VASUDHA

An Annual Publication of the
Department of Geography
Shri Shikshayatan College, Kolkata
December, 2019
Volume No. 11

VASUDHA

An Annual Publication of the
Department of Geography
December, 2019
Volume No. 11

SHRI SHIKSHAYATAN COLLEGE
KOLKATA

CONTENTS

Published by : Department of Geography, Shri Shikshayatan College

Editors : Dr. Nivedita Roy Barman and Smt. Indu Mundhra

Cover Photograph : Postojna Limestone Cave, Slovenia ● **Photo credit :** Dr. Susmita Sen

Printed by : Pratirup, 35 Nandana Park, Kolkata 700034

EDITORIAL

In continuation of the rich legacy of the ten earlier years, the Department of Geography presents the 11th volume of VASUDHA, studded with thought provoking and interesting articles, excursion reports and photographic representation of some of the key activities held in the Department. The combined human capital of the faculty, alumni and students of our department has contributed over the years various scholastic and relevant articles in Vasudha, making the journal an item to treasure for the next generation of geographers. As we moved from strength to strength as an institution of academic excellence, we realized the need to document our thoughts and progresses in our own ways for the progeny. Vasudha serves that purpose magnificently and not only captures the intellectual ability in all of us, but invariably provides a sneak peek into the DNA of the department and our view of the subject and life in general. Vasudha audaciously proclaims how geographers think, and what we are capable of contributing to the world.

It is imperative that compiling such a journal requires humongous effort from faculty, students and many others. We gratefully acknowledge the contributions of one and all and urge all our stakeholders to come forward and contribute more to this unique initiative, such that our signature continues to leave a mark on this esteemed institution. We take this opportunity to also thank the management of the college for all their guidance and specially our Principal, Dr. Aditi Dey for her constant encouragement in all activities of the department held throughout the year.

Congratulations to the team once again! We look forward to another great year of cordial engagement and intellectual pursuit.

AN ADVENTURE IN NATURE'S LAP

Soha Hossain

One of the most interesting parts of being a geographer is that we understand maps best and hence we can plan our own tours and routes exploring new areas which are rarely explored. Shimla, Manali and Kasauli are beautiful places which were part of my tour but I am sharing my experience about a place which is not very popular and not frequently visited, Tirthan Valley. While deciding the route to reach Manali from Shimla, I decided not to take the usual Chandigarh Manali highway. Instead I decided to go up towards Manali by taking a completely new route and come back via the usual Chandigarh Manali highway.

THE SELECTED ROUTE

We reached Shimla by taking the toy train from Kalka which has been declared as World Heritage by UNESCO. Travelling amidst nature, on a track laid down almost 117 years ago it was quite exciting. The train passes through the woods crossing tunnels and bridges, all engineered during 1898-1903. It was delightful to observe the extent of surveying that was done for this train route to be constructed during an era when there were no modern equipments. The train crossed 103 tunnels and about 950 bridges, all built with absolute perfection and all well maintained as well.

TOY TRAIN PASSING THROUGH THE WOODS

After spending a few days in Shimla we started our journey towards Manali. Instead of taking the usual route taken by all, we started moving towards the right of Shimla crossing Fagu and Narkand. Fagu is famous for apple orchards. Narkand is called second Shimla, a place for those who want to stay away from the busy and bustling towns. The best place to be seen here is the Hatu Peak located at a height of 3400m above MSL. The 360Ú view of the ranges from the peak is breathtakingly beautiful. Atop the peak is a temple of wooden architecture dedicated to Hatu Mata. Some believe it is dedicated to Goddess Kali and some say it is Mandodari, the wife of Ravana. And near the temple is a stove like formations of rocks, believed by locals as to be used by the Pandavas during their Agyaatwas. However after descending down the peak we kept moving further north towards our next destination Banjar in Tirthan Valley.

VIEW FROM NARKAND PEAK

After crossing Narkand, the road we took was no longer a highway but was gradually becoming narrower. We crossed small villages dotted everywhere with apple orchards, some in full bloom and some harvested. The ones ready to be harvested were covered in nets from top to bottom so that it can be protected from birds, monkeys and most importantly humans. After driving for three hours from Shimla we reached a small village, Thanedar where we took halt for lunch. But there were no hotels, restaurants or dhabas. After talking with some people we found a

THE ISOLATED ROADS

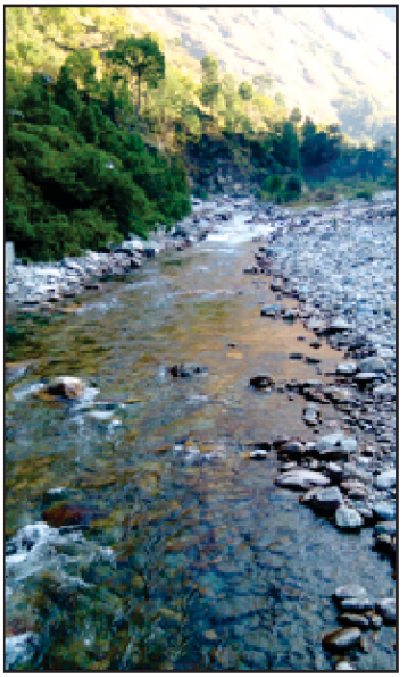
small shop, where the lady in charge was cooking for herself and so we requested her to prepare lunch for us. So we had a delicious platter of roti, sarson da saag and paneer bhurji in homemade butter. This was a lunch I think I will remember forever which ignited my taste buds and the hospitality received was better than any five star hotel.

We left Thanedar behind and proceeded on our journey on the Ani-Banjar-Aut road. After an hour the road got narrower and the forest was getting denser. Now we were on a single road and we had o stop if another car approached from the front and sometimes even go reverse. A tributary of the Sutlej was flowing down in the valley going almost parallel with the road. There were no villages in sight for hours and a car or two passed us after every one or one and a half hour. The only human encroachment visible was the road on which we were driving. Though my Google map was still working but our phones did not have any network connectivity. The range on the other side of the valley had no signs of human encroachment at all. It also seemed the region has experienced upliftment at places because at sudden places the trace of the river valley could be seen at quite a height from the valley floor and below it the entire slope was devoid of any vegetation. I was not able to take photograph of such a sight because my driver refused to stop. His refusal to stop was logical because on the road sides foxes were roaming and were not at all scared of a passing car. This again indicated that the frequency of cars is very less on this road. Shimla to Tirthan valley was supposedly a journey of six hours but after travelling for three hours from Thanedar we reached a village on top of a hill from where our destination was still three hours more of driving. It was already evening, the sun had almost set and we had a stretch of dense forest to cover before we reach our destination at Nagni village in Gushaini, Banjar.

PASSING THROUGH THE FOREST

We had left the last village and did not see any for the next three hours. The road was ascending on a steep slope with an angle of about 30Ú-35Ú. We were in Jalori on NH305 though it did not fulfil any criteria to be a national highway. It was narrow, a mixture of mud and pebbles, full of pot holes and extremely bumpy. The car's speed was restricted to only 10kmph and had to drive in first gear. And as we were approaching the top of the hill our driver complained that the ascent was very difficult and there were chances of slipping. The curves were extremely dangerous. And then in the darkness, only lit by the car's headlights we saw a dead end- a big boulder and a waterfall. It was coming down forming a bed of water and flowing down the slope. On getting down from the car we saw that hidden behind the big boulder was a narrow pass which is supposed to be our road, rather NH305. So we crossed the river bed formed by the waterfall and traversed past the boulder. Later we came to know this place as the Koth Nala, a place where accidents are most common even in bright daylight. Finally we reached Jalori Top or Jalori Jot or Jalori Pass at a height of about 3120m. The descent down the slope from the top was equally bad, even worse at places as the steepness was even 35-40 degress at the curves. But now lights were visible down in the valley and we got the first glimpse of Tirthan Valley set in the heart of The Great Himalayan National Park(GHNP) famous for being the home of leopards and snow leopards. Though the descent too was dangerous and we had to go in the same speed but relief gradually was dawning upon us. We

reached the first village Shoja, then further on we got Jibhi which is a favourite place for trekkers and hikers. The next village was our destination on the Tirthan River bed and so we descended further. The slope was now gentler and my driver was pretty annoyed with me for selecting such a dangerous route and I think that was expected. We reached Banjar and from there to our destination Nagni village near Gushaini, a more interior village at a distance of about 8km and a height of 1356m. Our homestay Tirthan Travel Nest actually felt like a nest to us after such an adventure. Our hosts, Rajender ji and his wife, gave us a warm welcome and a scrumptious kulluvi dinner was waiting for us. We settled in our room and could hear the passing Tirthan River. We were given a warning though, to not open the doors at night because leopards roam outside on the roads and even in the lawn. We learnt from our host that the road in Jalori is nicknamed as Death Road by locals and its comes under the category of one of the most dangerous roads of the world.



RIVER TIRTHAN

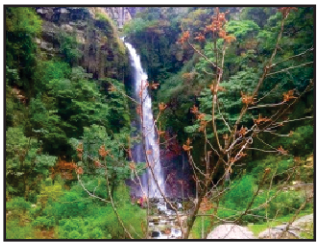
The morning was beautiful and serene waking up in a house inside the GHNP, the majestic ranges welcoming the morning's first sun rays. After breakfast we went on a hike. The river was gurgling away. It was a small village with houses here and there and almost all of them serving as homestays. Apple,pear,cherry and persimon trees were in abundance everywhere. The river is famous for trout fishing , and some hikers were busy in that. It's a trekkers paradise with waterfalls at a distance of 1 or 2 km away , meadows and a glacier about 8km away. We walked on the unknown paths and everywhere there was greenery, fresh air and those ranges I would love to go again. All the adventure and tension of the previous day did not go in vain. Every bit of it was worth it. We halted only for a day and proceeded towards Manali the next day.

VIEW OF GHNP FROM HOMESTAY

VILLAGE HOUSES DOTTED ON SLOPES

OUR HOMESTAY

HOMESTAYS ON THE RIVER BED



A NEARBY WATERFALL

" Do not go where the path may lead, go instead where there is no path and leave a trail."

~Ralph Waldo Emerson

Photo Credits: Author

CHOICE OF CONTRACEPTIVE METHODS IN ASIAN COUNTRIES: AN EXPLORATION INTO THE FAMILY PLANNING PROGRAMMES

Aditi Kundu, *Senior Research Fellow, Jawaharlal Nehru University, New Delhi, aditikundu31@gmail.com*

'Contraception' as a technology bears different connotations to different people. To the government and policy makers, it is just a tool for controlling the rising population; to a religious fundamentalist, it is a mere nuisance as it aids in going against god's will; to a prostitute, it helps in her uninterrupted business; to a seller, it is a means of money making; to a woman it is a right to her own body and its reproductive system. It is such a thing that if viewed from different coloured lens it will give diverse interpretations. For instance, it can be looked through a gendered lens or from a planner's perspective, from the angle of a business person to that of any institutional organisation; be it a joint family structure to a religious organisation.

Although the history of contraceptive stretches back to antiquity, now being part of modern medical discourse it is not more than a century old. Contraceptives and family planning as part of population policy of sovereign state policy is even more contemporary. Present work focuses on the historical context of government policies and how it shapes the contraceptive method choice of the country. As existing literature indicates, choice of contraceptive by a couple is a complex phenomenon that depends on a variety of factors. This study tries to look into several elements of contraceptive choice, but from a steady vantage point of government policies; it strives to explore how government policies manipulate the immediate factors and indirectly guide couple's choice of contraceptive.

In this endeavour, the issue is approached from couple's perspective as well as from government's or the provider's perspective. A couple tries to use contraceptive for either limiting or spacing childbirth. However, when they decide to use a contraceptive, there lies a host of factors leading to adoption of one method over another. There are four primary considerations; accessibility, affordability, perception and personal preference. A deliberation of these issues governs the contraceptive choice of a couple.

