

STUDY ON CLIMATE CHANGE AND CLIMATE RESILIENT AGRICULTURE



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Introduction




Climate Change is one of the main environmental challenges facing the world today. More than 3.6 billions already live in Areas highly susceptible to climate change. In general terms Climate change refers to a change in temperature and weather patterns pattern.

 The IPCC sixth assessment Published in 2021, found that Human emission of heat trapping gases had already warmed the Climate by nearly 2°C Farhenit (1°C) from 1850 to 1900.

 The Industrialization also lead to rapid change that created a huge pressure on environment and it's surrounding.

 The primary cause of Climate change relates to deforestation and disturbances created In the topography.

 Urbanization also cause a massive Change in how the natural cycle works (Urban jungle against natural jungle).

 Realise of harmful chemicals into the air or usie of lots of pesticides and insecticide often leads to degrading climate and landscape.

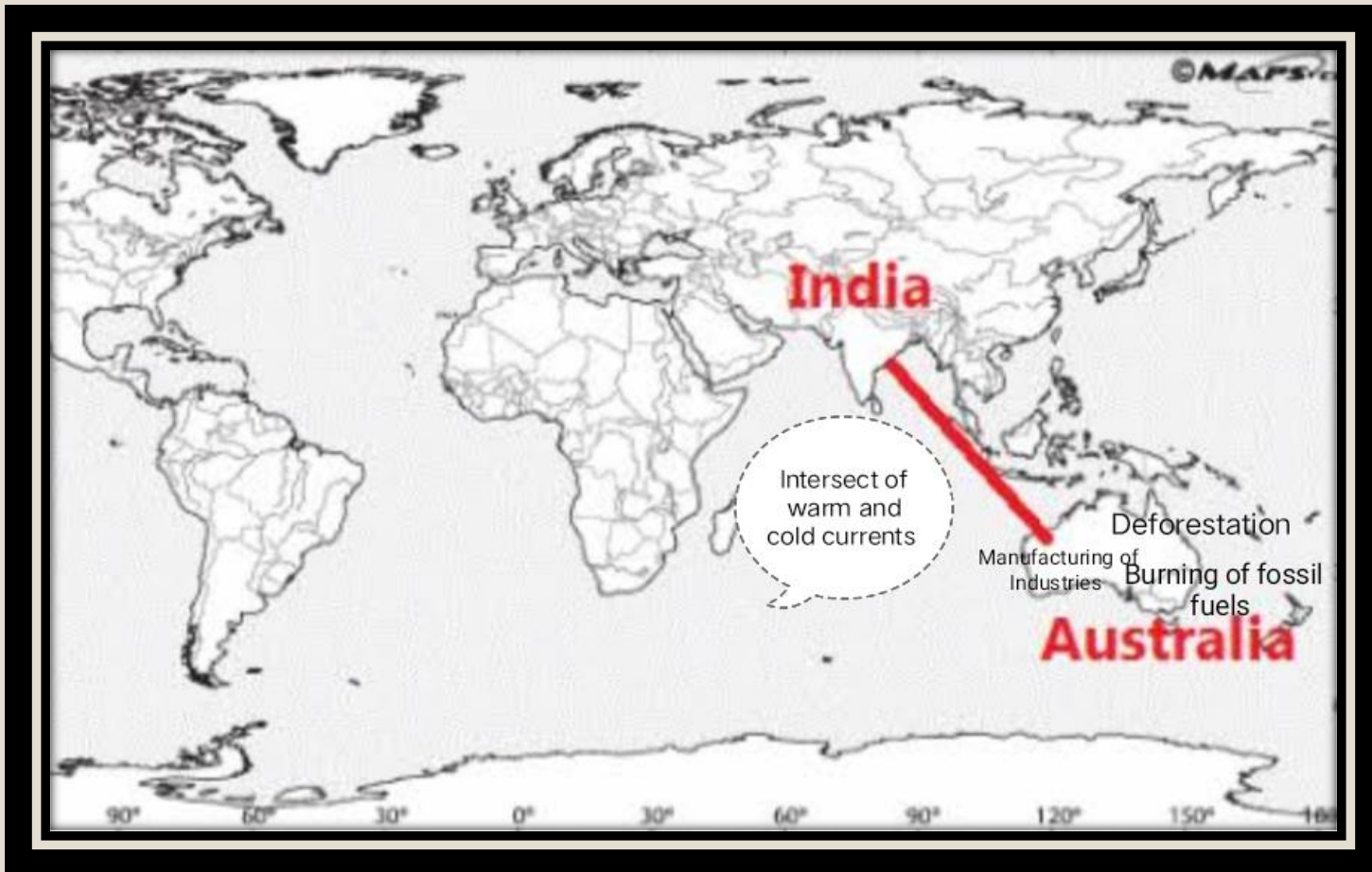
Examples of how climate change factors work globally

✨ Inter governmental panel on climate change (IPCC) in its fourth assessment report observed that “warming of climate is now unequivocal, as is evident from observation of increase in global Average air and ocean temperature, widespread melting area of snow and ice and rising global sea level (Solomon et. ,2007)

✨ A 1°C rise On the equator is equivalent to 10°C rise at the poles. With the rise in temperature the snow caps starts to melt. With in increase in snow melt there is also a rise in the sea level which leads to inundation of low lying costal areas.

