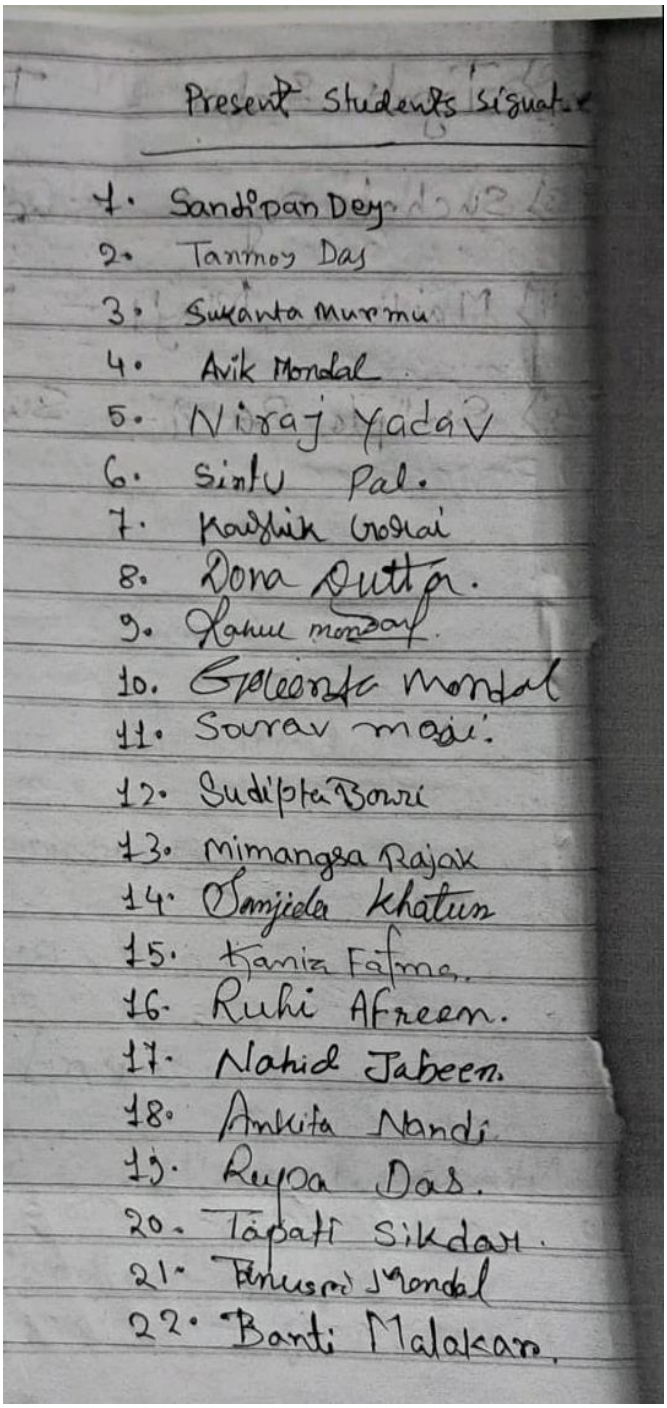
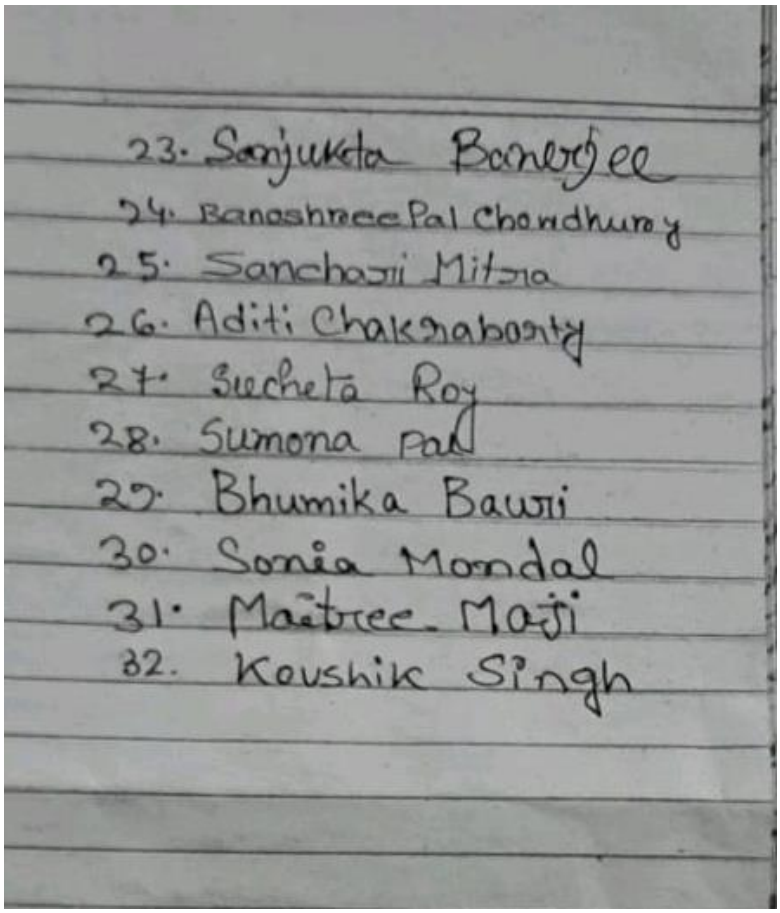
PROJECT WORK TO KASHIPUR [session 2022-2023]
Date : 17/05/2023

PURPOSE : According to the 6th semester practical syllabus for the project work we have decided to show the drought prone area and how it effect the inhabitats we have chosen kashipur block of purulia.