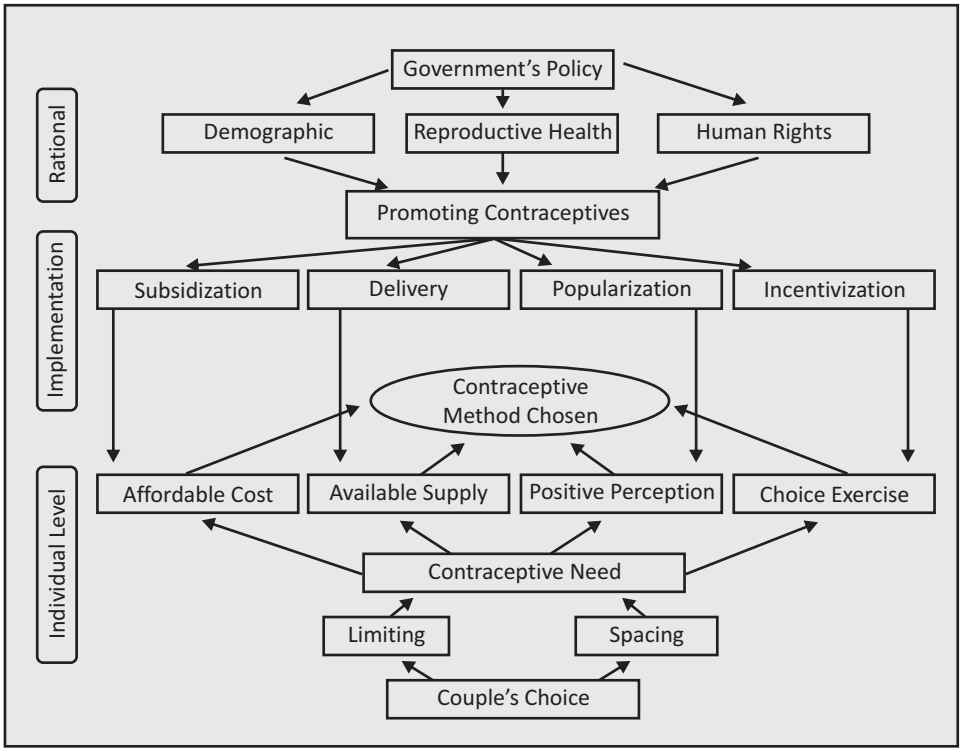
On the other hand, state's attention on the issue of family planning stems from three different rationales; demographic (to control the population growth of the country), reproductive health (to improve the condition of maternal health) and as human rights (owing to the argument that controlling one's fertility is a fundamental right). Whatever the motivation might be, instruments to arrive at the selected goals is always to promote the use of contraceptives. There lies a host of mechanisms through which state can promote the contraceptive use in the country which is again clubbed into four chief ones; increasing availability by improving service delivery, partly or fully subsidising the contraceptives to make it more affordable, popularising certain contraceptive(s) through awareness campaigns, provide incentives for adoption of a specific method.

All the steps taken by government to promote contraceptives, is particularly aimed at influencing one or more factors that couples consider before choosing their preferred contraceptive method. This paper attempting to identify the factors that lead to majority couples in a specific country choosing a specific contraceptive, looked mainly from the vantage point of government actions.

Discussion

A careful study of government policies reveal family planning programmes and policies that provide only a partial causation to the couples in determining their choice of contraceptive method. In most of the countries, it has been observed that guideline behind the ultimate choice of contraceptive method is the interplay of

socio-economic-cultural and psychological factors; which in turn are gradually shaped by family planning policies or a lack of such government initiatives. In some of the countries, the scenario is such that certain external agents act behind the stage and moderate the couple's contraceptive behaviour by and large. Moreover, the point that is to be kept in mind is that there is no single reason explaining or a dominant factor leading to the particular choice of contraceptive by a couple. Even if we need to agree that different factors play in shaping the contraceptive choice but 'the role of state' remained, either actively in some countries or passively in others. So, following this, several highlights is made and discussed from hereon.



State versus Donor Agencies: There lies a stark difference in the contraceptive choice depending on the major source of funding. If government is the main support, then a single contraceptive method is seen to be dominant in the land. On the other hand, if the financial aid is of some donor agencies, such as UNFPA, USAID, UNICEF, WHO or similar, then a combination of methods is seen to be present and no single method is ruling over. As in the countries having the oldest family planning institutions such as that of India or Sri Lanka, there has been a single method rigorously promoted in the country.

Direct State Intervention: Reward and Incentive or Coercion and Disincentive: Active or direct measures by which state intervenes is promoting contraceptives by subsidizing, rewarding or penalizing. Certain countries give benefits to people for limiting their family size whereas in some pro-natalist countries, it has also been seen that government penalizes or punishes for using contraceptives to regulate their fertility behaviour. Examples of reward oriented family planning programmes are India, Bhutan, Sri Lanka or Nepal; where government of Bhutan gave four dollars to the acceptors of sterilisation and Sri Lanka government gave cash prizes to the medical professional team for fulfilling their sterilisation targets. India sitting in the midst of the SAARC countries and being one of the population giants have adopted different methods of rewards and bonuses from giving cash prizes to people accepting sterilisation as well as inserting IUD to even lotteries of cars for women undergoing sterilisation. Although it claims to have a proper cafeteria approach, but it has histories of forcefully sterilizing people, even zero parity women. In the present also, it organizes sterilisation camps where men and women are sterilized for free but the entire procedure is conducted in such an unhygienic condition that several women die as a result of unsuccessful operation.

Legalisation or Criminalisation: After direct intervention, the next most effective method for a government to

dominate the contraceptive choice is via legal mandate. This is mostly for restricting a certain contraceptive to be used in a country rather than for promoting contraceptives The best example of legal manipulation is seen in Japan, where Japanese government conveniently banned all types of contraceptive except condom, and very obviously most of the contraceptive users chose condom as their preferred birth control method. Iran and Turkey also present cases where sterilisation remained banned for a long period of time, based on religious ground, and in the years immediately after their legalisation, use of permanent methods underwent a major surge in both the countries. A similar process is also observed for using intra-uterine devices in Mongolia. There are certain countries such as Azerbaijan where to use contraceptives; people need a medical prescription from a registered gynaecologist and obstetrician. Therefore, governments use this as a measure to control the use of contraceptives or certain contraceptives with a deeper policy implication in mind.

Availability and Acceptability: both Geographical and Social: If the government of a country promotes contraceptives and makes it available, then it becomes easier for people to use. Otherwise, it is not only that people need to have proper knowledge and awareness about using contraceptives but getting them at an affordable price and nearby to one's residence, which is also a necessity. If direct intervention does not operate in the country by the government, then the major determinant that helps a couple in choosing the desired contraceptive is the geographical availability and the social acceptability. Socio-psychological cost in most of the cases surpasses even the direct physical cost that is borne by a user.

Affordability: The Public Sector Boost: Even when most of the methods are physically available and socially acceptable, there still lies a major barrier in financial affordability. It is seen that if a particular contraceptive is available at a much cheaper rate in comparison to other contraceptives, then most of the people of that land have a tendency to rely on it in respect to all other choices. However advantageous the other contraceptives might be or even if the cheapest one does not fulfill the need of the user, even in that case it has been noticed that the cheapest one becomes the dominant contraceptive of the region. Such has been the case when oral pills became freely available in Bangladesh which being marketed by a non-profit organization became the dominant contraceptive in a very short span of time.

Knowledge and Socio-psychological barriers to contraception: Even if all the contraceptives are equally available in the country with a bare minimum cost and a proper cafeteria approach is followed, then also perception about contraceptive and a difficulty to overcome social, cultural and psychological barriers becomes a major deterrent. Knowledge regarding contraceptives, perception about contraceptives and choosing an appropriate method is a major task for a user. In most of the cases, it is observed that people are aware of almost all the available methods but the contraceptive acceptability becomes difficult. People are afraid of their perceived side effects that might hamper their lifestyle and the fear of which stops them from protecting themselves.

Abortion and IUD: This is an interesting scenario in countries such as Vietnam, Uzbekistan, Tajikistan, Kazakhstan, Kyrgyz Republic which presently has a sweeping dominance of IUD use have a precarious history of rampant and unsafe abortions. Rate of abortions in all these countries remained very high and whenever the women go to the clinics for medically terminating their pregnancies, an IUD is inserted in their uterus with due permission from them.

Post Decline Transition: The historicity of a region becomes very important to understand any behaviour of that land. No study on a region can be conducted negating its past history. The present scenario of a region

cannot be explained without the temporal story. Presently if a country has achieved the replacement level fertility, the government might not be very active in promoting contraceptives but history might unfold a different story as has been the case of Sri Lanka. Presently, Sri Lanka has a considerable share of hormonal and traditional contraceptive users to go alongside the majority of people who have opted for sterilization but on the other hand its fertility transition took place almost exclusively with female sterilisation. The Sri Lankan government actively promoted sterlisation at the cost of other methods but now have supressed due to its already controlled fertility behaviour.

Therefore, it is seen that a vast array and interplay of factors play hand in hand in shaping the contraceptive behaviour of a region with the role of state remaining an important position in deciding a contraceptive choice. This particular work has tried to unravel another layer to the already exisiting list of factors affecting the couples' contraceptive choice behaviour. It tries to establish that directly or indirectly the government occupies an important position in moulding the choices of couples contraceptive habit.

References-

Bulatao, R. A., Palmore, J. A. and Ward, S. E**.** 1989. *Choosing a Contraceptive: Method Choice in Asia and the United States*. *Westview Press, San Francisco, USA.*

Kundu, A., and Das, B. (2019). *Population, Fertility and Family Planning.* Rawat Publications.

Robinson, W. C., and Ross, J. A. (Eds.). (2007). *The global family planning revolution: three decades of population policies and programs*. The World Bank.

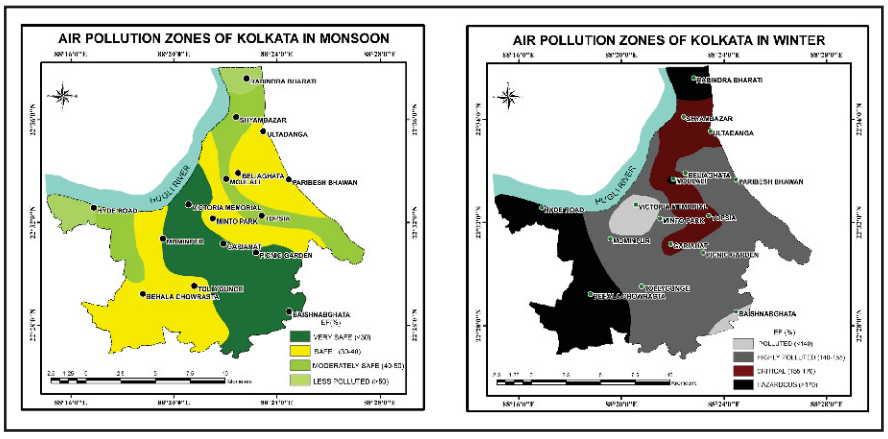
✠✠✠✠✠✠✠

AIR POLLUTION IN KOLKATA - SEASONAL VARIATION

Paper presented at National Conference on Contemporary Research Perspectives in Geography

Enakshi Mukherjee, Krishti Rudra, Rachita Saha, *Class of 2020*

Air quality in most mega cities has been found to be critical and Kolkata is no exception. Among all the pollutants in the air of Kolkata, this paper discusses seasonal variation of the most predominant pollutant, Suspended Particulate Matter (PM_{10}). The paper attempts to investigate the spatial distribution and seasonal variation of particulate matter in the city. It also aims to examine compliance of air quality standards set, vehicular emission and increasing constructional activities. Amount of PM_{10} has shot up in the city and its fringes over the past few years. PM_{10} effects both – human health (triggering a variety of pulmonary diseases) and the environment severely. The data used in the paper was collected from 14 air quality monitoring station under WBPCB (West Bengal Pollution Control Board) and 2 under CPCB (Central Pollution Control Board). The assessment of air pollution level has been computed by applying the Exceedence Factor (EF) method introduced by CPCB, which is (Observed mean concentration of pollution / permissible standard for the respective pollutants) *100. Based on the EF in percentage spatial distribution maps have been prepared for monsoon and winter seasons showing 4 broad air pollution zones in each map that is very safe, safe, moderate and less polluted in monsoon and polluted, highly polluted, critical, hazardous in winter prepared with Arc GIS version 10.1.3 . Pollution rises to the maximum in winter and reduces to minimum in monsoon impacting seasonal human health of city. Northern and South western fringe of city show the highest concentration of SPM in both the seasons and hence falls in the hazardous zone. The reasons being Cossipore thermal power plant in the north and industrial belt of south west which are stationary sources of pollution. Relatively less polluted zones are the central and eastern fringe of the city. A stringent policy portfolio involving various mitigating cost effective measures are necessary to control the negative impacts of air pollution due to excessive rise of PM_{10}.