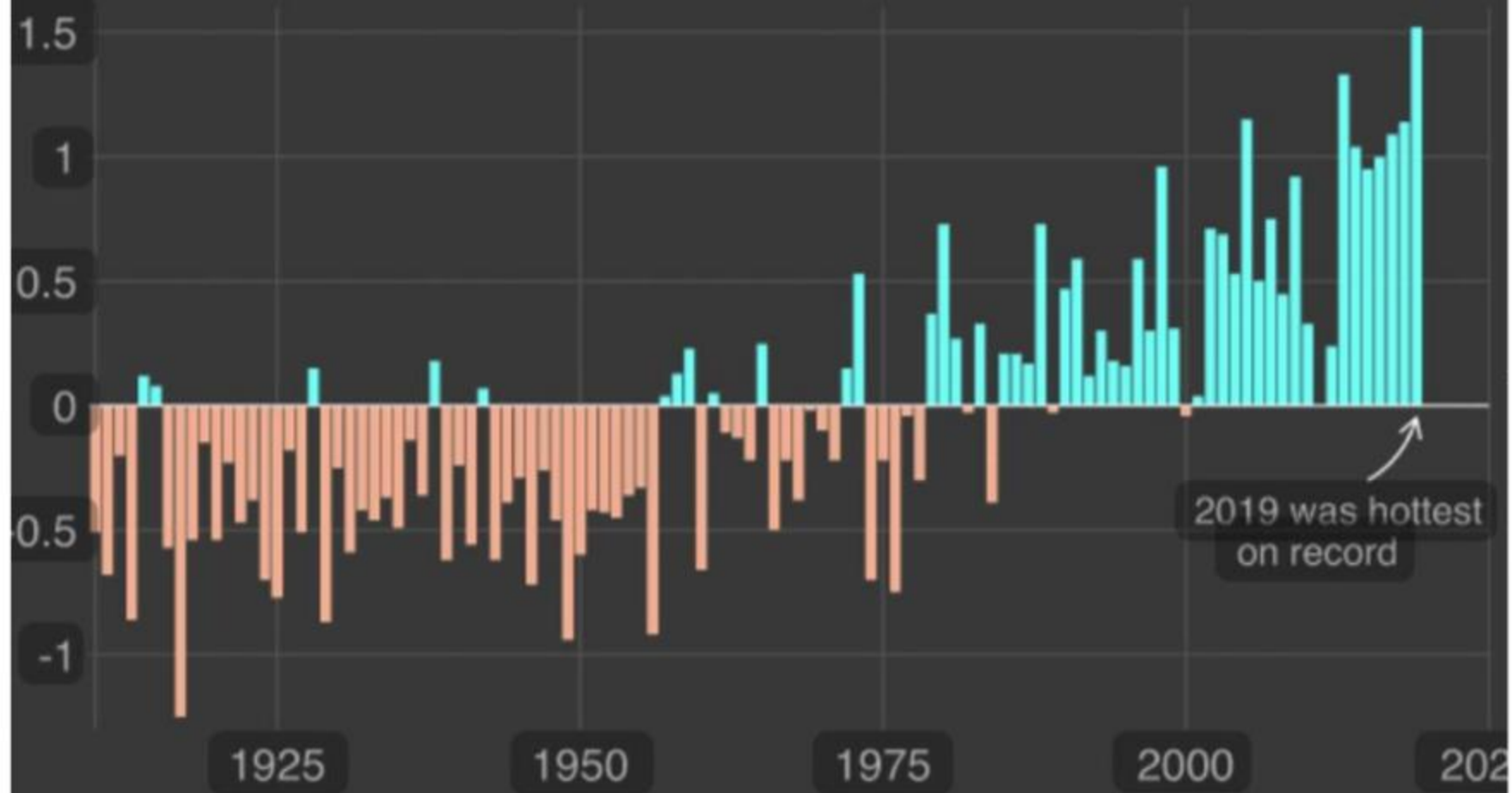
Several cities on the coast have been flagged as in being Peril as a result.

✨ While taking the example of India and Australia which reflect opposite polarity with one being hot and other being cold. Due to the burning of rice straw in northern India after kharif season, there is heating up of region. Similarly traising of three crops in a region which is naturally arid. Due to irrigation facilities created in the dessert there is a cooling effect in summer. This will affect Australia in some way due to a change in the Normal hot and cold currents in the sea and ocean between these two countries. In recent years Australia encountered several drought conditions. In India there has been an increase in cyclonic activity. These aspects have not been fully studied in thier interrelationships and hence it is difficult to make conclusive statements. Only indicative ones at the moment are possible.