Present Students signature

1. Sandipan Dey
2. Tanmoy Das
3. Sukanta Murmu
4. Avik Mondal
5. Niraj Yadav
6. Sintu Pal.
7. Kaushik Gorai
8. Dona Dutta.
9. Rahul Mondal.
10. Greeshma Mondal
11. Sourav Majhi.
12. Sudipta Bouri
13. Mimangsa Rajak
14. Sanjida Khatun
15. Kaniz Fatma.
16. Ruhi Afreen.
17. Nahid Jabeen.
18. Ankita Nandi.
19. Rupa Das.
20. Tapati Sikdar.
21. Tanusree Mondal
22. Banti Malakar.


23. Sanjukta Banerjee
24. Banashree Pal Chowdhury
25. Sanchari Mitra
26. Aditi Chakraborty
27. Suchetā Roy
28. Sumona Pal
29. Bhumika Bauri
30. Sonia Mondal
31. Maitree Majhi
32. Koushik Singh

KAZI NAZRUL UNIVERSITY

BIDHAN CHANDRA COLLEGE

NAME – KOUSHIK GORAI

REG NO. – KNU20103003109

SUBJECT – GEOGRAPHY

PAPER NAME – DISETER MANAGEMENT (DROUGHT IN PURULIA)

SEMERTER – 6TH

SESSION – 2020-2023

CONTENTS

ACKNOWLEDGEMENT

I would like to express my special thanks to our mentor Mr./Mrs. Priyanka Kar Roy, Sougata Maji, Moumita Das, Soumi Sengupta for his/her time and efforts he/she provided throughout the year. Your useful advice and suggestions were really helpful to me during the project's completion. In this aspect, I am eternally grateful to

you.

Also, I would like to take this opportunity to thank my family members & supporters, without them it could not have been done effectively in such a short period of time. I cannot forget their love &

support.

A project is a bridge between theoretical and practical learning and with this thinking I worked on the project and made it successful due to timely support and efforts of all who helped me.

Thanking you....

Koushik Gorai
07/06/2023
.....

Signature of Student

07/06/23
07.06.23
.....

Signature of Teacher

- **Introduction: -**
- A disaster is a serious disruption of the functioning of a community or a society involving widespread human, material economic or environmental loss and impacts, which exceeds the ability of the affected community or society to cope using its own resources.
- Disaster management is the creation of plans through which communities reduce vulnerability to hazards and cope with disasters.
- Disaster management does not avert or eliminate the threats; instead, it focuses on creating plans to decrease the effects of disasters.
- Disaster can be natural or human made.

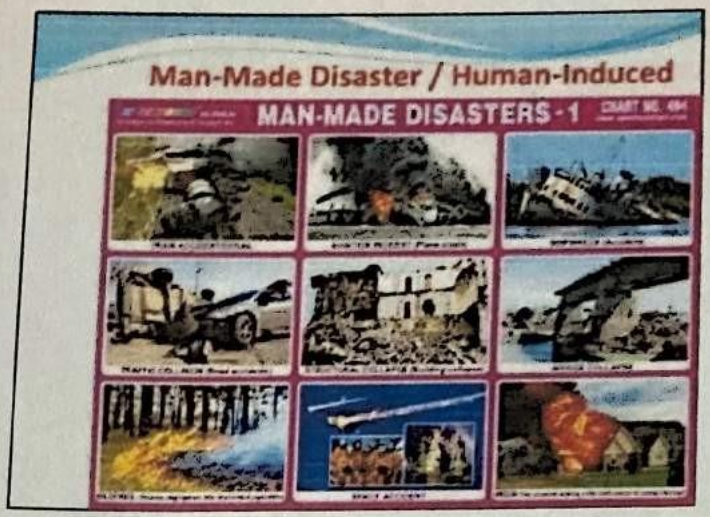
✦TYPES OF DISASTER MANAGEMENT:

There are two types of disaster management:

i. Natural Disaster Management: - Natural disasters are those which occur naturally due to a difference in the climate or the concerned body (water/earth). The natural disaster caused may be a result of steady or rapid disturbances in nature that have an impact on livelihood. These disasters can be harmful to both life and property. Earthquakes, Flood, Cyclone, Landslides are some common examples of natural disasters.

Natural Disaster

Man-made Disaster: - As the name suggests, man-made disasters are caused by the disturbances created by some notorious elements in society, or they can be to meet the lifestyle requirements of humans, which results in environmental degradation. Biological weapons, Deforestation, Pollution are some of the manmade disaster to human lives.



+Disaster Management Cycle: There are Many steps in the disaster management cycle, including:

i. **Prevention:** One part of addressing a disaster is by being proactive. Prevention involves identifying potential hazards and creating solutions that can help minimize the impact. While this part of the cycle involves preparation before the crisis event begins, putting the place permanent measures that can minimize hazards risk can help with every goal of disaster management. It can also be important to remember that not every disaster can be wholly preventable.

ii. **Preparedness:** Preparedness is when both individuals and groups within an area plan and train for what they do in response to a disaster event. Developing preparedness in an individual, group or community is a process that develops and improves over time. It's defined by ongoing training, both to teach others new concepts and to review action with experts. Those who understand appropriate response actions help evaluate and correct student reactions, helping teach, demonstrate and ensure high levels of readiness.

iii. **Response:** The response phase is the immediate reaction from everyone after a disaster occurs. It involves both long and short-term responses, both of which can heavily impact the overall outcome and aftermath of the event. In an ideal situation, a disaster management leader helps coordinate the resource use throughout the response operation to help ensure the maintenance of personal and environmental safety in an area.