Analysis :

In the monsoon months of July, August and September, the wet deposition of the pollutants results in a great reduction of their concentration in ambient air in almost all parts of the city. During this time, the sea winds from the south also result in greater atmospheric dispersion of the pollutants in a northerly direction as a result of which the concentration of pollutants within the city remains well within the permissible limit. The pollution zoning map for this season shows 4 zones in Kolkata all of which are safe as per the permissible standard set by WHO at 140 ìg/m^3 . Among the Air Quality Monitoring Stations, Rabindra Bharati has the highest level of particulate matter followed by Hyde Road, both of which have very old power plants and industrial areas in their vicinity. On the other hand, the wide green fields of the Victoria Memorial along with the adjacent areas of Maidan and Race course near the River Hugli along with the eastern part of the city with the presence of the Kolkata Wetlands records the lowest concentration of particulate matter.

In the winter months of December, January and February, however, the situation is reversed. Pollutant

values are invariably higher in all the Air Quality Monitoring Stations crossing the permissible standard of 140 ìg/m³ by high margins. It happens when the wind speed is lower and thermal inversion takes place in the evening over a period of time. During this time due to low humidity and high dryness, the particulate matter along with the dust particles remain suspended in the lower layers of the atmosphere. The pollution zoning map for this season has been prepared showing polluted, highly polluted, critical and hazardous zones of Kolkata. Hyde Road industrial area has the highest level of particulate matter followed by Rabindra Bharati located close to the old thermal power station at Cossipore established in 1949. The heaps of fly ash generated and dumped near the power plant become airborne with the passage of wind and add to the SPM level of the area. The roads here are unmetalled and every time heavy vehicles pass the area, huge amount of dust is generated. The south eastern fringe of the city around Baishnabghata, shows relatively lower pollution due to fewer residential area and thus relatively less traffic. The open patch of greenery around the Victoria Memorial, Race course and Maidan also records low concentration of particulate matter even in winter.

Conclusion:

It is undeniable that the air quality of Kolkata varies significantly between the monsoon and winter seasons. The indiscriminate discharge of particulate matter from industrial, vehicular and domestic sources have resulted in the deterioration of the air quality of Kolkata at an alarming rate. The situation is likely to aggravate if immediate ameliorative measures are not taken in this respect. The environmental planners need to adopt the most cost-effective approaches to control industrial, vehicular and domestic emissions considering the fact that Kolkata acts as a nerve centre providing the lifelines that link the country together and hence should receive immediate national attention.

Acknowledgement:

We would like to take this opportunity to thank the Principal of Shri Shikshayatan College, Dr Aditi Dey; our supervisor for this project, Dr Nivedita Roy Barman for inspiring us to work on this topical subject. We are grateful to Ms Triparna Barman, School of Oceanographic Studies, Jadavpur University for preparing the maps of this paper. agreeing to collaborate with us in studying the spatial distribution of air pollution in Kolkata. We are immensely indebted to Dr Kalyan Rudra, Chairman, West Bengal Pollution Control Board for helping us in data collection and analysis.

Bibliography

Chakraborti, S. “Air Pollution level in Kolkata among country’s highest” *Times of India*, Jan 3 (2017)

Gokhale, S. Khare, M. “A theoretical framework for the episodic-urban air quality management plan (e-UAQMP)” *Atmospheric Environment*, 41 (2007), pp.7887-7894

Gulia, S. Shiva Nagendra, S.M. Khare, M. Khanna, I “Urban Air Quality Management” *Atmospheric Pollution Research*, Vol 6, Issue 2, (Mar 2015), pp286-304

Md. Senaul Haque and Singh R.B. “Air pollution and Human Health in Kolkata, India: A case study” *‘Climate’* (Oct, 2017)

Nivedita Roy Barman, “Air pollution Hotspots of Kolkata”. UGC-MRP (2004)

Spiroska, J.Rahman, M.A. Pal, S. “Air Pollution in Kolkata: An analysis of Current Status and

✠✠✠✠✠✠

PHYSICO-ECONOMIC BACKGROUND OF VILLAGE BALLABHPUR

Suneha Ghosh, *Class of 2020*

The small village of Ballabhpur with a population of about 500 persons, is at the outskirts of Shantiniketan (Bolpur) in the district of Birbhum. The district of Birbhum is a region of lateritic and red soil as it is a continuation of the Chotanagpur plateau. The district is drained by numerous rivers like Ajoy, Kopai, Khoai, Brahmi and Bakreshwar rivers. Although the soil is not so fertile but with the help of irrigation facilities, the peasants cultivate paddy, vegetables and pulses for their consumption. The main source of irrigation is the canal irrigation under the Mayurakshi River valley project, the Tilpara Barrage. Apart, from this, well irrigation is also carried out. Hence, agriculture is the mainstay of the people in the district. The village Ballabhpur holds a number of handicraft industry like terracotta, pottery, silk wearing kantha stitch, basket wearing, which is carried out at the households of the peasants and even at Amar Kuthi workshop. The women folk are mainly trained and employed at Amar Kuthi. The roads are unmetalled and cart tracks are found. The ground water is the main source of drinking water. The villages still experiences the fluctuating supply of electricity. There is only one hospital at Shantiniketan and the other at Siuri for away from the village. Most of the houses are kutcha houses with sheds where they domesticate cows, buffaloes for acquiring milk. There are three middle schools at Shantiniketan 100km away from the village. There is only one primary school in the village.

PROBLEMS

As a part of a team of students of St. Teresa Secondary School of class XIIB, I had gone for a geography excursion to the village of Ballabhpur, situated few kilometers away from Shantiniketan, for conducting a socio-economic survey.

After survey, when the final primary data was gathered from 48 families, it was found that, the families had a low capita income, Though some families were well off while the others lived below poverty live.

It was surveyed that many of the families did not have proper electricity supply and most of them did not have gas oven. Some of the houses did not even have proper water supply. The families were to a great extent male dominated who worked for most part of the day while the women remained at home. Those who were employed did not have adequate income to fulfil all the needs and aspirations of their families and hence proverty prevailed. Most of the workers of the village were employed in the Amarkutir leather workshop which provides employment equally to both the genders. Infact, this workshop encourages females more than males.

The literacy rate among the male is more than that among the females. The younger women are quite educated which indicated that the status of women in the village has developed quite a lot. They are also sending their children to pre-school and hence one cannot say that people of Ballabhpur are not educated.

Although the village is more advanced compared to the other grass root level villages, it cannot be considered as a developed village of the area. Hence for overall development there should be more industries, workshops, cottage industry providing scope for easy employment for the village folks, both skilled and unskilled. Though people have basic literacy, they are not enough educated to get proper job. Moreover, there are many who are uneducated, thus, education facilities need to reach every corner of the village. The Panchayat should take adequate initiative towards the education of children. They should encourage education of particularly the girl child for brighter future of the nation.

PROSPECTS:

Amarkutir, located on the banks of Kopai river about 15 kms from Shantiniketan in Birbhum distrct in the State of West Bengal is a co-operative unit that produces leather goods, kantha stitched sarees, bamboo crafts and

batik at a reasonable price. A few kms away from the workshop , is a leather factory where the commodities are made.

It was started by Sri Sushen Mukherjee in the year 1927. This industry provides employment to a large number of villagers. The factory provides employment to both male and female workers, skilled and unskilled labours. This industry encourages female employment to a great extent. The employers are divided into groups and each group is allotted stitching, colouring, giving shape and print on various ethnic items.

However, now it has developed as an autonomous body known as "Amarkutir Society for Rural Development" and this has really gifted some prosperity to rural people of the area.

✠✠✠✠✠✠

THE RAINBOW MOUNTAINS

Puspika Das, *Class of 2021*

Introduction

One of the most magnificent geologic features in the world is the Ausangate of the Peruvian Andes, also known as the "*Rainbow Mountain*", has the breathtaking geological attributes. The mountain is striped with colours ranging from turquoise to lavender to maroon and gold. However, this "painted mountain" is notoriously difficult to find and get to, requiring several days of hiking to reach its peak deep within the Andes by the way of Cusco. It sits at an elevation of 6,384 meters (MSL), located approximately 100 km southeast from the nearer major city, Cusco.

History

The Andes are an incredibly complex mountain chain that extends along the western edge of the South American continent. The subduction of the Nazca plate underneath the South American plate initiated the mountain building and upliftment of the range, resulting in significant volcanism and the introduction of rare and varied mineralogy to the Andes Mountains. The reason for the colouration in the stratigraphic layers of the Ausangate Mountain is due to weathering and mineralogy. But this part of the Peruvian Andes was concealed underneath ice and snow until recently in 2015, when climate change caused the glaciers to melt and revealed this geological wonder, which has now become one of Cusco city's most popular attractions.

Creation

The beautiful colouration of these mountains includes the colours of rainbow (red, yellow, green) which have been explained by various scholars and researchers. The red colour of sedimentary layers often indicates iron oxide rust as a trace mineral; the goethite or oxidized limonite caused to introduce a brownish colouration to sandstones; the bright yellow could be due to iron sulphide as trace minerals within the pore cement and the varying shades of green colour are related with the presence of chlorite in different diagenetic states as well as concentrations. Thus, rainbow created by nature in Ausangate is popularly known as the "*Rainbow Mountain*" worldwide.

Climate and Weather

The annual weather in the area of **Rainbow Mountain Peru** usually has two long seasons: the dry and the wet. The dry season goes from May to November, mostly sunny with minimum percentage of rain or, precipitation, recommended time to trek. But the rainy (wet) season is usually considered from December to April with hail storms, snowing, cloudy days causing less visibility on the mountains. Travellers visiting the mountains should have some preparation for the quick change of temperature as well as weather even in winter. Due to the global warming, the weather condition in the Andes is becoming very changeable and unstable also unpredictable.

Anthropogenic Exploitation

The colourful Andes mountain receives some 1500 daily visitors. It become richer with crowd in recent past, when the site soared to its popular status and travel operators began to offer daily hikes towards the end of 2015. While it is growing in popularity with tourists, it has led many to feel concerned for the mountain's protection. It has also been seen that the trail that hikers traditionally take up the mountain has been badly eroded by the combination of visitors and horses that are used to carry people up the ascent. The community has also built a sizeable gravel-filled parking lot to accommodate the increase in traffic to the area which had

previously been an important wetland for various animal species that lived in the area. Over tourism is not the only threat on the horizon for Peru's Rainbow Mountain. To cite for example, a Canadian-based mining company, named Camino Minerals Corporation, has applied for permission to mine minerals in the surrounding area, including on the mountain itself due to the abundance of copper and iron ore.

