कल्पित है

आव्यसक्ता से अनभिज्ञ सदा
तू शोषण करने का आदी है
जिस पर तुझको इतना है नाज
वह महज तेरी आबादी है
काल एक दस्तक देगा
तू ही बता कब तक देगा
बिन आहट भीतर आएगा
घबरा जाएंगे तेरे प्राण
त्राहि-त्राहि चिल्लाएगी
मुट्ठी भर तेरी यह जान
रे रे मानव हो सावधान
नर ईश्वर का स्वरूप है तू
प्रकृति है पूष तो, धूप है तू
तू स्वयं समझ अपनी कीमत
इतनी भी मदिरा को पी मत
कि भूल जाए अपना पालक
अपनी जननी अपनी तारक
पहले प्रकृति को रख ऊपर
फिर देखना अपना स्वाभिमान
रे रे मानव हो सावधान
रे रे मानव को सावधान

बीज

Harshit Choubey, 3rd year, Dept. of Geography, Shivaji College

मेरी कविता में सिर्फ कुछ हि पंक्तियां है लेकिन मैंने पूरी कोशिश की है कि एक सकारात्मक ऊर्जा को आप तक पहुंचा सकूं.....

बीज जिसके भविष्य का कोई ठिकाना तक नहीं रहता ...हमें शांत रहकर भी किस तरह अभीप्रेरित करता है वह मैंने अपनी पंक्तियों में पूर्णता दर्शाने की कोशिश की है

बीज

सीखो उस बीज से तुम कुछ

जो सदा अंधेरे में पलता

ना देखे वो उगता सूरज

ना देखे सूरज ढलता

कहता वह दुनिया वालों से

जब भी वह उनसे मिलता है

नहीं डरता जो अंधकार से

पुष्प उसी में खिलता है

भूगोल

Abhishek Gehlot, 1st year, Dept. of Geography, Shivaji College

जलीय क्षेत्र से जानी गयी,
तो पहाड़ी विस्तार से पहचान मिली...!
प्राचीन संस्कृति से नामकरण हुआ,
तो जियोग्राफी नाम से प्यार मिला....!
सृष्टि से जन्म हुआ मेरा, प्रकति की वंशज मानी गयी,
मैं भूगोल नाम से जानी गयी...!!
हाँ...! मैं भूगोल बोल रही हूँ...
भू-गोल अर्थात पृथ्वी- गोल सा मेरा अर्थ
मुझे गर्व महसूस करवाता है...!
एराटोस्थनीज ने इस दुनिया मे लाया,
तो हिकैटियस ने पिता बन कर पाला...!!
टॉलमी, कार्ल रिटर, डेविड हार्वे , माजिद हुसैन जैसे महान लेखकों ने मुझे सँवारा...!!
कठिन परीक्षाओ में रीढ़ की हड्डी मानी गयी,
मैं भूगोल नाम से जानी गयी...!
हाँ...! मैं भूगोल बोल रही हूँ....
नारी की भांति में खुद का श्रृंगार करती,
सूरज से में मुख पर बिंदी लगाती...!
पहाड़ो की बनावट सा शरीर मेरा, वर्षों की शाखा, लता, बेलों से मेरे केशों को दर्शाता...!
नदियों से बहता, झरनों से गिरता पानी पायल की झंकार सा भाता...
एक स्त्री की तरह में सजती-संवरती गयी...
मैं भूगोल नाम से जानी गयी...!!
मैं भूगोल नाम से जानी गयी...!!

- अभिषेक गेहलोत

भारत में सुखे की समस्या

Dildar Ali, 1st year, Dept. of Geography, Shivaji College

मनुष्य सदियों से कुछ ना कुछ प्राकृतिकआपदाओं से झुझते आते रहे हैं। इसी तरह सूखा भी एक प्राकृतिक आपदा है, जो पानी की कमी से होती है।सुखा का अर्थ है जल की कमी।जब किसी क्षेत्र मेंवर्षा की कमी के कारण मानव को पीने योग्य पानी भी नसीब नहीं होती है और अकाल आ जाती है उसेसूखा कहते हैं।

सूखे के प्रकार=>भारतीय मौसम विभाग के अनुसार,

सूखा तीन प्रकार का होता है-मौसमी सूखा, जलीय सूखा तथा कृषि सूखा। जब काफी लम्बे समय तक वर्षा न हो तो उसे 'मौसमी सूखा' कहते हैं। हमारे देश में 10% से अधिक मानसूखी वर्षा अत्यधिक वर्षा कहलाती है तथा बाढ़ का संकट लेकर आती है। जब वर्षा 10% के आस-पास होती है तो उसे सामान्य वर्षा तथा जब 10% से बहुत कम वर्षा होती है तो वह अपर्याप्त वर्षा मानी जाती है। जब मानव के जीवनयापन के लिए भी पानी न हो, तभी सूखे की स्थिति पैदा होती हैं।