These resources include medical safety personal, equipment and supplies. Disaster management leaders also work toward keeping order during times of crisis, helping mitigate property damage from theft or crime during the crisis period.

iv. **Recovery:** Recovery is the last phase of the disaster management cycle. It involves the recovery and recuperation of the people and property that experienced the disaster. This can include individual therapy and group sessions with those who shared the incident experience. Recovery can also include physical recovery, both from immediate injuries that were sustained during the crisis and those that require longer treatments, such as physical therapy.

Once a part of the erstwhile Manbhum district, Purulia came into existence on 1 st November 1956 when the Manbhum district was divided between West Bengal and Bihar. This makes it one of the oldest districts in West Bengal. Purulia shares its western boundary with the district of Bankura while it is flanked by Burdwan District on the northeast and a part of Midnapore district on the southeast.

Purulia for the major part is bounded by Hazaribag, Singbhum, Dhanbad, Ranchi, Jamshedpur and Bokaro districts of Jharkhand, on its three sides.

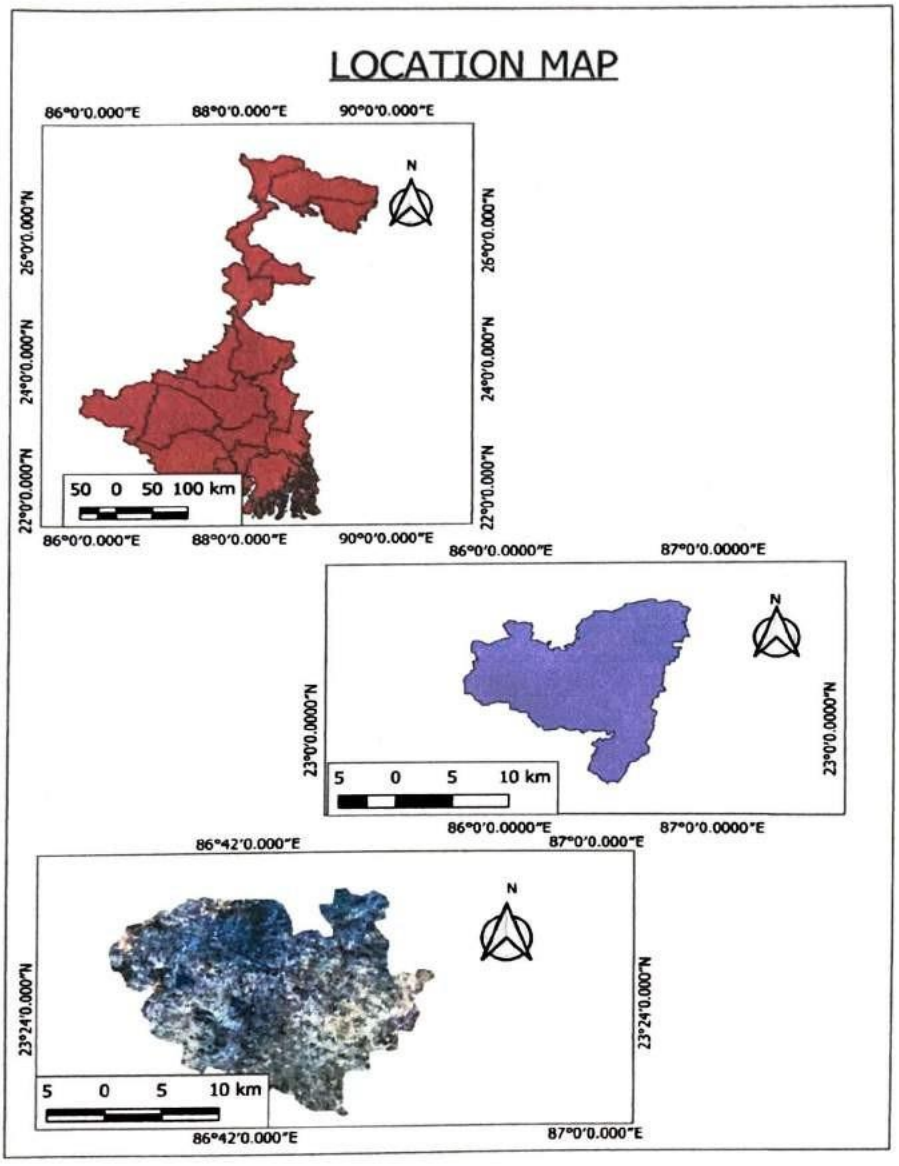
This western most district of West Bengal lies between 22.60° and 23.50° north latitudes and 85.75° and 86.6° east longitudes. Compass declination is 0°22' W. The geographical area of the district is 6259 km². Traversed by the Tropic of Cancer, Purulia has pan India significance because of its tropical location, its topography and funnel like shape. It funnels not only the tropical monsoon current from the Bay to the subtropical parts of orth-est India, but also N W acts as a gateway between the developed industrial belts of West Bengal and the hinterlands of Orissa, Jharkhand, Madhya Pradesh and Uttar Pradesh.

With the second highest concentration of schedule tribe population in West Bengal(Census, 2011) Purulia lags behind the other districts in terms of economic and human development.