Conclusion

The importance of this landscape lies on the many layers of the Peruvian Painted Mountain where millions of years of history and all the complexities that are associated therein. In order to preserve this beautiful natural wonder of the world the government should take some steps. Since, the number of tourists visiting the area has become overly burdensome, they could install a permit system. A permit system would help to control visitor numbers while providing a source of income for the local community, as well as funds for the maintenance and conservation of Rainbow Mountain. On November 23, 2018, a presidential decree by the Peruvian government declared a mining ban for the next 12 months. This is probably one of the major steps taken by the government. Understanding the environmental and geologic conditions that formed the rock units is one of the key building blocks of geology which allow for better understanding our world long before humans walked this green Earth.

Reference

- https://www.forbes.com/sites/trevornace/2017/01/21/welcome-rainbow-mountains-peru/
- https://geologyhubblog.wordpress.com/2017/09/22/the-rainbow-mountain-of-peru/
- https://www.lonelyplanet.com/articles/perus-rainbow-mountain-environmental-concerns
- https://www.topperutrips.com/blog/weather-rainbow-mountains-peru/
- https://theculturetrip.com/south-america/peru/articles/the-discovery-of-perus-rainbow-mountain-has-an-unfortunate-truth/
- http://www.newperuvian.com/the-rise-of-rainbow-mountain-in-peru/

✠✠✠✠✠✠✠

THE CARIBBEAN OF THE ALPS

Rajanya Manna, *Class of 2021*

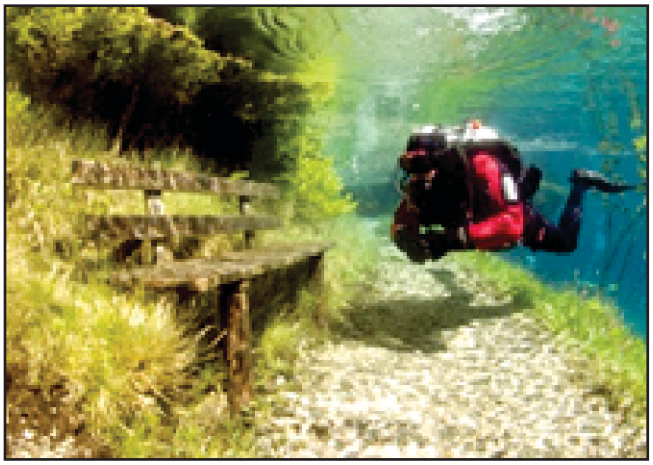
INTRODUCTION :

Every spring, melting snow creates a dreamscape in Austria. Grüner Sea also known as Green Lake is a lake in Styria, Austria in a village named Tragöess. It became popular in 2016 and since then has become a major spot in world tourism. Nature has formed plenty of water features that seem anything but natural like the Blood-red waterfall in Antarctica. But , this lake has an even cooler trick than other; at the same time of every year, it overflows to seven times its depth and the disappears almost completely on its own.

GREEN LAKE DURING WINTER

ABOUT THE EXTRAORDINARY LAKE:

The Green lake spends its falls and winters as a mild mannered lake of a few metres while it transforms itself into a 10 m deep lake during the spring or early summer. The lake is also famous for its emerald-green waters apart from the fact of an usual spring transformation. Every spring, when the phenomenon of snow melting takes place in the Hochschwab mountains, Grüner Sea collects all waters and floods the bigger part of the park.



GREEN LAKE DURING SPRING

During winters, it is a good place for an Alpine hike. In the mountains with crisp air, away from the city, visitors go for a day of walking around the small body of water, a mountain meadow, and the forest around it. However, during the warmer months as snow starts to melt, water covers the entire area. A number of trees, benches, bridges and flowers are covered with around 40 feet of water. Visitors from around the world trade in hiking boots for flippers and scuba gear and dive around the suddenly impressive-sized lake. Fish swim around park benches and swimmers float over bridges. The bottom is covered in grass, giving much of the lake a green hue, as well as lending to its name.

The natural phenomenon creates an almost surreal underwater park until July, when the water begins to evaporate again, restoring park access to land lubbers. Since the water is snowmelt, therefore it is extremely cold and incredibly clear. This high visibility (upto 160 feet) is actually what lent the lake its eponymous colour and eventually its nickname: ' The Caribbean of the Alps '.

The lake supports some aquatic life as well apart from being just a picturesque lake, such as small fish, underwater insects and some trout. The appealing magical, emerald-toned lake attracted too many tourists, and this lake became a hotspot for divers. However, the local tourism office imposed certain restrictions due to widespread human activities.

CONCLUSION:

Despite Green lake being famous for its crystal clear water, some recent activities have made its mesmerising clear water turn opaque due to an increase of algae and urine in the water. Hence, it is of utmost importance that necessary measures are taken to conserve this spectacular and much photographed place.

BIBLIOGRAPHY

- www.dailymail.co.uk/travel
- www.travelandleisure.com
- Travel tips and country facts by Datacube (YouTube)

✠✠✠✠✠✠✠

GROUND WATER MANAGEMENT: IF NOT NOW, THEN WHEN? IF NOT YOU, THEN WHO?

Sohini Chowdhury, *Class of 2021*

Groundwater is a valuable resource both in the United States and throughout the world. Groundwater depletion, a term often defined as long-term water-level decline caused by sustained groundwater pumping, is a key issue associated with groundwater use.

Causes of Ground water Depletion-

1. Groundwater depletion most commonly occurs because of the frequent pumping of water from the ground.
2. We continuously pump groundwater from aquifers and it does not have enough time to replenish itself.
3. Agricultural needs require a large amount of groundwater.

Pumping groundwater faster than it can recharge can lead to dry wells, especially during droughts. (Credit Wikipedia, Creative Commons)

Effects of ground water depletion-

1. Water-well problems
2. Reduced surface-water flows
3. Subsidence
4. Deterioration of water quality
5. Land Subsidence

Easy ways to restore ground water-

- We should use native plants in your landscape. They look great, and don't need much water or fertilizer. We must also choose grass varieties for our lawn that are adapted for your region's climate, reducing the need for extensive watering or chemical applications.
- We must use fewer chemicals around our home and yard, and make sure to dispose them off properly without dumping them on the ground.
- Potentially toxic substances like unused chemicals, pharmaceuticals, paint, motor oil, and other substances must be properly disposed off. Many communities hold household hazardous waste collections or sites. We need to contact our local health department to find ones, near us.
- We should shut off the water when we brush our teeth or shaving, and not let it run while waiting for it to get cold.
- We must check all the faucets, fixtures, toilets, and taps in our homes for leaks and fix them right away, or install water conserving models.
- We should limit ourself to just a five minute shower, and challenge our family members to do the same. Also, make sure to only run full loads in the dish and clothes washer. We have to water the lawn and plants during the coolest parts of the day and only when they truly need it. Make sure we all, obey watering restrictions during dry periods.
- We must reduce the amount of "stuff" you use and reuse whatever we can. Recycle paper, plastic, cardboard, glass, aluminum and other materials.

➢ We should use all natural/nontoxic household cleaners whenever possible. Materials such as lemon juice, baking soda, and vinegar make great cleaning products, are inexpensive, and environmentally-friendly.

Conclusion-

India is in the midst of one of its worst and most serious water crisis. Newspaper dailies are churning reports filled with images of hundreds of people waiting for water tankers or queued in front of a single tap which is incapable of fulfilling the demand. By 2020, 21 major cities including Delhi, Bengaluru, Chennai, Hyderabad and other states will run out of groundwater according to the Composite Water Management Index (CWMI) report released by the Niti Aayog in 2018.The Niti Aayog CWMI report is a timely reminder for us to mend our ways and take urgent measures to avert the crisis of our own making.

References:

https://ceoworld.biz/2019/10/10/indias-water-emergency-a-call-to-action/

http://cgwb.gov.in/hindi/faq.html

https://www.conserve-energy-future.com/causes-effects-solutions-of-groundwater-depletion.php

https://www.usgs.gov/special-topic/water-science-school/science/grou

✠✠✠✠✠✠✠

"THE DOOR TO HELL"

Sreoshi Bhattacharya, *Class of 2021*

The **Darvaza gas** crater known locally as the "**Door to Hell**" or ''**Gate of Hell**", is a natural gas field collapsed into an underground cavern located in Derweze, Turkmenistan. Geologists intentionally set it on fire to prevent the spread of methane gas, and it is thought to have been burning continuously since 1971. The diameter of the crater is 69 metres (226 ft), and its depth is 30 metres (98 ft). The crater is a popular tourist attraction. Since 2009, 50,000 tourists have visited the site. The gas crater has a total area of 5,350 m. The surrounding area is also popular for wild desert camping.

The gas crater is located near the village of Derweze, also known as *Darvaza*. It is in the middle of the Karakum Desert, about 260 kilometres (160 mi) north of Ashgabat, the capital of Turkmenistan. The gas reserve found here is one of the largest in the world. The name "Door to Hell" was given to the field by the locals, referring to the fire, boiling mud, and orange flames in the large crater, which has a diameter of 70 metres and to a depth of about 20 metres.

According to Turkmen geologist Anatoly Bushmakin, the site was identified by Soviet engineers in 1971. It was originally thought to be a substantial oil field site. The engineers set up a drilling rig and operations to assess the quantity of oil available at the site. Soon after the preliminary survey found a natural gas pocket, the ground beneath the drilling rig and camp collapsed into a wide crater and was buried.
Expecting dangerous releases of poisonous gases from the cavern into nearby towns, the engineers thought it best to burn the gas off. It was estimated that the gas would burn out within a few weeks, but it has instead continued to burn for more than four decades.

The early years of the crater's history are uncertain. local geologists say the collapse into a crater happened in the 1960s, and the gases were not set on fire until the 19 century.

The crater was featured in an episode of the National Geographic Channel series *Die Trying*. In the July 16, 2014 episode "Crater of Fire", explorer George Kourounis became the first person to ever set foot at the bottom, gathering samples of extremophile microorganisms.

Effects on future development of gas

On President Berdimuhamedow's April 2010 visit, he recommended that measures be taken to limit the crater's influence on the development of other natural gas fields in the area. At that time, Turkmenistan announced plans to increase its production of natural gas, intending to increase its export of gas to many countries such as Pakistan, China, India, Iran, Russia, and Western Europe, from its then yearly production level to a new production level of 225 billion cubic metres by 2030.

BIBLIOGRAPHY

- www.thedoortohell.com
- www.craterofturkmenistan.com

✠✠✠✠✠✠

CLIMATE CHANGE

Ahelee Bera , *Class of 2022*

INTRODUCTION

Climate Change is the defining issue of our time and we are at a defining moment. From shifting weather patterns that threaten food production, to rising sea levels that increase the risk of catastrophic flooding, the impacts of climate change are global in scope and unprecedented in scale. Without drastic action today, adapting to these impacts in the future will be more difficult and costly.

The problem of climate change is very serious

HISTORY OF EARTH'S CLIMATE CHANGES

20,000 years ago, the earth was a frigid landscape. Huge ice sheets several thousand meters thick, encased parts of North America, Asia and Europe. We commonly know it as the ice age but geologists call it the last glacial maximum.

Over the last million years there have actually been about ten different glacial maximums. Throughout the earth's history climate has varied greatly. For hundreds and millions of years the planet had no polar ice caps. Without this ice, the sea level was 70m higher. At the other extreme, about 700 million years ago, earth became almost entirely covered in ice during an event known as 'snowball earth'. So, what causes these massive swings within the planet's climate? One of the main drivers is atmospheric carbon dioxide -a green house gas that traps heat. Natural processes such as volcanism, chemical weathering of rocks and the burial of organic matter can cause huge changes in carbon dioxide levels when it continue for millions of years.