जलीयसूखा=

इस सूखे का सीधा संबंध जल से है अर्थात भूमि स्तर पर जीतने जलाशय हैं, जैसे कि नदी तालाब कुआं यहाँ तक की भूमिका जल में भी कमी आ जाती है तोइसेहीजलीयसूखा कहते हैं।इस सुख से पानी की अकल पर जाती है और न ही तो पीने के लिए पानी होती है नहीं सिंचाई के लिए पानी मिलता है।इस सूखे से मिटटी की नमीपन गायब हो जाती है।

कृषि सूखा=

इस प्रकार की सुखा मेंखेतोंमें जो नमीपन होती है है वो सुख जातीहै।और इसमें उगाए गए फसल नष्ट हो जाती है। और तो और सिंचाई के लिए पानी की अकाल पर जाता है। तथा इन तीनों प्रकार के अलावा मौसम विभाग ने और एक सूखे की प्रकार बताए है।

आर्थिक सूखा=

जहाँ सूखे की आपदा आती है उस क्षेत्र में भुखमरी आ जाती हैक्योंकि फसल नहीं हो पाती है ।रोजगार छिन हो जाती है, तरह तरह की बीमारियां फैल जाती है जिससे आर्थिक स्थितिः कमजोर हो जाती है। इसलिए इसे आर्थिक सूखा कहते हैं।

भारत में सूखे की विस्तार=>

भारत एक कृषि प्रधान देश है,भारत में 70 प्रतिशत से ज्यादा जनसंख्या गांव में ही रहती है।पूरे भारत देश में लगभग 5,55,137गांव हैं, जिनमें से लगभग 2,31,000 गांव किसी न किसी आपदा से ग्रसित है। भारत का 16% क्षेत्र को सूखाग्रासित घोषित कर चूकागया है। भारत मेंसबसेसूखे क्षेत्र पश्चिमी राजस्थान है, यहाँ पे ज्यादा भूमि निम्नीकरण भी है।इसके अलावागुजरात वो केरल मैं भी सूखा क्षेत्र पाया जाते हैं। इन तीनों राज्यों मैं भारत के लगभग 82% सूखेक्षेत्रपाए जाते हैं। इसके अलावा अन्य राज्यछत्तीसगढ़,आन्ध्रप्रदेश,मध्यप्रदेश, हरियाणा, झारखंड आदि राज्य में सूखे क्षेत्रथेफेलेहैं।भारत में हर लगभग 50 बिलियन सूखे से प्रभावित होते हैं।

सूखा के कारण=>

सूखे की निम्नलिखित कारण है,

प्राकृतिक कारण-प्राकृतिक करण में मानसून आते हैं, मानसून के चलते समयानुसार बर्षा नहीं होती है जिससे सूखे आते हैं।

मानवीय कारण-आज मानव जाति ने वातावरण को विभिन्न तरीके से प्रदुषित किये हैं जिसके कारण समय के अनुसारवर्षा नहीं होती है। हम सभी जल की महत्त्व तब तक नहीं समझते हैं जब तक कि सूखे या अकाल न पड़ जाए नहीं तो उसके पहले बिना मतलब का अंधाधुंध पानी को बर्बाद करते हैं। जिससे सूखे के वक्त पानी की तिलक पड़ जाती है।

सूखा को कम करने का उपाय=

वैसे तो हम प्राकृतिक प्रकोप से पूरी तरह बच नहीं सकते लेकिन कुछ हद तक कुरूरता को कम कर सकते हैं।भारत सरकार ने सूखे की समस्या से निपटने के लिए प्रयास करता रहता है,एस के लिए भारत सरकार ने सिंचाई एवं जल संसाधन मंत्रालय स्थापित किए रखे हैं। इसके अतिरिक्त सभी राज्यों में भी सिंचाई एवं जल मंत्रालय स्थापित करके रखे है। ओर तो और देश की जगह जगह में बड़े बड़ेबांध का निर्माण किये हैं जैसे कि भाखड़ा नंगल परियोजना, हिन्द बांध परियोजना, हीराकुंड योजना, दामोदर घाटी परियोजना आदि इनके द्वारा सिंचाई केलिए जल की भरपाई करते है।इन सभी योजनाओं से लाखों हेक्टेयर भूमि की सिंचाई कार्य होती है। हम समाज में जागरूकता फैलाकर जल की महत्त्वको सभी को समझाने से जल की बचत होगी और जल का सदुपयोग होगा जिससे सूखे की स्थिति कम रहेंगी। इसके अलावा हम सभी पेड़ पौधे लगाकर पर्यावरण को साफ मना कर मानसून की स्थिति सही करके भी सूखे को कम कर सकते हैं।