	PURULIYA
Total Area	6,259 km²
Total Population	2927965
Density of Population	470/km²
Literacy	86.35 per cent
Sex ratio	955
Average Annual Precipitation	Varies between 1,100mm and 1,500mm
Highest Point	Ajodhya Hills (855 m or 2,805 ft)
Longest River	Kangsabati River
Climate	Sub-tropical climate characterized by high evaporation and low precipitation
Terrain	W&S : rugged hilly terrain the master slope is towards the east and south-east
Sources	Census, 2011 IOSR Journal of Environmental Science, Toxicology and Food Technology. Volume 9, Issue 8 Ver. I (Aug. 2015) https://en.wikipedia.org/wiki/Purulia_district

LOCATION:

Kashipur block is a part of Purulia district, situated in the south eastern part of this district. The study area falls between latitude 23°26'54.50"N 23°21'26.92"N longitude 86°34'20.84"E 86°49'50.78"E, with an area of 2 433.62 km. A total of 40 villages are selected to enhance the drought resilience of the marginal community for adaptation to Climate Change.



CLIMATE:

Purulia are drought prone districts of West Bengal. They have a sub-tropical climate characterized by high evaporation and low precipitation. Temperature soars in the summer months and dips in the winter with the seasonal variation ranging from 12 degrees in winter to 45 degrees in summer, making it moisture deficient. South-west monsoon is the principal source of rainfall in the districts, while some amount of winter rain is not uncommon. Average annual rainfall varies between 1100mm to 1500 mm. The relative humidity is high in monsoon season, being 75% to 85%, but during dry summer months it comes down to 25% to 35%.

SOIL:

Soil of Purulia districts can be broadly grouped into three principal types (1) Red Soil (2) Alluvial Soil (3) Lateritic Soil (Groundwater Resources Assessment and Management of the Bankura District, CSME, 1993). Red and Lateritic soil dominates the landscape and gradually merges with old alluvium towards east. Gravelly soil is also found in patches in the vicinity of the hills. In general, the soil is thin, coarse grained, poor in organic matter and very poor in water holding capacity.

NATURAL VEGETATION:

Natural vegetation of the blocks consists of tree, shrubs, grass and weeds. The major tree species are Sal, Mahua, Palas, Kend, Arjun, Shimul, Pipal etc. Some important shrubs and herbs are Lal Bharenda, Nishinda, Maranphal, Ghetu etc.

The grasses found in the field are Sar, Kans, Mutha, Kansira etc.



HYDROGEOLOGY:

The crystalline rocks of Kashipur are usually very hard, massive and compact in nature but are generally fractured, jointed and traversed by veins of quartz and pegmatite. These rocks become disintegrated and decomposed near the land surface commonly referred to as "weathered zone" or "weathered residuum". This zone and fracture zones within the hard rocks serve as the main ground water storage in the area. However, due to high content of Apatite in Pegmatites and other fluoride bearing mineral in the crystalline gneisses, ground water is

often polluted with Fluoride much above the permissible limit.



MAJOR OBJECTIVES OF THE PROJECT:

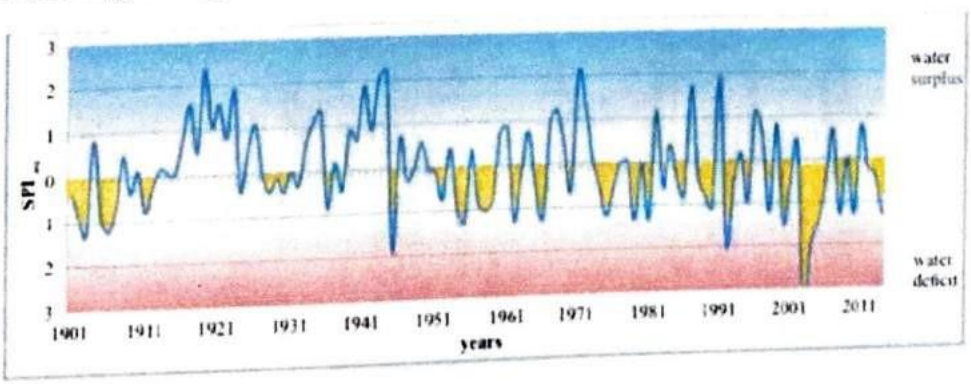
- Spatial analysis and relative vulnerability assessment of the study area using Remote Sensing and GIS.
- Drought frequency and severity assessment.
- Analysis of pre and post-monsoon drought.

DROUGHT ANALYSIS:

Drought index has been developed for the study area as a means to measure drought. There are several indices that measure how precipitation for given period of time has deviated from long term average. Some of the widely used drought indices include Palmer Drought Severity Index (PDSI), Standardized Precipitation Index (SPI), Standardized Water Level Index (SWI), Standardized Precipitation Evapo-transpiration Index (SPEI) etc.

SPI:

As in the rest of the state, even in Kashipur blocks, rainfall mostly depends on the vagaries of the south-west monsoon. The Standardized Precipitation Index (SPI) expresses the actual rainfall as standardized departure from rainfall probability distribution function. In this study, severity and spatial pattern of meteorological drought was analysed in the blocks of Kashipur . The Standardized index to characterize meteorological drought on a range of time scales. On short time scales, the SPI is closely related to soil moisture, while at longer time scales, the SPI can be related to groundwater and reservoir storage. Precipitation Index (SPI) is a tool which was developed primarily for defining and monitoring drought.