Australia has been getting warmer

Annual mean temperature above or below average (°C)



2019 was hottest on record

Note: Average is calculated from 1961-1990 data

Causes of Climate Change

Anthropogenic

Chemical Fertilizers

Deforestation

Increase Vehicles

Emissions of GHG

Industries

Emission of CO₂

Natural

Sunspot and solar cycle

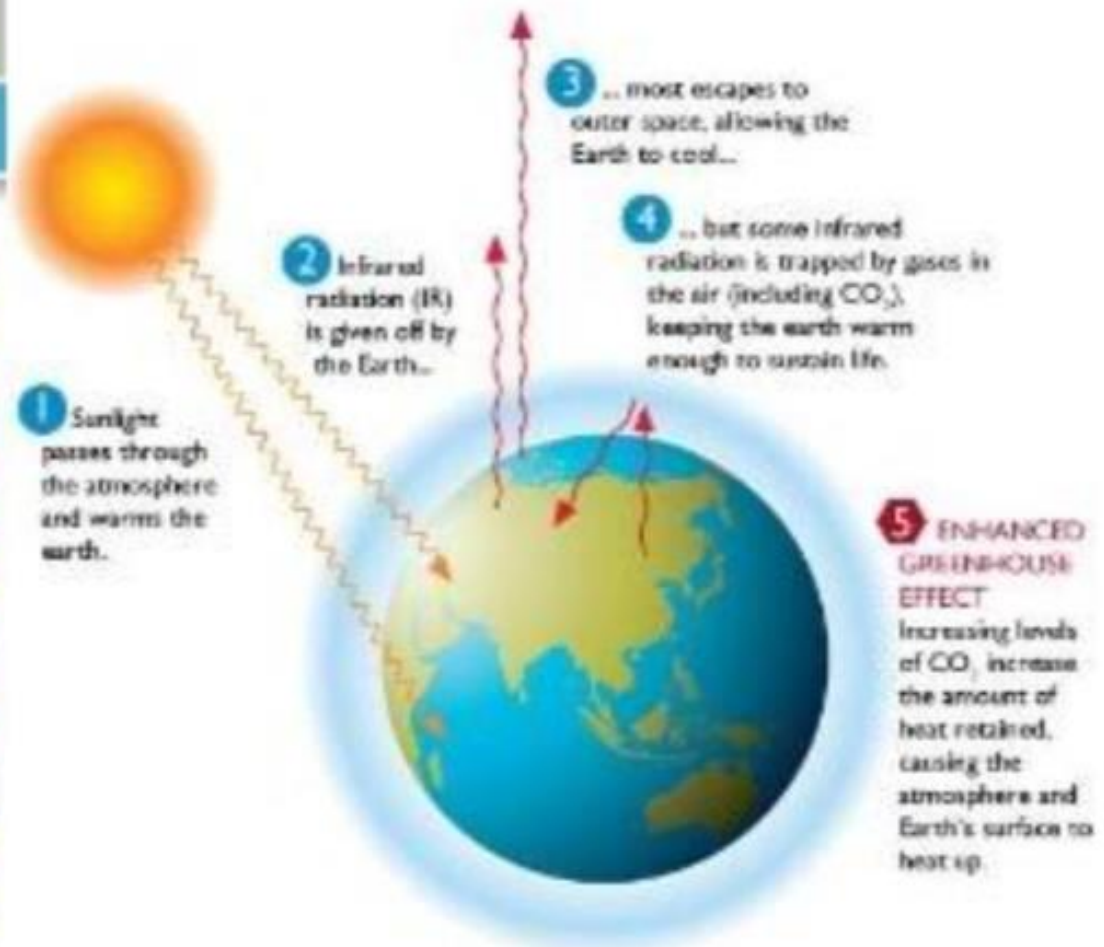
Ocean Currents

Forest Fire

Volcanic Eruptions

Meteorites

Methane emissions from animals



Climate change impacts in India

What the INCCA Report has found

Warmer seasons

- Avg. temp rise: 2.0 deg C predicted
- 1.0-4.0 deg C at extreme ranges

Increased annual precipitation

- lower frequency of rainy days; increased intensity

Cyclonic disturbances

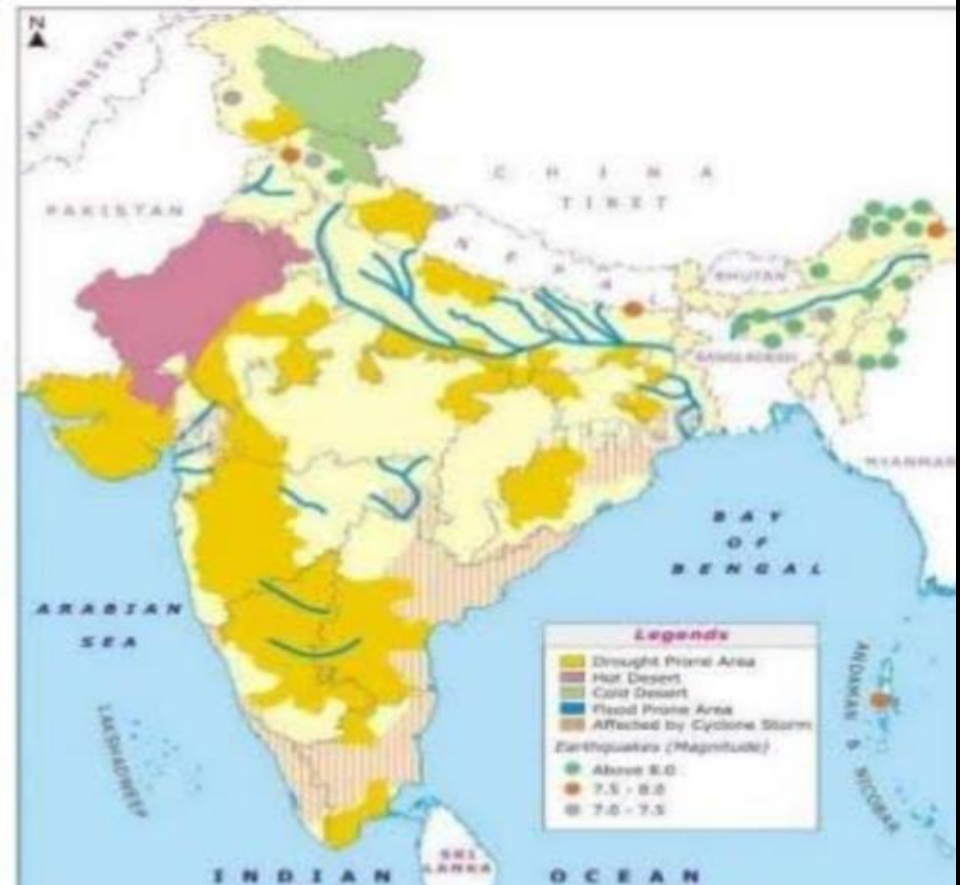
- lower frequency; increased intensity
- increased risk of storm surges