सूखे से होने वाली हानियां=>

सूखे से बहुत तरह की हानि होती है, जैसे भुखमरी की स्थिति, रोजगार की कमी, बीमारियां फैलना, फसलों की बर्बादी, मवेशियों के लिए चारे की कमी, आर्थिक स्थिति कमजोर होना जिसकी कारण बीमारियों का इलाज नहोना जिससे हजारों लोगों की मौत होता है। सबसे ज्यादा मवेशियों की मौत होती है क्योंकि मनुष्य तो कहीं और चला भी जाए लेकिन मवेशियों का क्या?

सभी तथ्यों को मिलाकर देखें तो सूखा एक भयंकर प्राकृतिक परकोप है जिससे हमें कई तरह की कठिनाइयोंकी सामना करनी पड़ती है।सूखे से भूमि निम्नीकरण होते हैं लेकिन हम सभी अगर पानी का सदुपयोग करें तो सूखे से बहुत हद तक बच सकते हैं। हम सभी शिक्षित वर्ग को अपना कर्तव्य समझकर जल की महत्ता के प्रति जन जागरूकता फैलाने की जिम्मेदारी लेनी है जिससे सूखे को कम किया जा सके।

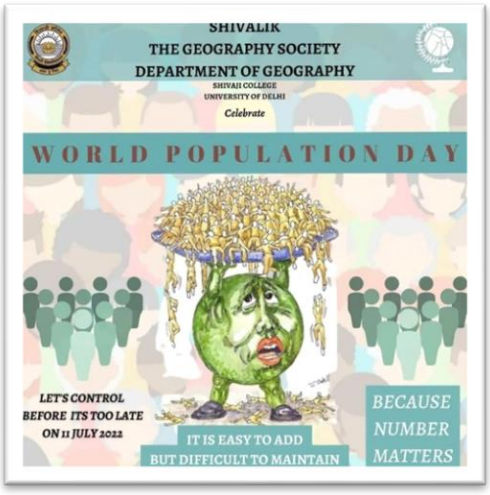
References:

- https://www.drishtiias.com/hindi/daily-news-analysis/why-india-struggles-to-cope-with-droughts
- https://en.wikipedia.org/wiki/Drought_in_India

Annual Report (2022-23)

1. **11th July, 2022**:

World Population Day, which seeks to focus attention on the urgency and importance of population issues, established by the then-Governing Council of the United Nations Development Programme in 1989. In an ideal world, 8 billion people means 8 billion opportunities for healthier societies empowered by rights and choices. But the playing field is not and has never been even. Based on gender, ethnicity, class, religion, sexual



orientation, disability and origin, among other factors, too many are still exposed to discrimination, harassment and violence. We do ourselves no favours when neglecting those left behind. Investing in human and physical capital for inclusive, productive societies that uphold human and reproductive rights. Only then can we tackle the enormous challenges facing our planet and forge a world where health, dignity and education are rights and realities, not privileges and empty promises. In a world of 8 billion, there must always be space for possibility.

2. **30th August, 2022**

Workshop on Career opportunities in GIS and Remote Sensing by Swastik Edustart Institute of GIS and Remote sensing

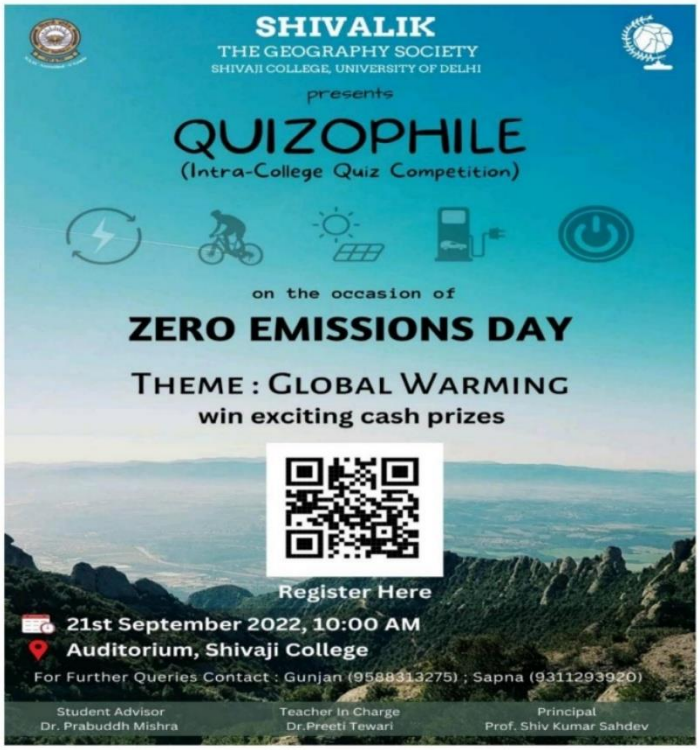
Shivalik, The Departmental Society of Geography Honours at Shivaji College, successfully conducted a workshop on 'Career Opportunities in GIS and Remote Sensing' in association with Swastik Edustart, an institution of GIS and Remote Sensing, on 30th August 2022. The Honourable guest & speaker for the workshop was Dr. Bratati Dey. The main aim of this workshop was to make students familiar with the GIS & Remote Sensing, which is an integral part of modern day sciences. The