Temporal Evolution of 1-Month SPI for the Entire Kashipur block

NORMALISED DIFFERENCE VEGETATION INDEX:

NDVI is an index of vegetation health and density computed from satellite imagery using spectral radiance in red and near infrared reflectance using the formula:

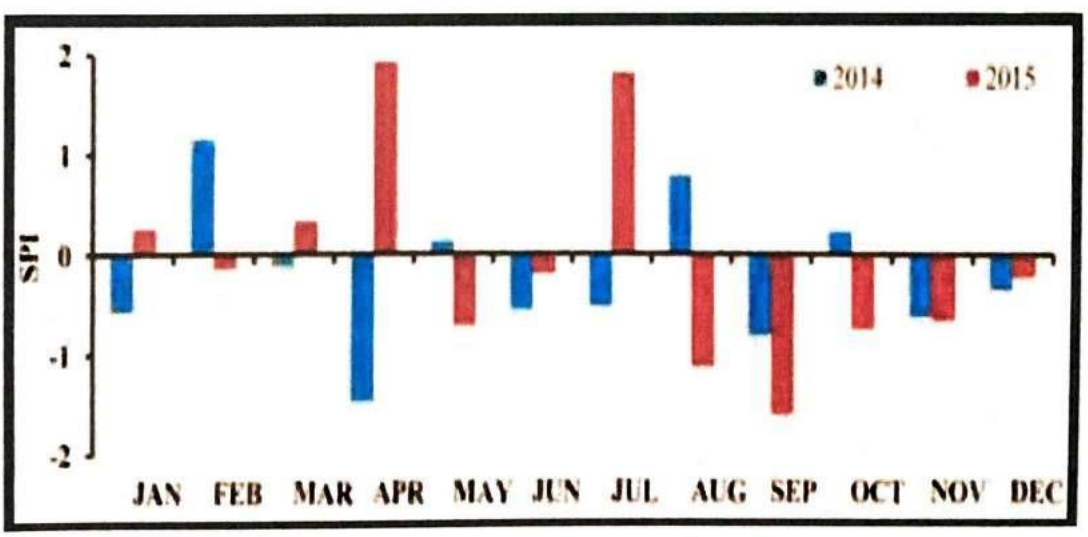
NDVI= (NIR-R) / (NIR+R)

Where, NIR= near infrared band, R= Red band;

NDVI is a powerful indicator used worldwide, to monitor vegetation cover over wide areas, and to detect frequent occurrence and persistence of droughts (Thavorntam and Mongkolsawat, 2006). It provides a measure of the amount and vigour of vegetation on land surface. The magnitude of NDVI is related to the level of photosynthetic activity in the observed vegetation. In general, higher values of NDVI indicate greater vigour and amounts of vegetation.

MOISTURE STRESS INDEX (MSI)

Moisture Stress Index is used to determine the soil moisture condition during a drought. It is a good indicator of agricultural drought. It has been calculated by using MIR band and NIR band of Lands at data. MSI value range is from 0 to 4.



SPATIAL SCENARIO OF DROUGHT

The spatial variability in the drought scenario revealed that mild and moderate droughts occurred in the north, east and northwest portion of the study area (which included villages like Rangamati, Lapara, Patpur, Kashipur, Suaria, Malanch etc.). The southern part (comprising villages like Gopal Chak, Balarampur, Kustor, Jamkiri, Lari etc.) of the study area was prone to severe drought, however, less prone to extreme droughts. Extreme drought occurred in south-western part (Sunra, Seja, Kashidi, Shampur, Gopalpur, Saharbera villages) of the study area. Hence the entire study area may be labelled as drought prone area in the month of April (pre-monsoon).

Even in the month of August (i.e. monsoon season) severe droughts were noticed in northern, southern and central portions followed by extreme drought in north eastern portion. Mild and moderate droughts occurred in the western portion of the study area.

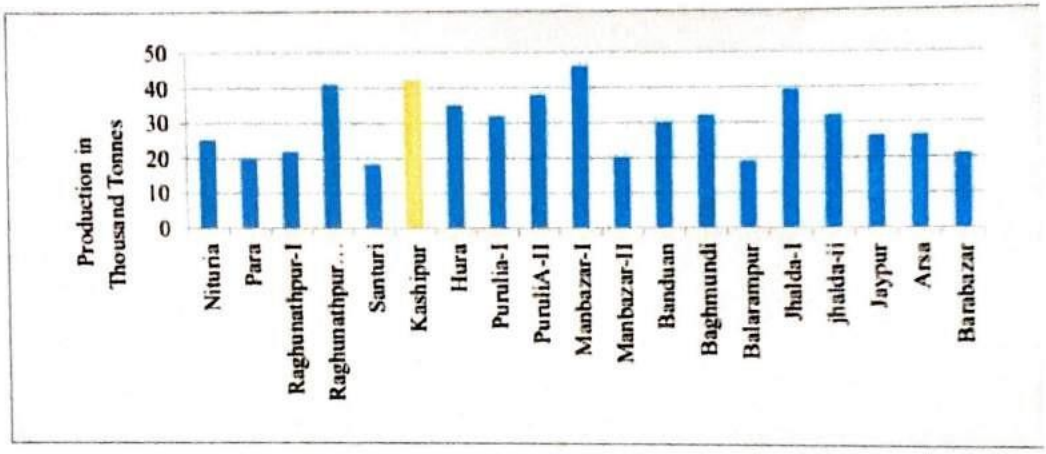
Kashipur (2000-2015)				
Drought Category	Colour	Pre-Monsoon (Apr)	Monsoon (Aug)	September
		Villages		
Extreme Drought				
Severe Drought		Seja, Sunra, Kashidi, Chaka, Lajhna		
Moderate Drought		Bhatin, Balarampur, Jagannathdi, Jamkiri, Jibonpur, Lara, Ranjandi	Bhatin, Balarampur, Jagannathdi, Jamkiri, Jibonpur, Lara, Ranjandi, Bodma, Jorthol, Tilaboni	
Mild Drought		Bodma, Jorthol, Tilaboni	Seja, Sunra, Kashidi, Chaka, Lajhna	Bhatin, Balarampur, Jagannathdi, Jamkiri, Jibonpur, Lara, Ranjandi, Bodma, Jorthol, Tilaboni, Seja, Sunra, Kashidi, Chaka, Lajhna