Over the past million years carbon dioxide level had been relatively low and repeated glacial maximums have been caused by cycles and earth's movement around the sun. As earth rotates it wobbles on its axis and its tilt changes altering the amount of sunlight that strikes different parts on earth's surface. These wobbles combined with earth's elliptical orbit cause summer temperatures to vary depending on whether the summer solstice happens when earth is closer or further from the sun.

CAUSES AND EFFECTS OF ICE AGE

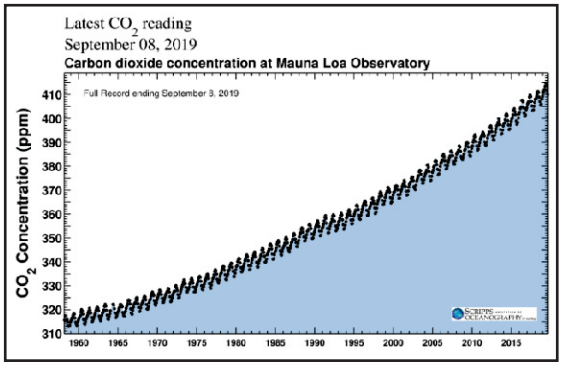
Approximately every 100,000 years, these factors align to create dramatically colder conditions that last through a millennium. Cool summers that are not warm enough to melt the preceding winter snow allow ice to accumulate year after year. These ice sheets provide additional cooling by reflecting more solar energy back into space. Simultaneously cooler conditions transfer carbon dioxide from the atmosphere to the ocean causing even more cooling and glacial expansion.

CLIMATE IN RECENT AGES

About 20,000 years ago, these trends reversed when changes in earth's orbit increased summer sunshine over the giant ice sheets and they began to melt. The sea level rose 130m and carbon dioxide was released from the ocean back into the atmosphere. By analyzing pollen and marine fossils, geologists can tell that temperatures peaked about 6000 years ago before another shift in earth's orbit caused renewed cooling.

CLIMATE CHANGE IN FUTURE

So what's coming next? Based on the repeated natural cycles seen in the climate record we would normally

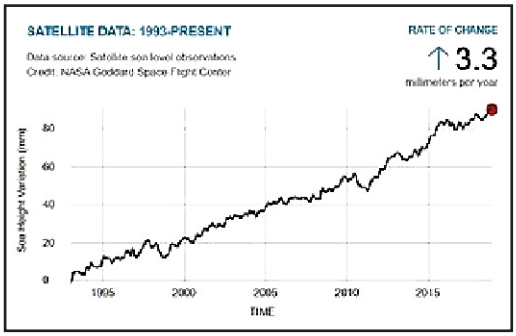


Carbon dioxide level increase from 1960 to 2016

expect the earth to continue a trend of gradual cooling for the next few thousand years. However, these cooling abruptly reversed about a 150 years ago. Why? The carbon dioxide levels in the atmosphere have been rising since the 19th century when use of fossil fuel increased. We know that from the study of air bubbles trapped in Antarctic ice.

This surge in carbon dioxide also coincides with global temperature increase of 1degree celsius. Atmospheric monitoring centers show that carbon dioxide levels are increasing rapidly and are at a higher level than at any point in the last 800,000 years.

Computer models from the Intergovernmental Panel on Climate Change (IPCC) forecast another 1-4degree celsius warming by the year 2100 depending on how much additional fossil fuel we burn. What does that mean for the ice currently in Greenland and Antarctica ? The past climatic changes suggest that even a small warming shift can begin a process of ice melt that continues for thousand of years. By the end of this century ice melt is expected to raise the sea level by 30-100 centimeters, enough to impact many coastal cities and island nations. If a 4 degree celsius warming persisted for several millenniums the sea level could rise as much as 10m. By studying past climates, scientists learned more about what drives the shifts in ice that has shaped our planet for millions of years. Research suggests that by taking action now to reduce carbon dioxide emissions quickly, we still have the opportunity to curb ice loss and save our coastal communities.



Increase in sea level from 1993 to present

CONCLUSION

Global climate change has already had observable effects on the environment. Glaciers have shrunk, ice on rivers and lakes is breaking up earlier, plant and animal ranges have shifted and trees are flowering sooner.

Effects that scientists had predicted in the past are now occurring: accelerated melting of polar ice cap, accelerated rise of sea level, and longer and more intense heat waves.

The countries from all over the world are trying to bring this problem under control by signing pacts and agreements, the most recent being the Paris Agreement. At the 21st Conference of the Parties in Paris in 2015, Parties to the UNFCCC reached a landmark agreement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future. The Paris Agreement builds upon the Convention and – for the first time – brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with

Effects of climate change

enhanced support to assist developing countries to do so. As such, it charts a new course in the global climate effort.

These efforts alone are not enough to fight against the forces of nature so each one of us needs to contribute to the cause. We must reduce the consumption of fossil fuel and switch to sustainable energy. We must come up with innovative ideas as to reduce the cost and increase the utility of renewable sources of energy. This is the only way by which we can save our world in time.

BIBLIOGRAPHY

climate.nasa.gov
www.un.org
www.ted.com

✠✠✠✠✠✠✠

WILDFIRE

Gargi Adhikari, *Class of 2022*

In just seconds, a spark or even the sun's heat alone sets off an inferno. The wildfire quickly spreads, consuming the thick, dried out vegetation and almost everything in its path. What was once a forest becomes a virtual powder keg of untapped fuel. In a seemingly instantaneous burst, the wildfire overtakes thousands of acres of surrounding land, threatening the homes and lives of many in the vicinity. An average of 5million acres burns every year in the United States, recording 100,000 wildfires each year. Wildfires are frequent in European countries such as in Portugal (13261 Forest fires in 2016); Russia (10089 Forest fires in 2016); Spain; Sweden and Italy. In North America; Car Fire in California in 2018, and 2018 British Columbia Wildfire and in 2017 Montana Wildfire are some of the devastating wildfires. In South America 2010 Bolivia Forest fire, and in 2019 Brazil Wildfire, etc., and several such such wildfires have been recorded in the last two decades.

Wildfires are uncontrolled, rapidly spreading and raging huge flames enhanced with wind action and firebrands that can wipe out an extensive forest or vegetation land area within minutes. 90% of all wildfires are caused by humans. Human acts of carelessness' such as leaving campfires unattended and negligent, discarding cigarettes or other flammable objects, may set the fire. Wildfires can also be started in communities experiencing shifting cultivation, where land is cleared quickly and farmed until the soil loses fertility, and slash and burn clearing. Forested areas cleared by logging encourage the dominance of flammable grasses and abandoned logging roads overgrown by vegetation may act as fire corridors. Burning debris in remote areas, arson, fireworks and machinery accidents such as explosion of gas balloons and car crashes can ignite huge wildfires.10% of wildfires are caused by natural causes, such as by lightning strike on power cables, trees or rocks which can trigger off devastating wildfires or by hot lava expelled during volcanic eruptions which flows into the nearby lands or vegetation and ignites wildfire.

Wildfires destroy the habitats and the intricate relationships of diverse flora and fauna leading to loss of ecosystems and biodiversity. When a forest is set ablaze, animals and birds rush to escape from the area in which many gets killed. This leads to extinction of many rare species of flora and fauna. Several acres of land and vegetation are destroyed and soil gets highly degraded. When plant life is exterminated by fire, the quality of air we breathe in declines and greenhouse gases increase in the atmosphere leading to climate change and global warming. In addition, the huge clouds of smoke instigated by wildfire leads to massive air pollution which causes intense breathing discomfort and worsen the health of people living nearby and the firefighters and life savers.

Forests which are rich natural wealth to this Earth are burning down into ashes every year and these wildfires are also grasping the lives of species of flora and fauna leading

to severe imbalance in the ecology. As most of the wildfires which occur are the direct or indirect consequences of human carelessness or their activities, it is therefore high time to put a check on these activities to stop burning down of huge forests every year. Extinguishing campfires before leaving the forest area, being careful of not discarding any sort of inflammable objects in the woods, stopping the practice of slash and burn agriculture, etc., can be some of the contributing steps in reducing the levels of wildfire each year. Accumulated efforts of humans can only stop wildfire and save forests and the lives of thousands of species of flora and fauna, the natural calamities apart.

BIBLIOGRAPHY:

https://science.howstuffsworks.com
https://en.m.wikipedia.org
https://eartheclipse.com

✠✠✠✠✠✠✠

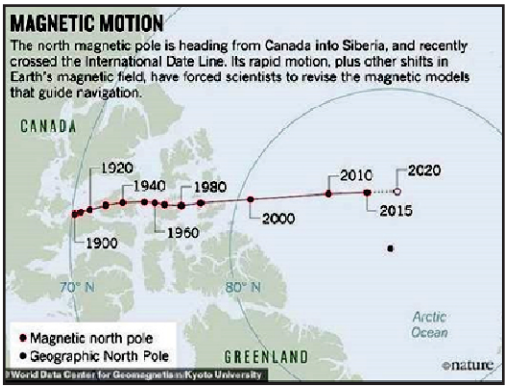
SHIFTING OF EARTH'S MAGNETIC NORTH POLE

Koyel Nath, *Class of 2022*

NTRODUCTION:

Something strange is going on at the top of the world. Magnetic north is not where it used to be. Earth's north magnetic pole has been skittering away from Canada and towards Siberia, driven by liquid iron sloshing within the planet's core. The magnetic pole is moving so quickly that it has forced the world's geomagnetism experts into a rare move. The pole wanders in unpredictable ways that have fascinated explorers and scientists since James Clark Ross first measured it in 1831 in the Canadian Arctic.

On 15 January, they were set to update the World Magnetic Model, which describe the planet's magnetic field and underlies all modern navigation, from the systems that steer ships at sea to Google Maps on smartphones.The most recent version of the model came out in 2015 and was supposed to last until 2020, but the magnetic field is changing so rapidly that researchers have to fix the model now. "The error is increasing all the time," says Arnaud Chulliat, a geomagnetist at the University of Colorado Boulder and the National Oceanic and Atmospheric Administration's (NOAA's). The problem lies partly with the moving pole and partly with other shifts deep within the planet. Liquid churning in Earth's core generates most of the magnetic field, which varies over time as the deep flows change. In 2016, for instance, part of the magnetic field temporarily accelerated deep under northern South America and the eastern Pacific Ocean. Satellites such as the European Space Agency's Swarm mission tracked the shift. Fluctuations in the Arctic were occurring faster than predicted. By summer, the discrepancy between the World Magnetic Model and the real-time location of the north magnetic pole had nearly exceeded the threshold needed for accurate navigation, said William Brown, a geomagnetic field modeler for the BGS. Some have speculated that Earth is overdue for another magnetic field reversal. An event that hasn't happened for 780,000 years and the North Pole's recent restlessness may be a sign of a cataclysm to come. Rocks hold geologic maps of even weirder movements of the magnetic poles, suggesting that in the last 20 million years, magnetic north and south have flipped places multiple times. This seems to happen roughly every 200,000 to 300,000 years. The exact causes behind these reversals remains uncertain.



CONCLUSION:

It's tough to predict what will happen to the magnetic north pole or whether it's even going to maintain its speed as it staggers toward Siberia, says Robyn Fiori, a research scientist with Natural Resources Canada. The only thing that seems certain about magnetic north is its unpredictability. In the meantime, scientists are working to understand why the magnetic field is changing so dramatically. Geomagnetic pulses, like the one that happened in 2016, might be traced back to 'hydromagnetic' waves arising from deep in the core. And the fast motion of the north magnetic pole could be linked to a high-speed jet of liquid iron beneath Canada.The jet seems to be smearing out and weakening the magnetic field beneath Canada, Phil Livermore, a geomagnetist at the University of Leeds, UK, said at the American Geophysical Union meeting. And that means that Canada is essentially losing a magnetic tug-of-war with Siberia ."The location of the north magnetic pole appears to be governed by two large-scale patches of magnetic field, one beneath Canada and one beneath Siberia," Livermore says. "The Siberian patch is winning the competition."