session covered an overview of how to achieve a bright future in field of GIS just after graduation. Various career opportunities in the field, specialised institutions which train in these particular courses, possible internships during the graduation etc. were discussed by ma'am in detail. Various work done by Ma'am and her team was showed to the students like portrayal of hospitals in 5 km vicinity, wetlands in Delhi and many more. The session was concluded by the TIC Dr. Preeti Tewari, with a vote of thanks to Dr. Bratati and their team. Overall, the session was very entertaining & informative, and students loved it.

3. 21/9/22:

QUIZOPHILE: Intra college quiz competition

transportation. **SHIVALIK,** the Geography department of Shivaji College has a tradition of contributing to the environment conceivably. Keeping the tradition alive SHIVALIK organized **"QUIZOPHILE 2022"** an **Intra-college quiz competition** on the **theme "Global warming". Quizmasters** for the event were **Pawan Gupta from the 3rd year** and **Gunjan from the 2nd year**. The competition started with a sacred lamp lightning ceremony by the teachers of the Geography Department and chanting 'Saraswati Vandana'. More than 20 teams with 2 participants each participated in the **Preliminary round**. Participants had to answer 10 questions in the time frame of 10 minutes. The best six teams were qualified for the main rounds of the quiz. They were named A, B, C, D, E, and F respectively. The next phase was divided into 4 rounds that were: Pass the Question round, Visual round, Rapid fire round, and ultimately The Gamble round. Team F of Deeksha and Shradhha were bossing the scoreboard at the end of round 3 but lost their position in the gamble round. Team E of Karina Rana and Riya, students of Political Science Hons won the quiz, while team A of Abhinandan and Himanshu and Team B of Lovely and Vineet were adjudged 1st runner-up and 2nd runner-up respectively. The audience was kept indulged frequently through audience questions. All the winners were given certificates as well as cash rewards. The event ended with the concluding remarks of **Dr. Preeti Tewari, Teacher-in-Charge of the Geography Department** highlighting the significance of this day that each needs to make an effort to limit emissions, as they directly affect human health and the environment, causing climate change, air pollution, extreme weather events, and more. All the SHIVALIK and organizing Committee members got special appreciation from the teachers for the smooth conduction of the event.



List of Participants:

S. no.	Name (Participant 1)	Name (Participant 2)	Course (Participant 1)	Course (Participant 2)	Year (Participant 1)	Year (Participant 2)
1	Adarsh Kumar Chaudhary	Deepanshu Dabas	Ba Prog. (His.+Pol.)	Ba Prog. (Geo.+Pol.)	2	2
2	Karina Rana	Riya Sharma	Ba Hons. political science	Ba Hons. political science	3	3
3	Chhatrapal	Udayshil Kumar	BA geography honors	BA geography honors	3	3
4	Vineet Krishna	Lovely Dhingra	BA Programme	BA Programme	3	3
5	Bhumika	Vandana	B.sc. Biochemistry	B.sc. Biochemistry	2	2
6	Mehak rawat	Butul raza	BA History hons.	BA History hons.	2	2
7	Tanisha Sehgal	Tanishqa Garg	Ba programme (Eco+pol sci)	Ba programme (Eco +pol sci)	2	2
8	Butul Raza	Mehak Rawat	B.A History	B.A history	2	2