Sea-level rise

- 1.3 mm/year on average

Fresh water supply

- High variability predicted in water yields (from 50% increase to 40-50% reduction)
- 10-30% increased risk of floods; increased risk of droughts



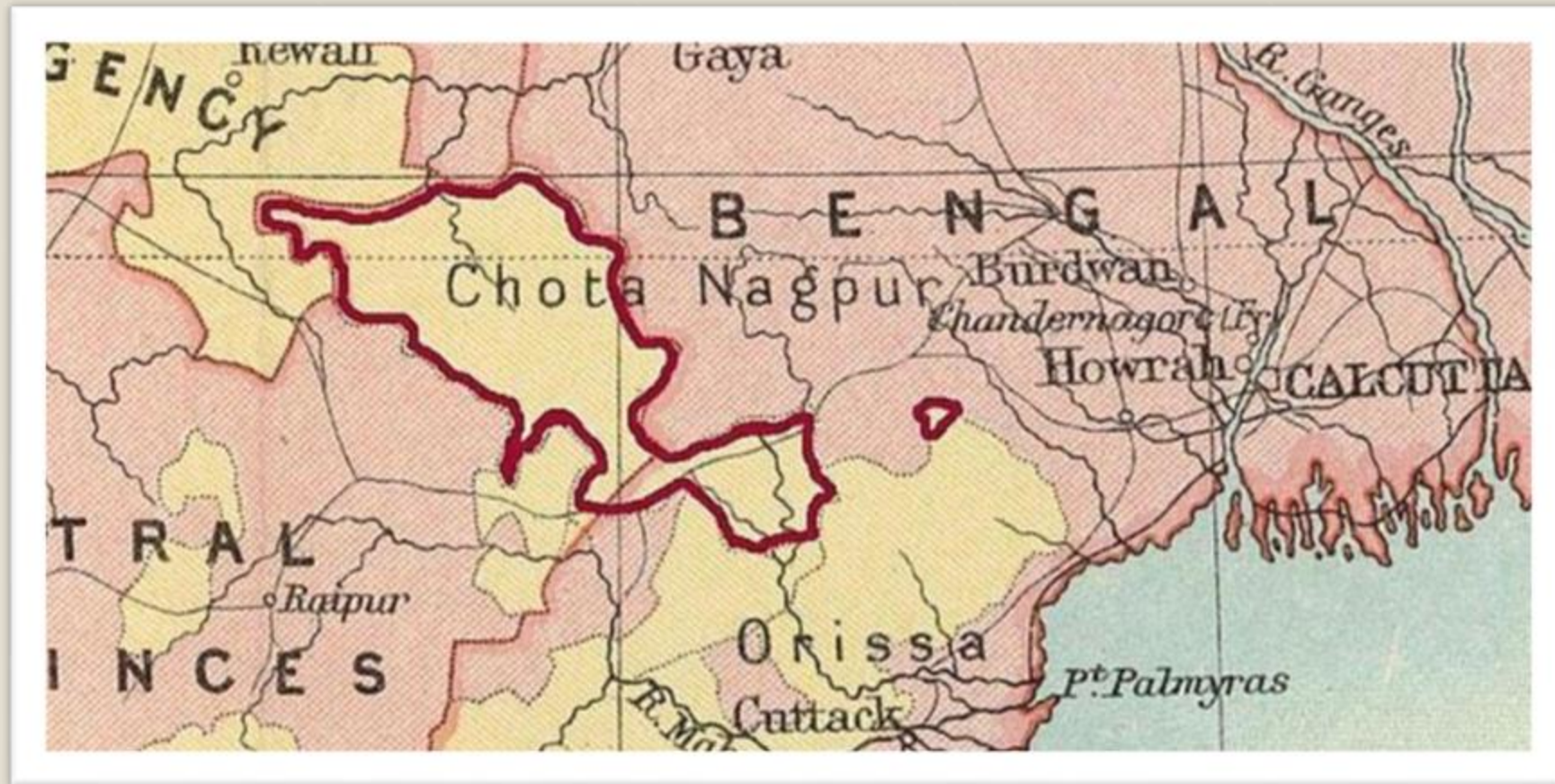
Climate change in Indian context

Climate change is one of most Important global environmental challenge faced by India. India is ranked among the listed countries most affected by the climate change (2019). India has a sub tropical climate due to its peculiar position in the Asian continent and Indian ocean.