BIBLIOGRAPHY:

- www.sciencealert.com
- www.nature.com
- www.nationalgeographic.com
- www.nasa.gov

✠✠✠✠✠✠

CYCLONE FANI

Koyena Das, *Class of 2022*

INTRODUCTION

Extremely Severe Cyclonic Storm Fani is the strongest tropical cyclone to strike the Indian state of Odisha after the 1999 Odisha cyclone. The first severe cyclonic storm of the 2019 North Indian Ocean cyclone season, Fani originated from a tropical depression that formed west of Sumatra in the Indian Ocean on 26 April. Vertical wind shear at first hindered the storm's development, but conditions became more favourable for Fani on 30 April. Fani rapidly intensified into an extremely severe cyclonic storm and reached its intensified peak on 2 May as a high-end Category 4 major hurricane. Fani weakened before making its landfall, and its convective structure rapidly degraded thereafter, degenerating into a remnant low on 4 May, and dissipating on the next day.

Prior to Fani's landfall, authorities in India and Bangladesh moved at least a million people each from areas within Fani's projected path onto higher ground, and into cyclone shelters, which is thought to have reduced the resultant death toll and casualties. Fani killed at least 89 people in eastern India and Bangladesh and caused about US$8.1 billion in damages in both India and Bangladesh, mostly in Odisha, in India.

HISTORY

The IMD began tracking a depression located west of Sumatra on 26 April, classifying it as BOB 02. Later that day, the Joint Typhoon Warning Center (JTWC) issued a Tropical Cyclone Formation Alert on the system. Afterward, the storm slowly coalesced while moving northward, and was upgraded to a deep depression at 00:00 UTC on 27 April. At the same time, the JTWC began warning on the system, designating it 01B. Six hours later, the IMD upgraded the system to a cyclonic storm and gave it the name *Fani*.

The system continued to intensify until 18:00 UTC on 17 April, after which it stagnated for over a day, as convection around the storm's center waxed and waned. Fani resumed strengthening around 12:00 UTC, with the IMD upgrading it to a severe cyclonic storm.At that time, Fani began a period of rapid intensification as it was located within a very favorable environment with sea surface temperatures of 30–31 °C (86–88 °F) and low vertical wind shear. As a result, the JTWC upgraded Fani to a Category 1-equivalent cyclone late on 29 April. Around 00:00 UTC on 30 April, Fani was upgraded to a very severe cyclonic storm by the IMD.

IMPACT

India

At least 72 people have been killed by Fani in India out of which 64 were accounted in Odisha. In Odisha, a teenager was killed after being hit by a falling tree. One woman died when she was hit by flying debris, and another died of a heart attack while in a cyclone shelter. The cyclone adversely affected electricity supply and telecommunication in several coastal areas of Odisha, and to a lesser extent, of West Bengal. Puri and Khordha district in Odisha were the worst hit. The Jagannath Temple in Puri suffered minor damage, the repairing cost were estimated to be 51 million (US$738,000).The Siksha Anusandhan University also suffered a damage of about 300 million (US$4.3 million). Total damage in Odisha were estimated at 120 billion (US$1.74 billion), mostly in property damage and the relief. After the cyclone, Odisha required [1] 170 billion (US$2.46 billion) for

rebuilding the infrastructure. Indian Prime Minister Narendra Modi announced that the government had released over ₹ 10 billion (US$145 million) for the states affected by Fani. There were massive environmental devastation, as well. Trees destructed under heavy wind in Odisha during cyclone Fani. Although no fatalities occurred in Andhra Pradesh, Srikakulam and Vizianagaram districts, they reported an economic loss of 586.2 million (US$8.5 million).The South Central Railway also suffered a damage of about 29.8 million (US$432,000).

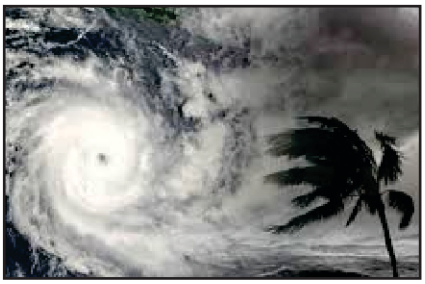
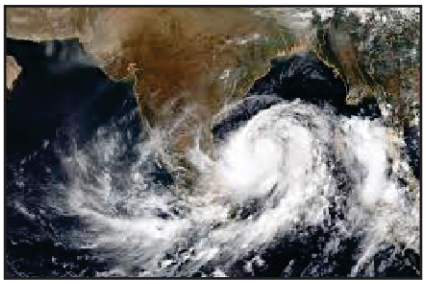
BANGLADESH

Fani killed 17 people in ten districts of Bangladesh. In Bagerhat District, a woman died after being hit by a falling tree, and 7 of them were killed by lightning in two districts of Bangladesh. The cyclone also destroyed about 63,000 ha (160,000 acres) of farmland in 35 districts of the country, the agricultural loss were at 385 million (US$4.6 million).

WHY FANI IS NAMED SO?

While selected the name of the cyclone, countries have to take care that the world is easily understood by the regions of the world, hence the names should be in their familiar words.

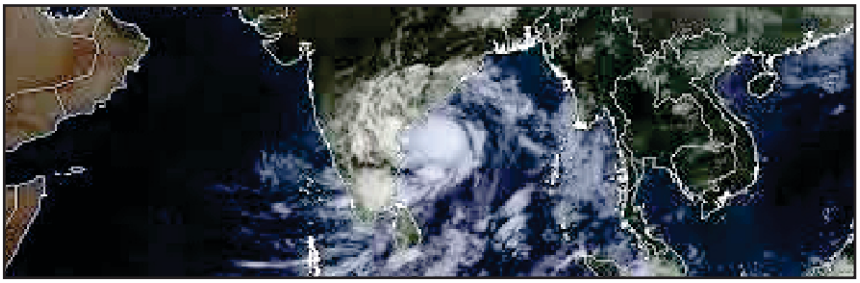
"The main purpose of naming the tropical cyclone is basically for the people of every region of the world, the facilities tropical cyclone disorder is risk awarding properties, management and reduction". Another important reason is to help the authority quickly identify storms and keeping a track of them because it is an easier to remember by their names than by using a very tough technical terms and along with latitudes and longitude.


CONTROL TAKEN BY THE GOVERNMENT OF ODISHA:-

The cyclone fani has left a trail of destruction which occurs in a large of coastal Odisha, but its management has been emerged as a global example in the reduction of loss of the life.

The Odisha government and the cyclone had the task of reality infrastructure. They used the opportunity which achieve the cost efficiency, and build the coastline to extreme weather.




Many survivors were sent to safe places for the protection and the many were safe in regions far from the sea-side. Dry food and other necessaries were distributed among the people for their survival.

BIBLIOGRAPHY

1. *"Cyclone Fani churns toward India, prompting evacuation of almost 1 million". CBS News. AFP. 3 May 2019. Retrieved 3 April 2019.*
2. ^ *Wright, Pam (2 May 2019). "Tropical Cyclone Fani Nears India as Country Works to Evacuate Hundreds of Thousands". The Weather Channel. Retrieved 2 May 2019.*
3. ^ Jump up to: *Mohanty, Debabrata; Bhattacharya, Snigdhendu (4 May 2019). "Fani leaves trail of devastation; India, Bangladesh count losses". Hindustan Times. Retrieved 5 May 2019.*
4. ^ Jump up to: *Kumar, Hari; Gettleman, Jeffrey; Yasir, Sameer (3 May 2019). "How Do You Save a Million People From a Cyclone? Ask a Poor State in India". The New York Times. Retrieved 5 May 2019.*
5. ^ "*Cyclone Fani: Naval ships, aircraft on standby". The Hindu. 30 April 2019. Retrieved 30 April 2019.*
6. ^ "*Bangladesh prepares for Fani as cyclonic storm draws near". Dhaka Tribune. 1 May 2019. Retrieved 1 May 2019.*

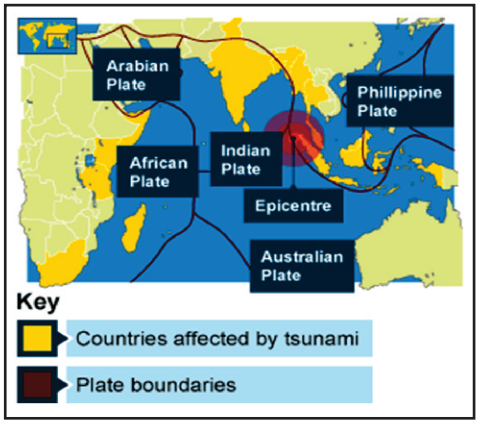
✠✠✠✠✠✠

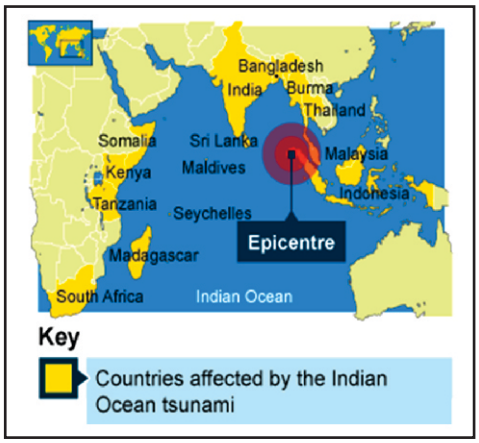
CASE STUDY: THE INDIAN OCEAN TSUNAMI OF 2004

Madhuleena Das, *Class of 2022*

INTRODUCTION:

Tsunami is a Japanese word which means **'harbour wave'**. A tsunami is a large sea wave caused by the displacement of a large volume of water. They can be caused by earthquakes triggered by moving sections of the Earth's crust under the ocean. In the last decade there has been a number of devastating tsunamis. Two large ones caused particularly extensive devastation: the Indian Ocean Tsunami (26 December 2004) and the Japanese Tsunami (11 March 2011).





The Indian Ocean tsunami of 2004 was caused by plates moving and slipping under the ocean. Tsunamis from seismic activity are much more rare in the Indian Ocean compared to the those in the Pacific Ocean. Nonetheless, the 2004 event in the Indian Ocean occurred at 00:58 UTC (08:58 local time) on 26 December, 2004. The earthquake-generating tsunami had a moment magnitude between 9.1 and 9.3. It was the second most powerful event since modern seismic records began in 1900 and was the largest for the preceding 40 years. The event affected the orbit of the Earth and triggered other earthquakes approximately 11,000 km away in Alaska. Since 1900, only two earthquakes have been recorded with a similar magnitude; the 1960 Great Chilean Earthquake and the 1964 Great Alaskan Earthquake both of which generated significant tsunamis. The epicenter of the Sumatra -Andaman megathrust event was 30 km undersea around 250 km northwest of Sumatra along the Indo-Australian plate boundary. It is estimated that this section of the plate had not moved for >200 years, which during that time, accumulated a lot of energy. At the time of impact, the earthquake set a new record for the longest duration t between 8 and 10 min. The earthquake ruptured the Sumatra and Sunda subduction zones over a length of 1,300 km which generated a massive tsunami consisting of two or three mainwaves and numerous smaller ones. Based upon seabed surveys, it is estimated that there was at least 10 and 4-5 m of lateral and vertical movement respectively, along the fault line.

IMPACTS OF THE TSUNAMI:

This event caused the largest loss of life of any known tsunami with 230,000-280,000 estimated fatalities. Based on fatalities, this event outranks almost every natural disaster. This, and the 2010 Haiti earthquake that killed between 100,000 and 316,000 are the deadliest natural disasters of the twenty-first century.