of Kashipur

CROP PRODUCTION:

Purulia are drought prone districts in West Bengal and are characterized by very high variability of rainfall and extreme temperature conditions. From these districts blocks are selected namely Kashipur from Purulia . These two blocks comprise of poor tribal population who are vulnerable to the impacts of drought. The Kharif crop (mainly Rice) production in the two blocks of these districts is shown in the graph below:5.9 Crop Production.

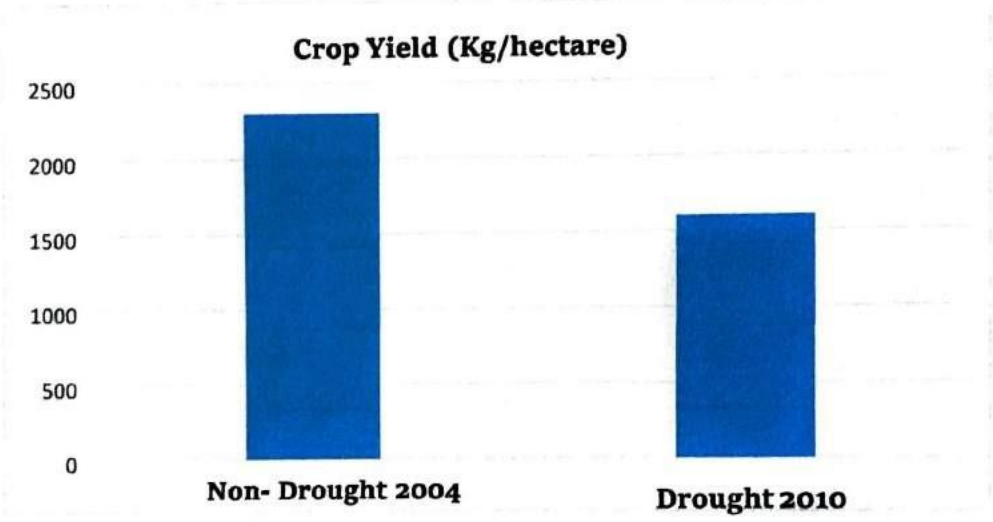
A comparison of the types of crop grown in the two districts show that the twodistricts are continuously trying to adapt to the climatic variations by introducing water intensive agricultural practices which has led to a rise in the production of certain crops making the agriculture less dependent on rainfall and more dependent on irrigation. A shift in temperature and rainfall pattern has also led to the damage of certain crops during their harvest.



Rice Production of Purulia Districts in Drought Year 2002

COMPARISON OF CROP PRODUCTION IN DROUGHT AND NONDROUGHT YEAR

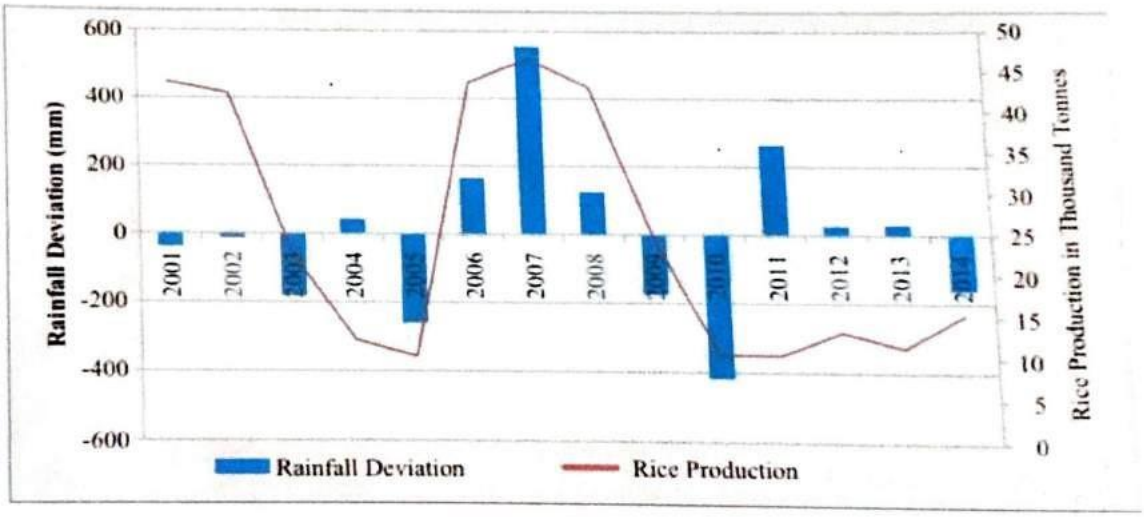
It could be seen from the graph, that rainfall is directly correlated to production. As rainfall decreases, production also falls. This is true for both the districts but the fall in production was more in case of Kashipur block of Purulia making Purulia more vulnerable to deficiency in rainfall. Kashipur of Purulia was affected in both drought year and non-drought year, the yield per hectare has low, but during a drought, a sharp decline can be seen in the case of both Kashipur blocks.