The major factor contributing to climate change are as follows. Massive increase of green house gases like chlorofluoro carbons, methane , ozone , methane and carbon dioxide come out in form of harmful gases by manufacturing industries. Deforestation is the vital reason for climate change as the trees are been cut down by the people at the rapid pace due to urbanization and industrialisation. Rapid increase in economic development by burning of fossil fuels and pressure on local communities for survival which leads to a vicious cycle of deforestation and pauperisation forcing people to move to urban and industrial areas in search of jobs.

Climate change is generally associated with various adverse impacts on agriculture, water resources, Forest, biodiversity, health, costal infatuated and rapid increase in temperature. Under the future scenario it is predicted that there is increase in annual temperature of 0.7 to 1.0 *C by 2040.

Chota Nagpur Topography



Introduction :-

- Chota Nagpur a plateau in eastern India covers most of Jharkhand as well as adjacent state of Chhattisgarh, Odisha and West Bengal. While talking about the topography of this plateau – it is indulating with prominent gneissic Hills and it has average level around 300 meter(1000ft) and with plateau elevation – 700m above sea level. It is characterized by humid and sub humid weather. In the era of climate change, Chota Nagpur is facing extreme Climate change due to rise in temperature as well as due to the changing pattern of cultivation.
- Puruliya, is located in the state of West Bengal, known for its rich forest cover . It is one of the twenty three districts. It is characterized by the tropical savanna climate, with rugged hilly area indulating terrain which experience hot summer and frosty temperature in winter. It is often leads to high evaporation , extreme precipitation and it often leads to vulnerability through drought, water scarcity, land degradation
- Due to the climatic change in Puruliya it creates a serious and vast impact in the surrounding in form of famines, loss of agriculture, water runoff, water scarcity and decline of vegetation due to the excessive heat.
- In order to reduce the above crisis some intervention need to be done in order to save the lives of the people and the area . Several measures can be taken in form of planting more trees, rain water harvesting, building of check dam and use of organic materials in stead of chemical products for cultivation so that the quality of soil can be maintained

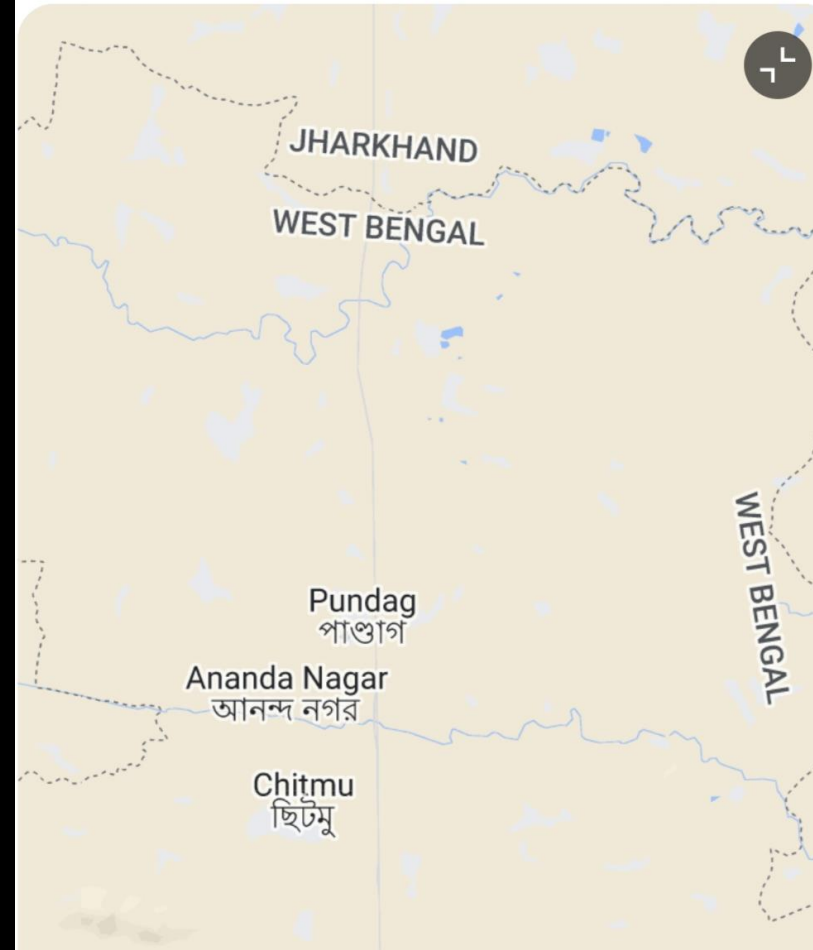
Case study of Pundag, Purulia, West Bengal