The impact of the Boxing Day tsunami, was exacerbated by the scale of seabed displacement, its proximity to the coastline of Banda Aceh Province in Indonesia where most fatalities and damage occurred, and the lack of an Indian Ocean Tsunami Detection and Warning System. Even with a functioning warning system in place, the people of Banda Aceh would have had less than 15 min to evacuate. Ultimately approximately 170,000 of the fatalities occurred in this area. One of the great tragedies of this event is that with a warning system in place, it is

believed that all 60,000 lives(approx.) lost in Sri Lanka, Thailand, India, Maldives, Bangladesh, Malaysia, Myanmar, and in several countries in East Africa could have been avoided. This estimate includes around 9,000 tourists, mainly from Europe, vacationing in Thailand. For example, Sweden lost >500 citizens. In addition to the extensive fatalities, approximately 1.69 million people were displaced. Indonesia and Sri Lanka were the worst impacted with over half million people displaced in each country. Many survivors lost their livelihoods due to the destruction of their fishing boats and coastal farms. The scale of destruction and damage was enormous, but in most places, it was limited to within 1 or 2 km of the coastline. Large expanses of the coastal zone were cleared of every building, all vegetation, and soil. The total cost of damage was estimated at around $15 billion, which is rather low given the scale of the devastation because most of the areas affected were in developing countries where standards are low compared to the global average. Indonesia was the worst affected with an estimated damage of at least $4.5 billion, followed by Sri Lanka with an estimated $3.5 billion, and India and Thailand with an estimated damage of >$1.5 billion each.

CONCLUSION:

In the aftermath of the tsunami, the UN Intergovernmental Oceanographic Commission (IOC), comprising UN Educational, Scientific, and Cultural Organization and other partners, began coordinating efforts to create an Indian Ocean early warning system and administering evacuation plans. In 2005, UN Meeting in Kobe, Japan, it was agreed to establish a warning system that would become operational in June, 2006. The warning system consists of 25 seismographic stations reporting to 26 national tsunami information centers and six DART (Deep-Ocean Assessment and Reporting of Tsunami) buoys. In 2012, Thailand successfully launched their national warning system, which was eight years after the Andaman coast was destroyed and 5,395 people killed, many of whom were tourists. The Thai National Disaster Warning Center established 136 warning towers and three tsunami-detection buoys in the Andaman Sea that are connected to the United States Geological Survey, the World Meteorological Organization, and other authorized disaster-monitoring agencies. The efficacy of Indonesia's early warning system was tested in April 2012 when an 8.6 Mw earthquake occurred 400 km southwest of Banda Aceh. Despite the initial (and likely justifiable) panic by people in many at-risk coastal locations, according to Thorkild Aarup, Head of the Tsunami Unit of the UN IOC, "The three early warning systems (and evacuation drills) functioned as they should have across the board. The Indonesian early warning was issued at 8.43 UTC-five minutes after the quake happened. The Australian warning was issued 10 min after,

while India's was issued eight minutes after the earthquake." The region has certainly become much better equipped in the eight years following the devastating 2004 Boxing Day tsunami. However, it is essential that governments continue to train people to respond to warning systems and prepare the coastal inhabitants for tsunami disasters.

BIBLIOGRAPHY:

1.**"**Tsunami case studies", www.bbc.co.uk

2. "Indian ocean Tsunami", www.wikipedia.org

3. "Indian ocean tsunami- economic aspects",www.indianoceantsunami.web.unc.edu

4."Tsunamis and earthquakes: Tsunami generation from the 2004 Sumatra earthquake- USGS Western Coastal and Marine geology", www.walrus.wr.usgs.gov

5."Magnitude 9.1- Off the west coast of Sumatra" U.S Geological Survey. 17th August, 2012.

6."Analysis of the Sumatra-Andaman Earthquake reveals longest fault rupture ever", National Science

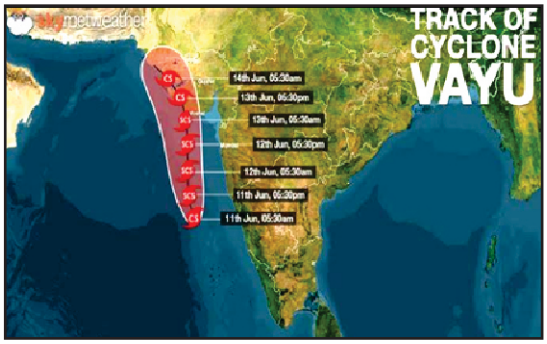
✠✠✠✠✠✠

CYCLONE VAYU

Rajeshwari Chakraborty, *Class of 2022*

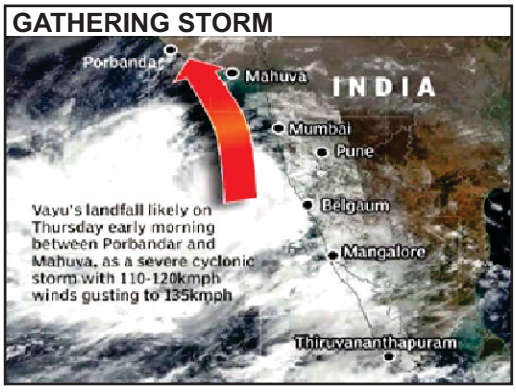
INTRODUCTION

Cyclone Vayu, was a catastrophic and extremely deadly tropical cyclone that caused widespread loss of life and destruction in Somalia, especially Mogadishu, during a part of the hyperactive 2018-19 North Indian Ocean cyclone season.



Meteorological history

Vayu, originated from an area of low pressure located roughly 120 miles off the coast of Somalia. The area moved over warmer waters on March 6, and the Indian Meteorological Department began watching the area on the same day for potential development. Over warm waters and with low wind shear, the low quickly organized, and the IMD classified it as a tropical depression on the same day. The depression remained over warm waters as it moved towards the coast of Somalia. On March 7th, it was upgraded to a tropical storm, and was assigned the name, *Vayu*. On the next day, Vayu underwent a period of rapid intensification as it moved over even warmer waters, with low wind shear. It quickly developed a large 70mile wide eye, before the eye contracted a sign of intensification. Soon after hitting its initial peak, the storm changed directions while just off-coast of Somalia, paralleling it while affecting Mogadishu and its surrounding area for many days. On March 8th , the storm began to track away from coast, its winds intensifying further. Vayu peaked while in middle of performing the loop, Vayu exited land over Mogadishu as a tropical storm, before travelling away from coast and weakening to a tropical depression. Soon after, the storm briefly intensified to a low-end tropical storm, but right afterwards it encountered wind shear, which ripped its western side apart. Vayu slowed down to a tropical depression, still moving eastwards. High wind shear rapidly destroyed the storm, and Vayu transformed into a remnant low on March 16. It fully transformed to a simple cluster of thunderstorms on March 17th, 2019..



PREPARATIONS

As the system intensified into a deep depression, the IMD issued a pre-cyclone watch for the coastline of the state of Gujarat. The agency indicated that further strengthening into a cyclonic storm within the following 24 hours was very likely. Fishermen were warned not to venture into the Arabian Sea near the developing system or in the forecast path of the cyclone, and mariners already at sea were urged to return to the coast. The pre-watch for the Gujarat coastline was upgraded to a yellow cyclone alert. This was further upgraded to an orange alert on 11th June. Beginning on the morning of 12th June, the government evacuated approximately 300,000 people living in coastal regions of Gujarat to 2000 shelter homes. All flights at

airports in Porbandar, Diu, Bhavangar, Keshod and Kandla were grounded. In Mumbai, ferry services were cancelled or shortened, to the west on 12–13 June. All ports in Gujarat suspended operations. Approximately 2,300 personnel in 52 teams from the Force were deployed to Gujarat help local authorities with evacuation efforts, as well as to aid in search, rescue and relief operations after the cyclone. The Indian Coast Guard, Army, Navy and Air Force were also all put on alert. Police officers also conducted night patrols to ensure that no residents were left behind in evacuated areas.

IMPACTS

Despite not making landfall, Cyclone Vayu tracked close enough to the Indian coastline to produce minor impacts. Strong winds, heavy rainfall and large waves were experienced along large sections of the country's western coast, particularly in Gujarat , numerous thatched houses were either damaged or destroyed by gusty winds, with many kutcha houses having their roofs torn off. A large number of tin sheds were blown away, and many trees were uprooted along the Saurashtra coast and on the island of Diu. Strong wind caused the 150-year-old Bhuteshwar Mahadev temple in Porbandar to collapse and a metal shed at Somnath Temple to be damaged. Damage to power lines and electricity poles caused power cuts in more than 2,250 villages in Gujarat, with some blackouts lasting for several days in some locations. The prolonged strong winds generated waves of around 4 m (13 ft) high along large parts of the coastline, many low-lying coastal areas on the Saurashtra coast and southern Gujarat were flooded. Many of the victims had been working on farms during heavy rain and thunderstorms when they were struck. In the town of Chamba in northern India, houses and roads were damaged by flash flooding and hail from a severe thunderstorm associated with Vayu. Rainfall associated with Vayu continued for several days in the state of Maharashtra, with the city of Nashik receiving 92.1 mm (3.6 in) of precipitation in a 24-hour period on 15–16 June. The family of the deceased victim received Rs.5 lakh. The onset of the Indian monsoon had been delayed past its usual commencement by about one week due to near El-Niño conditions in the tropical Ocean throughout 2019. The anticlockwise rotation of the cyclone's wind field caused typical cool onshore winds to be replaced by hot winds from the desert to the north.

BIBLIOGRAPHY:

https://en.m.wikipedia.org/wiki/Cyclone_Vayu
https://www.google.com/amp/s/amp.cnn.com/cnn/2019/06/11/world/cyclone-vayu-india/index.html

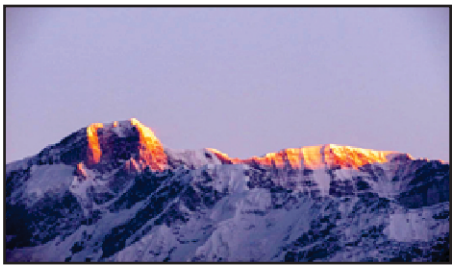
✠✠✠✠✠✠

THE ETERNAL BEAUTY OF CHOPTA VALLEY

Soumi Kayari, *Class of 2022*

Serenity, it was the very first word which came to my mind when my eyes caught the view of the mesmerizing valley of meadows and evergreen forest named Chopta. Situated at an altitude of 2680m above sea level, a part of Kedarnath wildlife sanctuary Uttarakhand, India, this valley is mostly attracted to nature lovers and trekkers. As a visitor in the month of October, I experienced very cold weather with sunny to partly cloudy mornings and temperature varying from minimum of 2-3-degree celsius to 17-18 degree celsius maximum. Different species of flora like Pine, Fur and Deodars enhances the greenery of this place. Being an unspoiled natural destination, it has several eco-camps for the travellers. Magpie Jungle camp located at a distance of two hours and thirty minutes from the city area, on the lap of mother nature is one such eco-camp which is surrounded by snow covered mountain peaks. October 12th, 2019 I started my journey from Sitapur, Uttarakhand and reached the camp around 10a.m. I had to walk through a dense forest to reach the camp area. The electricity in here is generated from solar panel so, the guests had to use candle lights or else torch light at the night, and the water too was collected from the natural small waterfalls and streams flowing near the valley. It was a perfect place to escape the chaotic city life and be close to nature.