			honors	honors		
9	Astha kumari	Jyoti	Geography Honours	Geography honors	3	3
10	BHAGWAT PRASAD TIWARI	SAGAR DORIYA	B.Sc. (H) Physics	B.Sc. (H) Physics	2	2
11	Sakshi Uniyal	Deepali Raj Sharma	B.A Hons geography	B.A Hons geography	3	3
12	Shaurya Mathur	Vansh Sharma	BSc Physics Hons	BSc Physics Hons	2	2
13	Anuj kunar	Prashant kumar	Bbe	Bbe	2	2
14	Abhinandan Kumar	Himanshu Kumar	BA(H) Geography	BA(H) History	3	2
15	Deeksha Bhandari	Shraddha Prajapati	B.A Geography Hons	B.A Geography Honours	2	2
16	Tanishq Rathi	Chirag Dhiya	Political science honors	Political science honors	2	2
17	Shivam	Shubham	Ba. Hon. Geography	Ba. Hon. Geography	2	2
18	Akanksha Chugh	Kishan Verma	BA(H) Geography	BA(H) Geography	3	3
19	Aditi Aggarwal	Srishti Shreya	Bbe	Bbe	2	2
20	Vasu	Priyanka	BSc Physics (Hons)	BSc Physics (Hons)	2	2
21	Harshvardhan Gaur	Harshvardhan Sharma	BA Hons Political Science	BA Hons Political Science	2	2
22	DEEPANSHU	MD ARMAN	BA HISTORY HONS	BA HISTORY HONS	3	3
23	Kartik Goyal	Shevani Sri R K	BBE	B.A.(Hons)Business Economics	2	2

LIST OF WINNERS

SNO.	NAME(PARTICIPENT 1)	NAME(PARTICIPENT 2)	COURSEPARTICIPENT 1)	COURSE(PARTICIPENT 2)	YEAR(PARTICIPENT 1)	YEAR(PARTICIPENT 2)	WINNERS POSITIONS
1	Karina Rana	Riya Sharma	Ba Hons. political science	Ba Hons. political science	3	3	I
2	Abhinandan Kumar	Himanshu Kumar	BA(H) Geography	BA(H) History	3	2	II
3	Vineet Krishna	Lovely Dhingra	BA Programme	BA Programme	3	3	III


SHIVALIK
QUIZOPHILE
(Intra-College Quiz Competition)
ZERO EMISSIONS DAY
THEME : GLOBAL WARMING
A

Seminar on CV writing by T. I. M. E.