- **Pundag**

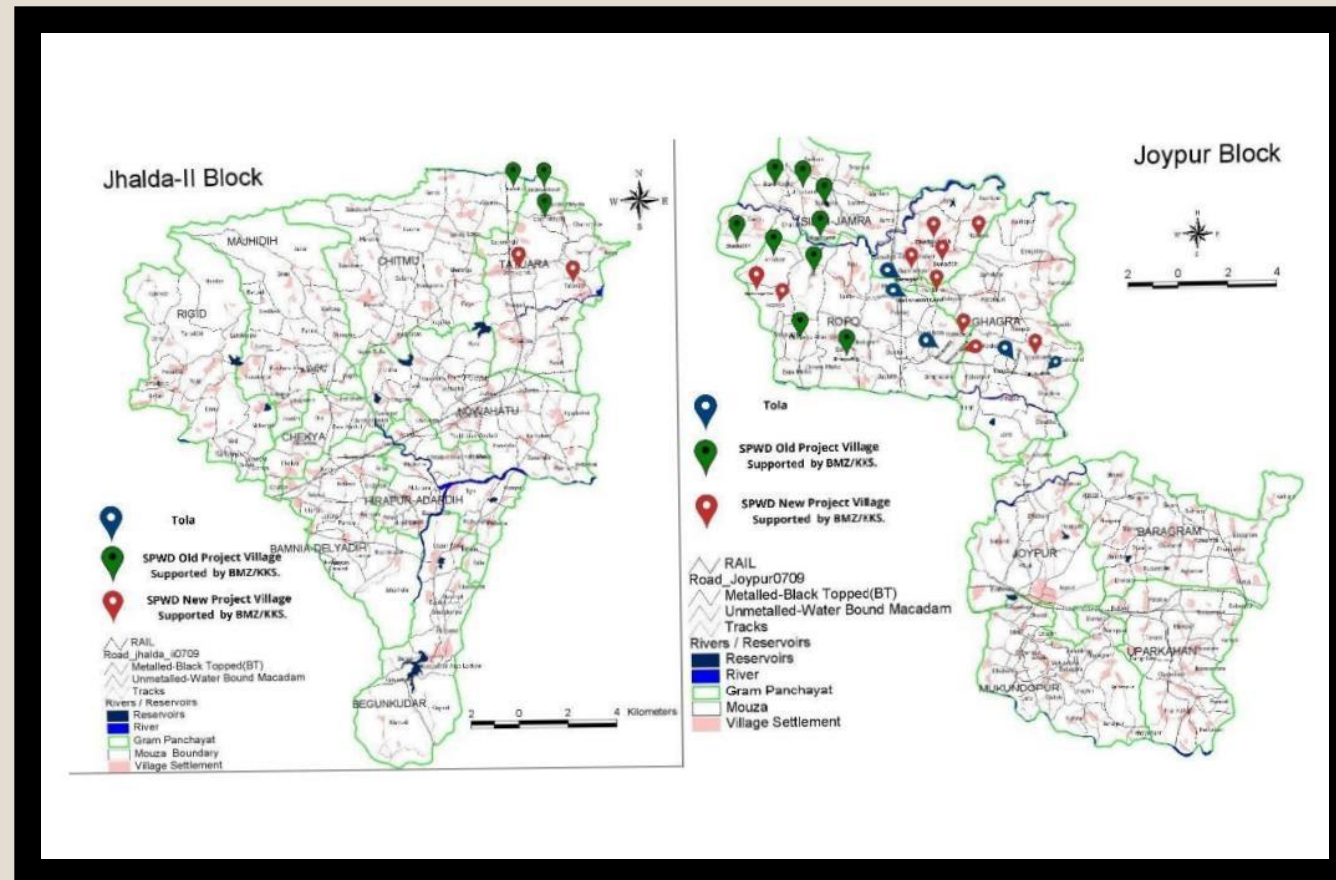
- - It is located in Jaipur Subdivision of Puruliya district of West Bengal, India. It is 23km away from sub district headquarters of Jaipur. Pundag region is divided into two blocks – Jhalda and Jaipur Block
- Pundag is characterized by hot and humid weather in summer and cold winters. Pundag is basically surrounded by rocky and rough surfaces in form of large stones and huge mountains it can be termed as highly terrain region. Sandy soil is generally found in Pundag characterized by low water holding capacity which ultimately leads to water runoff and further act as water scarcity. This area receives extreme High temperature and less monsoon affected area.
- All these factors are the major reasons for Climate Change in the region.
- In order to overcome the Climate crisis, SPWD has developed a project to deal with climate change and in order to develop Climate Resilient Agriculture and promote it further among the villagers. Several methods have been developed by them in form of Matkha khad, Organic fertilizer, cow shed urinization, vermic compost, drip irrigation, mulching, bio mulching, food forest and check dams, and wells. SPWD has been working in 12 villages within these 2 blocks.

Pundag

Village in West Bengal



Pundag Region divided into two blocks :-



Topographic features of villages visited in Pundag region

3.2 Village description

3.2.1 Narandih & Dhadkidih: Narandih, nestled under the Sidhi Jamra gram panchayat, epitomizes rural life in Purulia. Its 51 households are home to 282 individuals, with a balanced gender ratio. Despite its modest size of 117.66 hectares, the village boasts a relatively high literacy rate of 85%, reflecting a community eager for knowledge and development. Bokaro, a bustling town, stands as a beacon of progress and opportunity just 10 kilometers away, offering access to markets and services essential for the villagers' livelihoods.

3.2.2 Gopinathpur & Sunadih: Gopinathpur, a serene hamlet under Sidhi Jamra, exudes tranquility amidst its 139.28 hectares. The village's 80 households shelter 401 souls, evenly split between men and women. Despite a literacy rate of around 50%, the community thrives on traditional knowledge and practices. Bokaro's proximity offers a lifeline to urban amenities and economic opportunities, shaping the village's aspirations and lifestyle.