Comparison of Crop Production in Drought & Non-Drought Years

CROP-PRODUCTION IN KASHIPUR BLOCK OF PURULIA

Impact of Rainfall Since Kashipur was worse affected in comparison to be more vulnerable, the relation between rainfall and rice production in Kashipur has been explored in the graph below:



Relation Between Rainfall and Rice Production in Kashipur

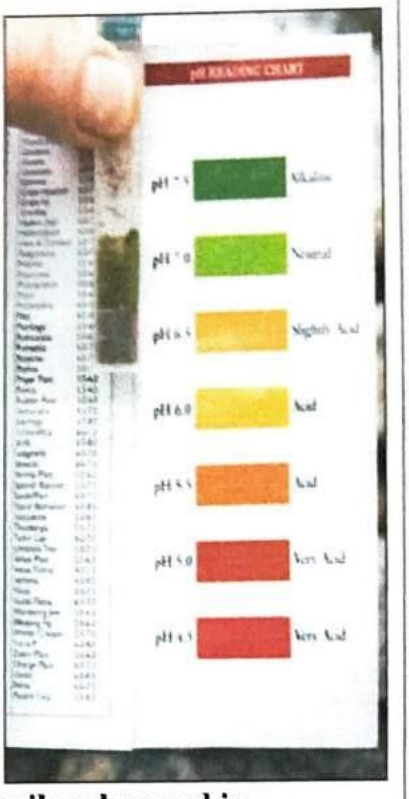
Soil Moisture Survey

Soil moisture plays an important role in the hydrological cycle. Soil moisture at the surface layer (0–5 cm) is an important hydrological variable influencing the feedback between land surface and atmospheric processes that leads to climate irregularity. Soil moisture is the major source of water for crops and hence plays a key role in crop production. Likewise, soil moisture is important for hydrologic applications such as flood and drought monitoring, weather forecasting, weather management and so on, (Sahoo et al., 2008.

Sample	*Lat/Long*	*PH(%)*	*Charecteristics*	*Organic(%)*	*Crops*
Sample -1	*23° 25' 428"N 86° 42' 386" E*	*6.5*	*Very slightly acitic*	*0.5% - 7.5%*	*chilli, coriander*
Sample-2	*23° 25' 425"N 86° 42' 383" E*	*6.5*	*Very slightly acitic*	*>5.0%*	*Ginger,Turmeric*
Sample-3	*23° 25' 350"N 68° 42' 329" E*	*7*	*Netural*	*>0.5%*	*Garlic, Papaya*
Sample -4	*23° 26' 286"N 86° 42' 457" E*	*7*	*Netural*	*0.5% - 0.75%*	*lady finger, watermelon*

Perception

A reading of 7 is neutral; crops typically grow best when pH is between 6 (slightly acidic) and 7.5 (slightly alkaline). Results of soil pH are reported on a logarithmic scale; a soil with a pH of 6 is 10 times more acidic than a soil with a pH of 7, and a pH of 5 is 100 times more acidic than a pH of 7. Soil test results (see figure 1) can be viewed in three categories: (1) low or yes, a fertilizer addition will likely increase growth and yield; (2) high or no, a fertilizer addition will not likely increase growth or yield; and (3) intermediate or maybe, a fertilizer addition may increase growth or yield.



Soil organic matter (OM) is a surrogate for soil carbon and is measured as a reflection of overall soil health. When monitored for several years, it gives an indication whether soil quality is improving or degrading. Soil OM is important to a wide variety of soil chemical, physical, and biological properties. As soil OM increases, so does CEC, soil total N content, and other soil properties such as water-holding capacity and microbiological activity. As OM increases, so does the ability to adsorb and reduce effectiveness of many soil-applied herbicides. Soil OM is in equilibrium with climate, soil mineralogy, and environment, providing limited capacity to accumulate organic matter. A soil with 2 percent OM will not increase to 10 percent under normal farming or gardening practices. A 2 percent increase in soil OM (e.g., from 1 to 3 percent or from 4 to 6 percent) would be considered a large change and the maximum likely for most situations in Oregon. Soil OM could increase more than 2 percent in a garden or area receiving large amounts of compost or other organic residue.

DROUGHT PERCEPTION

Purulia is the westernmost District of West Bengal with all-India significance because of its tropical location, its shape as well as function like funnel. The Grampanchayat Kashipur falls in Purulia district situated in West Bengal state, with a population 2580. The male and female populations are 1336 and 1244 respectively. The size of the area is about 2.35sq km. Kashipur is one of the Drought prone area of Purulia district.

During the Survey, we get a lot of information about Kashipur, Purulia. when we interact with them and discuss about their problem caused by the Drought. We got to know that how people of that area, are surviving in such a critical condition. They face several problems due to Drought and are suffering from that. Kashipur is one of the Backward region of the West Bengal because of less amount of Rainfall, Poor climatic condition, unsenitized area, Lack of medical facilities, Poor Education system, low Economic condition, less attention of Government etc.....