REPORT

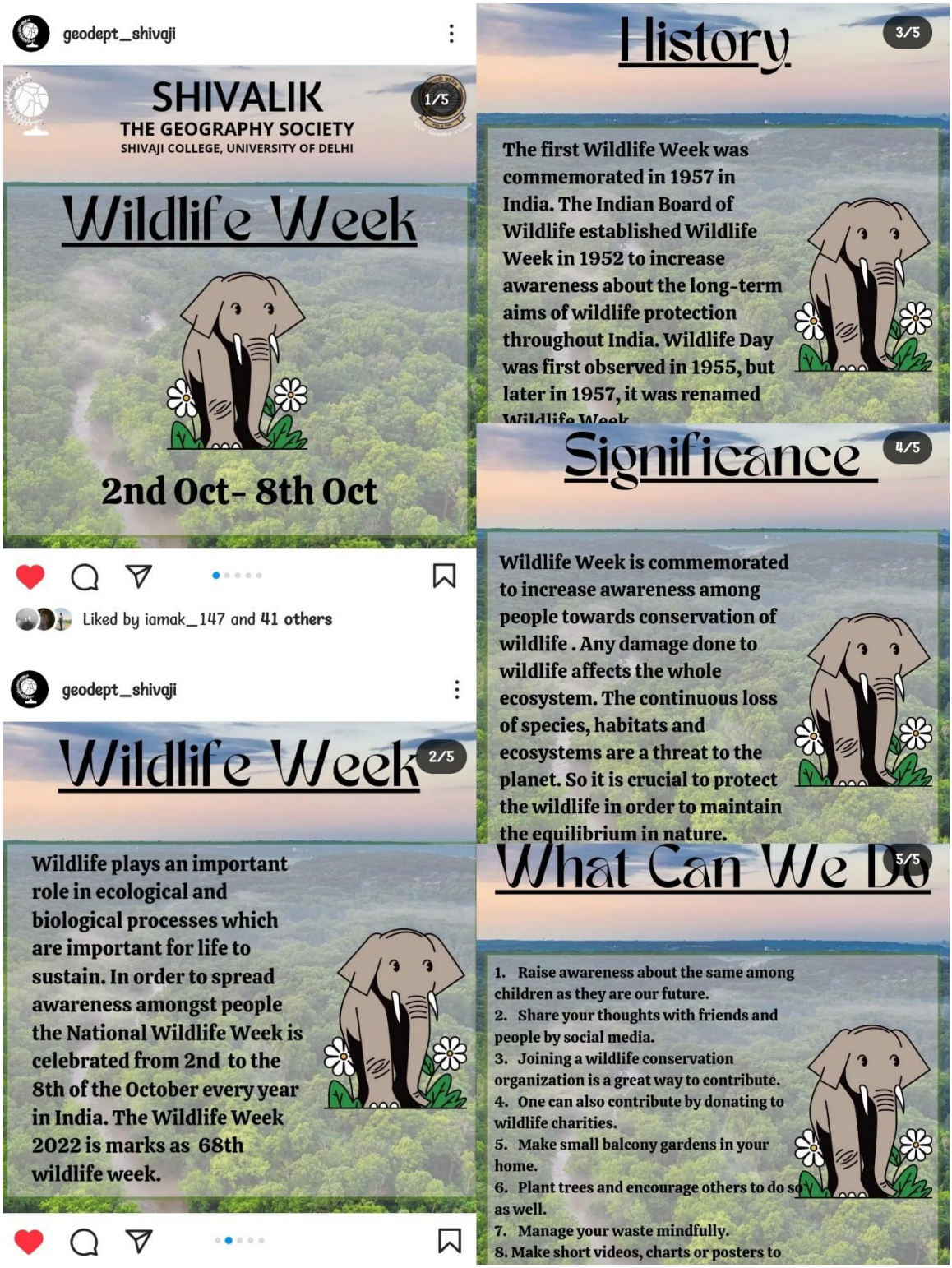
Seminar on CV Writing

by T.I.M.E.

Date: 28th September, 2022

A CV is a vital tool in a job search that gives you a chance to make a memorable first impression on recruiters by showcasing the skills and work experience you've acquired throughout the years. An excellent and well-crafted resume can show companies right away why a candidate is a good fit. To make such a well-structured resume, **SHIVALIK,** the Geography Department of Shivaji College, conducted an interactive seminar on CV writing on September 28th, 2022. **Mr. Rohit Premchandani**, an alumnus of Shri Ram College of Commerce, currently working with T.I.M.E Institute, was our guest speaker. He commenced the session by explaining the meaning of the term "CV" and how it is derived, followed by an explanation of various thought-provoking words like Johar Window, façade and blind spot. He focused on fundamental but unnoticeable mistakes that job-seekers make while writing their CV. For example, using negative and extreme words like 'but', 'not', 'perfectionist' etc; not highlighting important points or having an email with an absurd username. He highlighted the importance of presenting one's career objectives according to the demand of the organization, putting down hobbies that interest the recruiter and have the potential to push forward the interview, like cooking, chess, and emphasizing the importance of efficiently molding a CV to suit the job profile one is seeking in the company, along with the importance of voluntary work and co-curricular activities. The seminar ended with a query-resolving session to which questions were answered by the speaker. The interactive session came to an end by a vote of thanks by Preeti Tewari Ma'am, Teacher-in-charge of Geography Department.

4. 2-8 October,k 2022



5. 14/14/23:
SEMINAR ON PERSONAL INTERVIEW

REPORT

SEMINAR ON PERSONAL INTERVIEW

DATE: 14TH OCTOBER, 2022

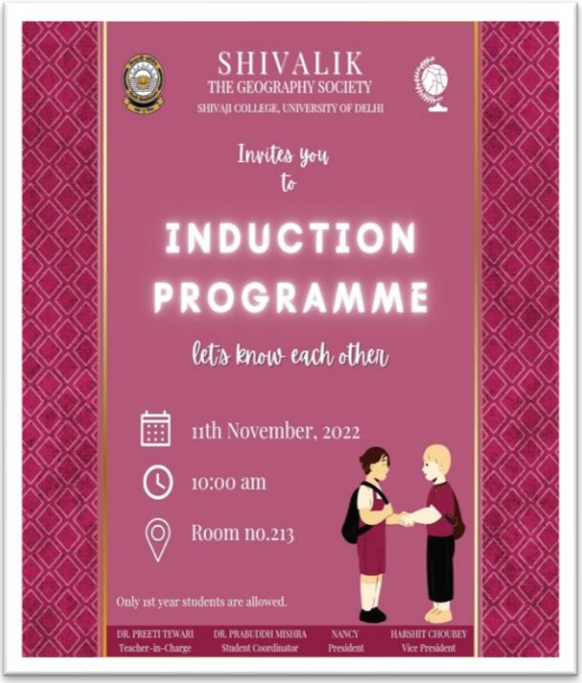
Personal Interview plays a very important role in an individual's life. It determines, whether we will be recruited to an institution or not. Thus, it becomes a necessity, to present ourselves in the best possible way in an interview. To aware students regarding the same, SHIVALIK, the Geography Department of Shivaji College, conducted an interactive seminar on Personal Interview on October 14th, 2022. Mr. Sunil Dua, an esteemed professor and career counsellor, currently serving as the senior regional head at T.I.M.E. Institute was the guest speaker for the event. He started the session by explaining the real meaning of personal interview. Highlighting the importance of the term 'personal'. He talked about the dress sense one should have like it must be formal, later he focused on the importance of knowing oneself . He specified how the questions are to be answered smartly. What are the elements to be actually added while introducing oneself was the main point to which he determined the arena such as academics, co-curricular, extra- curricular, hobbies, strength, goal, ideal. To this, sir also focused on what are the don'ts to be taken care of during the very start till the end of the personal interview such as not to get nervous, not to greet male members first and so on, then he enlightened the importance of every single word we use as in how questions are derived and asked from the same. The seminar ended with a query-resolving session to which questions were well answered by the speaker. The interactive session came to an end by the vote of thanks by Dr. Preeti Tewari, Teacher in-charge of Geography department.