3.2.3 Chhakudih: Chhakudih, part of the Ropo gram panchayat, is a modest village in Jaipur block. Its 33 households accommodate 210 residents, with a literacy rate of approximately 33%. Isolated by a distance of 33 kilometers from the bustling town of Jhalda, the village cherishes its simplicity and self-reliance. Life in Chhakudih revolves around agriculture and community bonds, fostering a sense of resilience and unity among its inhabitants.

3.2.4 Asanya & Beheragara: Nestled under the Ropo gram panchayat, Asanya embodies rural simplicity and resilience. Its 107 households are home to 573 individuals, with a balanced gender ratio. Despite challenges, the village boasts a commendable literacy rate of 52%, reflecting a community eager for progress. Jhalda, located 31 kilometers away, offers opportunities and services vital for the village's growth and development.

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3.2.5 Hatinada & Siyal Gara: Hatinada, a settlement under the Ropo gram panchayat, stands as a testament to communal harmony and perseverance. Its 281 households are home to 1578 individuals, with an almost equal distribution between males and females. Despite a literacy rate of 46%, the village thrives on collective efforts and traditional wisdom. Jhalda, the closest town, serves as a hub for economic activities and social interactions, shaping the village's aspirations and progress.

3.2.6 Shushnidih: Shushnidih part of the Ghaghra Gram Panchayat, epitomizes rural life's simplicity and challenges. Its 180 households accommodate 929 individuals, with a gender ratio favoring males. Despite a modest literacy rate of 30%, the village cherishes its close-knit community and traditional values. Jhalda, located 30 kilometers away, offers access to essential services and markets vital for the village's sustenance and growth.

3.2.7 Damrughutu: Damrughutu, a village in the Tatuara Gram Panchayat, symbolizes rural resilience and perseverance. Its 228 households are home to 1284 individuals, with a balanced gender ratio. Despite a commendable literacy rate of 55%, the village thrives on agricultural practices and community bonds. Jhalda, just 10 kilometers away, serves as a gateway to economic opportunities and essential services, shaping the village's growth and aspirations.

3.2.8 Tatuara: Tatuara, a village in the Tatuara Gram Panchayat, embodies rural life's essence and challenges. Its 987 households accommodate 5863 individuals, with a nearly equal distribution between males and females. Despite a modest literacy rate of 40%, the village thrives on agricultural practices and traditional values. Jhalda, located 25 kilometres away, serves as a beacon of progress and opportunity, shaping the village's aspirations and lifestyle.

Society for Promotion of Wastelands Development (SPWD)

The Society for Promotion of Wastelands Development (SPWD), founded in 1982, is a national non-governmental organization (NGO) dedicated to reversing the degradation of land and natural resources. SPWD collaborates with partners such as Karl Kubel Stiftung and community institutions to prevent, arrest, and reverse the degradation of life support systems, particularly land and water. The organization's mission is to expand livelihood opportunities in a sustainable and equitable manner through people's participation.

2.1.1 Mission

SPWD's mission is "to prevent arrest and reverse the degradation of life support systems, particularly land and water, so as to expand livelihood opportunities in a sustainable and equitable manner through people's participation."

2.1.2 Focus Areas

SPWD's work is centered around the following themes - Sustainable Agriculture: SPWD promotes sustainable agricultural practices to improve food security and livelihoods in rural communities. This includes initiatives such as improved rice cultivation, improved upland cultivation, promotion of kitchen gardens, production and application of organic fertilizers, and livestock rearing. These practices not only help increase agricultural productivity but also contribute to environmental sustainability.

2.1.3 Watershed Development

Check Dam, Wells, and Water Governance: SPWD works towards sustainable water management through watershed development, tank rejuvenation, and effective water governance practices. These initiatives help improve water availability and quality, which are crucial for agriculture, livelihoods, and ecosystem health.

2.1.4 Land Use Management

SPWD emphasizes the importance of effective land use management practices to prevent land degradation and promote sustainable land use. This includes promoting soil conservation techniques, land reclamation initiatives, and sustainable land use planning.

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2.1.5 Approach

SPWD's approach involves initiating action projects, commissioning research studies, and raising social awareness about the existence of Wastelands and opportunities for their restoration. The organization emphasizes identifying the needs of local communities, documenting field technologies, and developing appropriate institutional mechanisms to address emerging issues. SPWD also works towards influencing larger systems, policies, and programs of the government and other concerned agencies to promote sustainable natural resource management practices.

2.1.6 Collaborative Projects

SPWD has worked in collaboration with over a hundred local voluntary agencies across 17 states in 11 agro-climatic zones of India. The organization's initiatives encompass socio-technical interventions and address cross-cutting aspects such as gender, environmental benefits, and climate change. Through these collaborative projects, SPWD has been able to reach a wider audience and have a greater impact on sustainable development.

Projects work Done by SPWD :-

Annex 1: Project Extract P6272

3. Project implementation schedule

The implementation of the project will start on November 1, 2021 and will end on December 31, 2026.