Drought is another important factor to consider for the agriculture dependent population. It is closely related to food insecurity and can be defined as the probability of an acute decline in food excess or consumption levels below minimum survival needs. In drought years, food insecurity increases due to severe decline in food production or availability, both from individual farms and in the market due to increased uncertainty of income related to lack of employment opportunities and livelihood. Vulnerability may be assessed in terms of multiple factors/indicators, which expose people to food insecurity through reduced food availability, access and utilization.

We collect the following data from the villagers of Kashipur, which are either causes of drought or impacts of Drought and know about certain things of Kashipur (as drought prone area)....

RAINFALL

When we asked the people of Kashipur about amount of Rainfall, We got to know that this region received less amount of Rainfall (is about only in 2 or 3 months annually).Average annual Rainfall varies between 1100mm and 1500mm. This is a major cause of drought in Kashipur, Purulia.

Other Sources of water

There are some other sources of such as Tanks provided by Local Authority, wells, handpumps and Pond or River etc.. but in a poor condition or un-maintained. Local government provide only 2 tanks(2000 lt per) of water in 2 or 3 days. There are total 12 handpump in the village which is not sufficient for them. Wells are also become dry in the drought. People depend upon the sand mixed water of River for their daily use (cooking, bathing, and drinking). This is so unhygienic. With poor sanitation facilities that become cause of so many diseases.

AGRICULTURE

Because of less amount of Rainfall, agriculture of Kashipur affected. They grow only one type of crop that is Paddy Crop in a Year. They are unable to growing different types of Crops because of Drought and limited to Paddy crop.

Purulia				
Year	Summer	Kharif	Rabi	Rainfall
Crop Yield (tonnes/ha)				
1999	2.4	0.9	1.3	1416.0
2000	2.4	1.0	1.6	1033.0
2001	1.7	1.1	1.5	1434.0
2002	2.0	0.8	1.0	1383.0
2003	2.2	1.1	1.4	1260.0
2004	2.1	1.0	1.0	1220
2005	2.3	0.9	1.1	1079
2006	2.4	1.0	0.8	1276
2007	1.5	0.8	1.0	1783.8
2008	1.7	0.6	0.9	1383.4
2009	2.0	0.5	3.5	1165.8

SOURCE OF INCOME

Most of the people have not the land for Agriculture so they employed as a Labour in nearby factories or plants. People in the Drought season also doing the labouring work. From the our survey we found that average of people engaged in Labour work.

POVERTY AND ROLE OF GOVERNMENT

People of that area, are facing high level of poverty as they have not enough water, income, and other facilities to survive a comfortable life. Due to poverty some people leave their study and engaged in other work. They have not their hoses or land. They are living on a government property. People of that area are very upset with the government. They are demanding for a timed water tap, irrigational facility for agriculture, better transportation and communication and educational facilities etc....

CONCLUSION

This study could identify the meteorological, agricultural and hydrological droughts in Purulia district in a monthly scale using precipitation data (IMD and TRMM), vegetation data (NDVI) and ground water level data (CGWB). The SPI, NDVI anomalies and SWI has been used to assess monthly meteorological, agricultural and seasonal hydrological droughts in the district. The study also assessed the time lag between occurrences of the three successive types of droughts.

The identification of lag time between precipitation and vegetation health indicates that the use of SPI can reinforce the reliability of early warning of agricultural drought by confirming the cause of the reduced vegetation productivity with variability of quantity and duration of rainfall in previous months. The present approach can provide important information for adopting appropriate adaptation strategies as well as for predicting agricultural drought in any particular year according to the computed lag times.

LIST OF REFERENCES:

Brown, J. F., Wardlow, B. D., Tadesse, T., Hayes, M. J., & Reed, B. C. (2008) The Vegetation Drought Response Index (VegDRI): A new integrated approach for monitoring drought stress in vegetation. GIScience & Remote Sensing, .

Chow, Ven Te, Maidment, David R. and Mays Larry W. (1988) Applied Hydrology 1988 (1)

Bhattacharya, P., Chatterjee, D., & Jacks, G. (1997) Occurrence of Arseniccontaminated Groundwater in Alluvial Aquifers from Delta Plains, Eastern India: Options for Safe Drinking Water Supply. International Journal of Water Resources Development.

Bhuiyan, C. (2004, July) Various drought indices for monitoring drought condition in Aravalli terrain of India. In XXth ISPRS Congress .

Bhuiyan, C., Singh, R. P., & Kogan, F. N. (2006) Monitoring drought dynamics in the Aravalli region (India) using different indices based on ground and remote sensing data. International Journal of Applied Earth Observation and Geoinformation, 8(4), 289-302.

Bradford, R. B. (2000) Drought events in Europe. In Drought and Drought Mitigation in Europe Springer Netherlands.Census of India, Population census.(2011) The Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi, India.

Changnon, S. A., & Easterling, W. E. (1989) Measuring drought impacts: the Illinois case. JAWRA Journal of the American Water Resources Association, 25(1), 27-42.

Chatterjee, R. S. and Bhattacharya, A. K. (1995) Delineation of the drainage pattern of a coal basin related inference using satellite remote sensing techniques. Asia Pacific Remote Sensing J.,1: 107- 114.

Das, S., Choudhury, M. R., & Nanda, S. A. C. H. I. K. A. N. T. A. (2013) Geospatial assessment of agricultural drought (a case study of Bankura District, West Bengal). International Journal of Agricultural Science and Research (IJASR) ISSN, 2250-0057.