6. 5/11/2022:


geodept_shivaji
Shivaji College
SHIVALIK
THE GEOGRAPHY SOCIETY
SHIVAJI COLLEGE UNIVERSITY OF DELHI
1/5
WORLD TSUNAMI AWARENESS DAY
(5 NOVEMBER)
View insights
Boost post
geodept_shivaji
Shivaji College
2/5
WHAT ARE TSUNAMIS?
The word "tsunami" comprises the Japanese words "tsu" (meaning harbour) and "nami" (meaning wave). A tsunami is a series of enormous waves created by an underwater disturbance usually associated with earthquakes occurring below or near the ocean. Tsunami waves often look like walls of water and can attack the shoreline and be dangerous for hours, with waves coming every 5 to 60 minutes.
View insights
Boost post
3/5
SIGNIFICANCE OF THE DAY
In December 2015, the UN General Assembly designated 5 November as World Tsunami Awareness Day and tasked the UN Office for Disaster Risk Reduction to coordinate the commemoration tsunamis disasters worlwide. World Tsunami Awareness Day was established at the suggestion of Japan to call on countries, international bodies and civil society to raise tsunami awareness and share innovative approaches to risk reduction.
4/5
FACTS ABOUT TSUNAMIS
1. Tsunami is a Japanese word reflecting Japan's tsunami-prone history.
2. Tsunamis are also known as killer waves.
3. Tsunamis are more than one wave. The first wave of a tsunami is usually the weakest, successive waves get bigger and stronger.
4. Tsunamis have great erosion potential. They can strip beaches of sand that may have taken years to accumulate and can undermine trees and other coastal vegetation.
5. Tsunamis are very long, a tsunami can be as long as 100 kilometers.
5/5
WHAT WE CAN DO ?
1. Learn about what to do in the event of a tsunami
2. Watch a movie about Tsunamis like "The Impossible" and "After Wave"
3. Attend an educational seminar or webinar about Tsunamis
4. Share your thoughts with friends and people through social media.
5. Raise awareness about the same among children as they are our future.

7. 11/11/2022:

INDUCTION PROGRAMME for Freshers



8. 11/11/2022:

Seminar on GROUP DISCUSSION by T. I. M. E.

9. 14-18 November, 2022

10. 16/11/22


SHIVALIK
THE GEOGRAPHY SOCIETY
SHIVAJI COLLEGE, UNIVERSITY OF DELHI
Observes
GIS DAY
1/7
SIGNIFICANCE
GIS Day helps us learn about geography and the real-world applications of GIS that are making a difference in our society. GIS Day is an opportunity for GIS professionals and organisations to highlight their work and share the amazing things they are doing via fun, educational grassroots events.
2/7
GIS DAY
GIS stands for "Geographic Information System." World GIS Day is celebrated on the third Wednesday of November every year, or the Wednesday within Geography Awareness Week. It is observed on November 16 this year.
6/7
IMPORTANCE OF GIS
GIS is improving how we measure and analyse things, as well as how we predict the future. It is also providing better ways to plan, design, and make decisions. The success of the GIS community is creating tens of thousands of important systems around the world and providing evidence of the huge contributions the field is making.
HISTORY
The first-ever GIS Day was held on November 19, 1999. It was famously inspired by American activist and lawyer, Ralph Nader. It was first organised by the National Geographic Society (NatGeo) and the Association of American Geographers (AAG). Apart from NatGeo and AAG, some of the original sponsors of GIS Day included the University Consortium for Geographic Information Science, the United States Geological Survey, Hewlett-Packard, and the leader in spatial analytics, Esri (Environmental Systems Research Institute).
7/7
USES OF GIS
Daily uses of GIS include:
1. Mapping
2. Telecom and network services
3. Transportation planning
4. Environmental impact analysis
5. Flood damage analysis
6. Navigation
7. Pest control and management

The content in our feed is the best example for the Geography department being the most active one . The feed is so informative and productive that it adds some value to the reader's mind. Not only these, all the achievements are regularly posted on our page so that students remain motivated throughout. One can find a lot of information related to our department, it's competitions, its events on our page.