Measure	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	2021	2022	2023	2024	2025	2026
5.2.1 Water Resource Development						
5.2.1.1 Construction of water infrastructure						
5.2.1.2 Establishment of resource groups						
5.2.2: Climate Resilient Farming						
5.2.2.1 Establishment of <i>Farmers Groups and Community Resource Persons</i>						
5.2.2.2 Improved Rice Cultivation						
5.2.2.3 Improved Upland-Cultivation						
5.2.2.4 Kitchen & Forest Gardens						
5.2.2.5 Production and application of organic fertilizers						
5.2.2.6 Plasticulture						
5.2.2.7 Exposure visits						
5.2.3 Organisation and market linkages						
5.2.3.1 Formation of Farmer Producer Company (FPC)						
5.2.3.2 Extension of the cluster facilitation center						
5.2.4 Alternative Livelihoods						
5.2.4.1 Livestock rearing (ducks, goats, cows, para-vets)						
5.2.4.2 Off farm livelihoods (sewing, machines)						
5.2.5: Networking and Advocacy						
5.2.5.1 Annual & National Level Workshops						
5.2.5.2 Awareness raising on Covid-19 & supply of hygiene and sanitary items						
5.2.5.3 Staff capacity building						
5.2.5.4 Dissemination and Visibility						

Intervention By SPWD

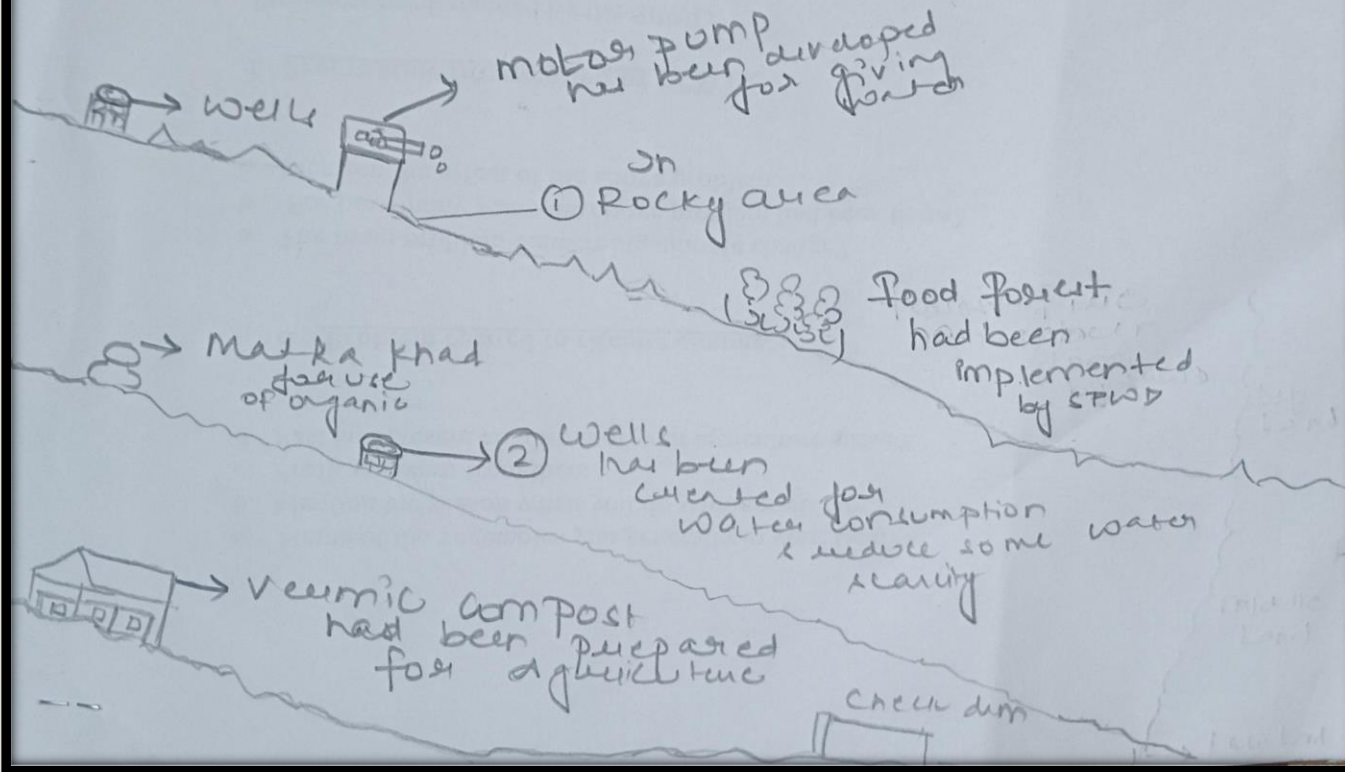
Past Condition

1. No kitchen garden
2. No power house
3. No use of rock area for cultivation.
4. No food forest
5. No water source is being implemented in different villages in source of wells, check dam & pump house.

Present intervention condition

- Kitchen garden was implemented
- Power house has been implemented
- Use of rock area for cultivation.
- Food forest is being implemented.
- Some water source is being implemented in different villages in source of wells, check dam & pump house.

Implementation done on three levels of land by SPWD.



Suggestion

- 1. By planting of trees.
- 2. By using organic farming methods instead of modern methods of farming, insecticide and pesticides.
- 3. By using renewable sources of energy.
- 4. By Restoring nature to absorb more carbon.
- 5. Creating of industrial area far from the residential area.
- 6. By practising car pooling and using less of their personal vehicle.

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Thank you  Every one 