October 13th, 2019, my day started by witnessing a splendid view of the sunrise from the camp over the Himalayan mountain peaks. The aesthetic view of the orange light over the white snow, felt like nature had



painted her own canvas. The chirping sounds of the Blue Whistling Thrush, White Capped Redstart and Himalayan Monal made the overall environment even more delightful. Chopta is the base of Tunganath temple, one amongst the five age-old shrines of Panch Kedar. After having some breakfast consisting of local food, I started my journey for Tunganath trek (a 4km trek). The starting point of the trek is located at a distance of three or four kms from the camp and a local travel service is available to reach there. One had to hire hiking sticks from the nearby locals before the trek. As I moved forward, the road started to become steeper and narrower with undulated rock boulders in between and the forest became denser. The thick canopy cover barely allowed the sunlight to enter and reach the ground. As I trekked up further there was a change from tall pines and deodars to small trees, bushes and shrubs. Though the route was getting more tough to move forward but the beauty and charm of the surrounding environment was even more pleasing. At a certain level both the sides of the route were seen filled with Rhododendron trees and a hamletted rural settlement was also there inhabited by the local people. Their lifestyle in these mountains was pretty simple yet harsh as they need to struggle to get hold of their daily needs without the help of modern technology. Their huts were made of rocks and they totally depended on the mountains and its natural resources. Mother nature fulfils all their basic needs. Apart from this they had small shops selling tea and coffee for the trekkers.

The weather was becoming gloomy and soon the warm blue sky got covered with grey clouds followed by fog covering the mountains. Slowly the faraway snow-covered peaks hid themselves behind the clouds. After trekking for another two hours we finally reached the temple of Tunganath the highest temple of Lord 'Shiva' on

Earth. The temple dates back to more than five thousand years and was totally built with rocks. The breathtaking view of the ancient architectural work at an elevation of 12,073m was worth the climb.

The sound of the religious bells and the whistling sound of the rushing winds made the surrounding environment even more thrilling. The entire valley could be seen from the summit which was partly covered with fog and clouds, whose beauty and grace could withstand any kind of materialistic thing on earth. As told by one of the local guides that the temple is closed after 10th of November every year and all the inhabitants and the priests and the caretakers of the temple comes down to the valley region after that because, the snow cover gets as thick as 3m and the region gets more prone to natural calamities. After spending quite a few hours, I started my journey for returning to the camp. It was time for the sunset and the weather slowly got better. The sky was finally clear and for one last time the golden rays of sun touched the snow-covered peaks showing its grace to the world before it got dark. The memory of that last picturesque sunset upon the Himalayan mountain ranges always reminds me the words of the poet John Keats "*A thing of beauty,is a joy forever*".

✠✠✠✠✠✠✠

PHOTO ALBUM OF DEPARTMENTAL ACTIVITIES

Workshop on 'Implementation of CBCS in UG Studies in Geography (Semesters 3 and 4) held on 26th and 27th April, 2019

Add On Course on 'Advanced GIS and IP Training' held in May 2019

Poster Presentation by students on Active Learning Day 22nd August, 2019

Career counseling by alumae on 21st November, 2019

Alumna discussing job opportunities, 25th November, 2019

One Day Workshop on 'Cadastral Mapping and GIS', 8th December, 2019

INFLUENCE OF PHYSICAL SETTING ON SOCIO-ECONOMIC LIFE OF MAN IN DHADKA, PURULIA DISTRICT

Banani Das and Didhiti Das, Class of 2019

INTRODUCTION: On the 4th December, 2017 the students of Geography Department visited Dhadka mouza in Bundwan Block, Puruliya District for field survey. The mouza is 14.3 km away from Bundwan town and 45.7 from the district headquarter Puruliya. The total geographical area of the village is 317.6 ha. According to 2011 census Dhadka has a total population of 1896 in 351 households.

OBJECTIVE: To present a geographical account of Dhadka mouza and correlate the physical and sociocultural features of the village.

METHODOLOGY: The present paper has been prepared following three different aspects of field study viz. (a) pre-field study (b) field study and (c) post-field study.

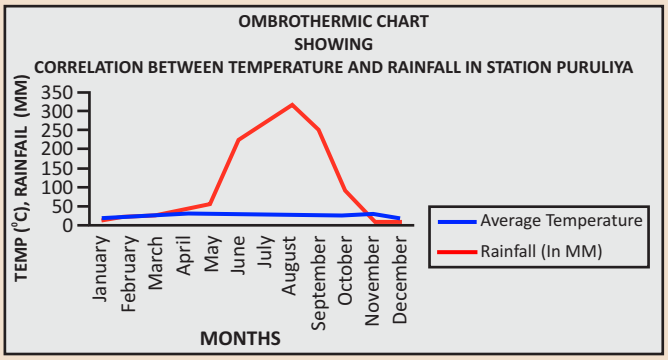
PHYSICAL SETTING: Puruliya is westernmost district of West Bengal. It is a part of Chotanagpur Plateau of Jharkhand and a zone between young alluvial plains of West Bengal and ancient plateau of Jharkhand. Being a part of the Ranchi peneplains, it is underlain by Precambrian metamorphic rocks except in a small area in the north-eastern part where sedimentary rocks of Gondwana age are exposed. Here, unconsolidated sediments occur as discontinuous patches adjacent to the major rivers and streams. Rocks of various geological ages range from Achaean to Recent. Intrusive granite exists in patches in the Bundwan block.

The nature of terrain and its features indicate that except in hilly areas, the general elevation of land ranges between 180-300m above msl. Average elevation of Bundwan block is about 263m and the Dhadka mouza is approximately 182.37m above msl. The slope of the land in the District is from less than 10m to 80m per km. The slope is steeper in the west. The average slope in the mouza is level to moderate. The landscape exhibits a level plain interspersed with residual hills, hillocks, dome shaped mounds and dissected valleys. The Bundwan block has some residual hills. The mouza has a gentle undulating terrain. The relative relief in the mouza has been found to be less than 12 m indicating level land and extremely low relief. The toposheet no. 73 J/9 shows contour line of 170 m passing through the central and the eastern parts of the mouza.

The principal rivers in the District are Dwarakeshwar, Kangsabati and Silabati Rivers and there are many

rivulets draining the District. Two non-perennial rivers, the Jora Nadi in the west and the Dora Nadi on south-east, flow past the Dhadka mouza.

The climate of the District is hot and dry with 18.5p C temperature in winter (January) rising to 32.1p C in summer (May). South-west monsoon is the principal source of rainfall. Annual rainfall is 1333.9mm. The wettest month is August with 315.3 mm of rainfall, the driest month being December with only 7.5 mm of rainfall. The relative humidity is high in monsoon season rising to 75% to 85% from a dry winter 25% to 35% relative humidity. It has been found that in the District medium type of drought occurs once in every three years and severe type of drought once in every 10 years. The ombrothermic chart shows a water surplus period between end of March and end of October as expected with monsoon rainfall.



The soil series associations found in the mouza are Baghmara-Shimaldanga and Genrua-Baghmara series and also Barapanjia –Rangamati series. The texture is dominantly sandy-loam to loam. Rivers from upland of Chotanagpur bring deposits of rounded pebbles mixed with laterites.

Tropical deciduous forests are found in the District as well as in the mouza. The major tree species are Sal, Mahua, Palas, etc. and their associations. Most of the virgin forests have been degraded and replaced by shrubs, bushes and agricultural lands.

A variety of fauna are found in the District with high number of bird species including quail, dove, pigeon, bulbul, jungle crow, weaver bird etc. An elephant migration route cuts across the encroaching human habitation and causes a major animal-human conflict issue. Other than elephants, there are mammals like wolf, sloth bear etc.

SOCIO-ECONOMIC STUDY: The male population surpasses the female population in the study area. The backbone of their economy is agriculture but people are also occupied in tertiary activities like weaving, cattle rearing. 60% of the household have electricity while 18% of household have a proper sewage system. The health status of the people are studied and it is found that among the rural population 50% have a moderate health condition . One not so well equipped public hospital is present in the vicinity of the region. A dominant area of the village is under forest cover, next is household sector and huge area of wasteland, pasturing land and agricultural fields follow.

Though, there is negligible growth of working population of main and marginal workers from 2001 and 2011 there is a considerable growth of women working population over the past 10 years.

The village scenario portrays nearly 90% of houses are owned by villagers . Out of this 40% of pucca and 60% of kutcha type of houses.

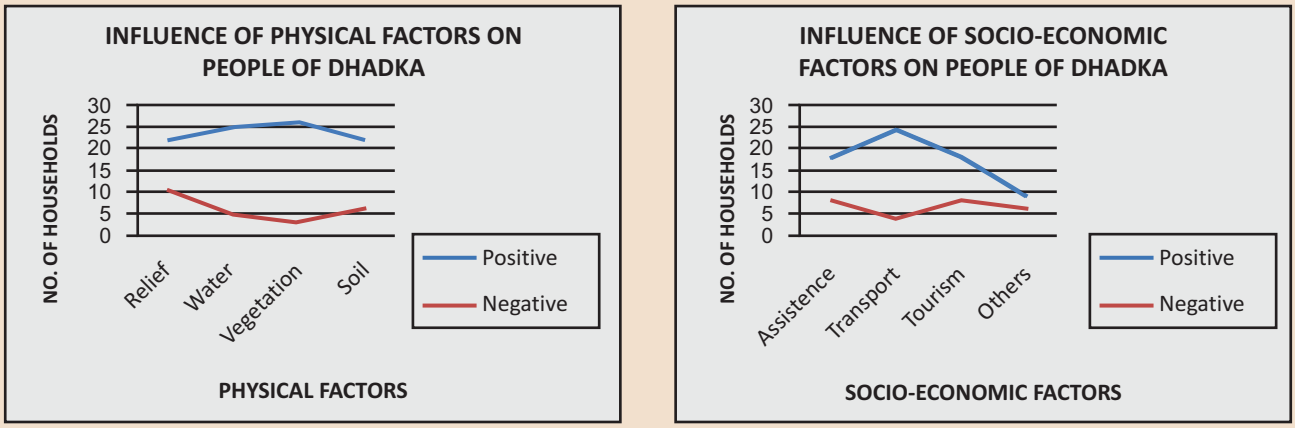
Education playing a vital role, literacy rate determines the level of education. The male literacy rate is 66.52% and female literacy rate is 28.46% out of total population which increased to 74.61% and 50.01% respectively.

The transport and communication of the area show heavy transportation in market area , near to the local health centre and school.

The village shows higher concentration of grocery shops among other shops. The maximum income comes from shops dealing with cement and hardware .

The overall perception of the villagers shows that they want improvement in the sectors of income, wealth, education (Fig . 2)

PERCEPTION STUDY



Source:-Village Survey, 2017 **Fig. 2**

CONCLUSION: On the basis of observations, we may conclude that Dhadka village is a developing village which is striving towards attaining cultural history and develop tourism. It's unique activity is handicraft items which include showpieces from the local SABAI grass and tradition bearing CHHAU MASKS. The given graphs thus shows the influence of physical factors on people of Dhadka. and influence of socio-economic factors on people of Dhadka indicating a correlation between physical and socio-economic factors.

BIBLIOGRAPHY:

- Census,2011.Census of India,2011.District Census Handbook, Puruliya, village and Town Directory.
- District Resource Map, Puruliya, West Bengal,2001. Geological Survey of India, Government of India, Kolkata.
- District Statistical Handbook, Puruliya,2016 Bureau of Applied Economics and Statistics, Department of Planning, Statistics and Programme Monitoring, Government of India.
- Forest of Puruliya District. Purulia.nic.in .
- IMD 2010.Climatological Table. India Meteorological Department, New Delhi.
- Map of Dhadka Village. Google Maps India,2017.
- Puruliya Map, India Google Satellite Maps. www.maplandindia.com>India>Puruliya
- Toposheet no. 73 J/9 , 2003.Bihar,West Bengal. Survey of India, Government of India
- West Bengal State Forest Report 2011-12. India Environmental Portal. www.indiaenvironmentportal.org.in

✠✠✠✠✠✠