11. 20/01/23

Seminar on higher studies abroad by T.I.M.E

SHIVALIK, the Geography Department of Shivaji College, conducted an interactive seminar on Higher Study Abroad on January 20th, 2023. Mr. Sunil Dua, an esteemed professor and career counsellor and the senior regional head at T.I.M.E. institute was the guest speaker for the event.The seminar ended with a query-resolving session to which questions were well answered by the speaker.

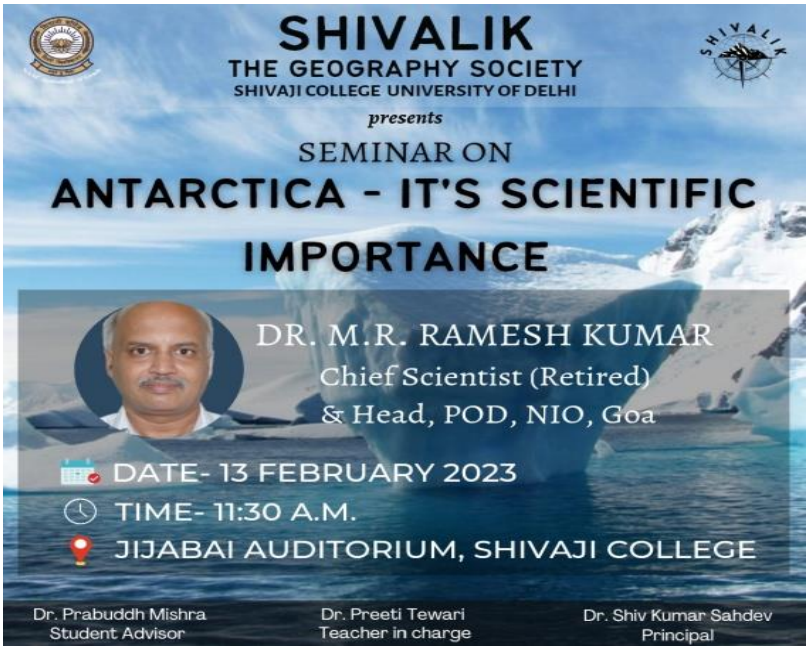
12. 11/02/23

Alumni Meet

Shivalik, the Geography Department of Shivaji College organized Mulaqaat- The Alumni Meet it was a soulful event where alumni got the opportunity to reconnect with old friends, relive memories, and make new ones. Some of our best alumni came back and shared their success stories with their alma mater. The gathering was jam-packed with many entertaining games, amusing anecdotes, and many others Current students had the opportunity to interact with their seniors and absorb knowledge from those who had gone before them. These insights and skills can help them achieve in their own academic and professional endeavors

13/02/23

Seminar on Antarctica and it's scientific importance



Antarctica is the world's southernmost continent and the location of the South Pole.It remains covered with snow and is virtually uninhabited, but plays an important role in world geography. Thus, Antarctica seems to be a very interesting and important topic for budding geographers. To inform students about the same, SHIVALIK, the Geography department of Shivaji College, conducted an interactive seminar on the topic "Antarctica and its scientific importance" on February 13, 2023. The session was led by Dr. M.R. Ramesh Kumar, Chief Scientist (retired) and Head, POD, NIO, Goa. The session began with a brief introduction to the topic and some basic information regarding the continent of Antarctica. Further discussion took place about the strange windy, cold, and dry climatic conditions of Antarctica, and stress was placed on India’s expeditions to Antarctica. Various interesting facts regarding the continent were shared with the listener s to develop interest, such as Antarctica having 70% of the world’s fresh water, a large number of meteorite sites, and travellers to Antarctica facing a "greenout" feeling. Educational videos about the differences between weather

and climate, as well as d ifferent types of clouds, were also shown. Sir also shared his personal experiences of his travels to Antarctica and showcased pictures clicked by him, such as those of penguins and other fauna of the South Pole. Issues of environmental importance such as global warming and the effects of greenhouse gases were also discussed in depth. The unique feature of this workshop was the constant interaction between the speaker and the listeners with various rounds of questions and answers, and each person who answered was rewarded with gifts like chocolates, rare postcards, etc. by Sir as a token of appreciation. At the end, a vote of thanks was delivered by Dr. Preeti Tewari, teacher in charge of the geography department. All in all, the session was a really informative and fruitful experience for all the attendees, and it made everyone more aware of the importance of Antarctica in world geography.