

AN ANALYSIS OF FLOODS IN PUNJAB DURING 2023

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Karhali Sahib, Dist-Patiala**Abstract:**

Floods are among the most devastating natural disasters, leading to loss of life, displacement, and economic setbacks. Punjab state of India is located in the northwestern part of India, experiences various natural disasters. **In this paper, an attempt is made to highlight the damage of flood during 1970-2023 in Punjab state of India and district-wise damaged of flood in 2023. This study is based on secondary data from 1970-2023. During study period it is observed that** the areas adjacent to the Sutlej, Beas, Ravi, Chenab and Ghaggar rivers are the worst affected. In 2023, Punjab experienced significant flooding that had profound effects on its communities, infrastructure and economy. It is suggested that by taking a proactive and integrated approach, the impact of floods in Punjab can be significantly reduced.

Keywords: *Affected, Agriculture, Disasters, Flood, Integrated***I. INTRODUCTION**

The natural disasters are catastrophic events caused by natural processes of the earth. They can cause significantly damage to the environment, property and human life. Some common types of natural disasters include earthquakes, volcanic eruptions, floods, hurricanes, droughts etc. India is highly susceptible to a variety of natural disasters due to its diverse geographical and climate condition. The frequency and intensity of floods has grown in the country over the years primarily because of the increased encroachment of flood plains. Interestingly, while the number of deaths caused by flooding has decreased over the last decade, the number of affected populations and economic losses has increased significantly. In India, around 75% of the total rainfall is concentrated over 4 months of monsoon (June – September) and as a result almost all the rivers carry heavy discharge during these four months. Around 12% of the country's land area is prone to floods which means around 40 million hectares are prone to flood and annually on an average 8 million is affected by floods. The most flood prone are the Brahmaputra, Ganga and the Meghna basins. The states are Uttar Pradesh, Bihar, West Bengal, Assam, Punjab and Orissa (Alam, Muzzammi).

Punjab state of India is located in the northwestern part of India, experiences various natural disasters. Punjab, one of the northernmost states of India, is bordered by the Pakistani province of Punjab to its west, Jammu & Kashmir in the north, Himachal Pradesh in the northeast, Haryana in the south and southeast, and Rajasthan in the southwest. The confluence of five rivers makes Punjab's agricultural land rich and productive. Approximately, 82% of the state's land is under cultivation, compared with the national average of 40%. Punjab is known as the 'Breadbasket of India', and led to the first Green Revolution in the country. By 2025, it is expected that the state will be among the leading producers of non-food grains and an exporter of various agri-products. Punjab alone contributes to 19% (wheat), 11% (rice), 5% (cotton),

10% (milk), 20% (honey) and 48% (mushrooms) grown in the country (India Brand Equity Foundation, 2024). However Punjab state of India is located in the northwestern part of India, experiences various natural disasters. Some of the most common ones include:

1. **Floods:** Punjab faces frequent flooding, especially during the monsoon season, due to heavy rainfall and overflowing rivers like the Sutlej, Beas, and Ravi. These floods can cause significant damage to agriculture, infrastructure, and housing.
2. **Droughts:** Although less common, droughts can occur due to insufficient rainfall, affecting agriculture and water supply. Punjab, being an agrarian state, is particularly vulnerable to drought conditions.
3. **Earthquakes:** Punjab is situated in a seismically active zone, and while major earthquakes are rare, the region is still susceptible to seismic activity.
4. **Heatwaves:** During the summer months, Punjab often experiences extreme heat, which can lead to heatwaves. These can have severe impacts on health, agriculture, and water resources.
5. **Hailstorms and Thunderstorms:** Punjab occasionally faces severe weather events like hailstorms and thunderstorms, which can damage crops and property.

In 2023, Punjab experienced significant flooding that had profound effects on its communities, infrastructure, and economy. This research paper delves into the causes and impacts of these floods, providing a comprehensive analysis of the events that transpired.

II. REVIEW OF LITERATURE

By reviewing the related literature, the investigators comes to know that to which extent, the work has already been done and what further could be done in the particular field. For this purpose, the review of related literature focusing on natural disasters is being presented here under:

Goyari (2005) attempted to examine the sustainability of the agriculture sector in the face of damages wrought by natural calamities. Frequent floods every year in Assam had been destroying standing crops, creating water logging, soil erosion and affecting large crop areas and thus threatening the sustainability of the drive towards higher productivity and production of various crops in the state. While most flood control measures undertaken so far had been of a short-term nature, concerted policy decisions on long-term measures, both on the part of state and central governments, and cooperation by neighbouring countries were needed to solve flood problems permanently.

Singh (2014) analyzed that the main natural disaster endangering the agrarian state of Punjab is floods which cause a lot of damage to cropped area every year. The extent of crops damaged due to floods in Punjab was very immense in areas where the level of groundwater table was high and area which lie along the course of rivers Beas and Satluj.

Vijender (2019) revealed that occurrences of floods in the state of Punjab and presented the causalities and damage. This study showed that there is an important pattern emerged from floods since 1990 and the cause of floods was due to heavy rain in the catchment area of the rivers. The canals in the state also cause of flood many time due to mismanagement.

Mohanty et al. (2020) examined despite massive investments and continuous flood-control efforts in India, the socio-economic damages and death toll continue to remain high. This review article identified the region-specific flood problems in India and discussed the

initiatives undertaken by major Indian flood management agencies, with an emphasis on the current ongoing flood management practices. The effectiveness of these practices in the long term was discussed, and specific gaps were identified. The recommendations provided in this article may be useful to guide stakeholders and policymakers in formulating and implementing sustainable flood management plans for improved flood resilience.

Kaur (2024) Punjab holds an important position in India. The green revolution has resulted in remarkable growth rates in agricultural productivity and output in the state of Punjab. However, Punjab has to cope with the issue of declining soil health, rapidly growing micronutrient deficiencies, and alarming water table depletion as a result of the adoption of intensive technologies. In the state, the green revolution brought about a number of issues that have now come to light. The major deleterious effects have been on our environment, as a result of which the natural balance has been disrupted. Excessive use of chemical fertilizers resulted in degradation of soil health. Similarly, the overuse of pesticides is responsible for contamination of air and water bodies. Burning of paddy stubble is also a serious issue in the state. The present paper examines the environmental crisis related to agriculture in the state. The role of central and state government to deal with this issue is also analyzed.

Kaur (2024) showed that the flooding in Punjab happened because of peculiar rainfall patterns in Punjab and Himachal Pradesh in July. While Punjab in total received about 5% less rainfall than normal during the 2023 monsoon season, July stood out as an outlier. July 2023 saw 43% more rain than normal. In Himachal Pradesh also the month saw 75% more rainfall than normal in July. which peaked between July 7 and July 11, when it exceeded 436% of normal within four days.

From the above discussion, it is clear that every year due to heavy rain flooding destroys lakhs of acres related with agriculture in Punjab. The present research examines the extent of crop area damaged due to flood in Punjab during 1970-2023. This paper is divided into five sections. Section I includes introduction Section II is devoted to the review of literature while Section III outlines research methodology. Section IV highlights year-wise and district wise damaged of flood in Punjab state during 1970-2023 and Section V concentrates on the conclusion and policy implications.

III. RESEARCH METHODOLOGY AND OBJECTIVES

This paper is based on secondary data which is collected from various reports of Punjab Government on flood, Statistical Abstract of Punjab, research papers and different newspapers. This paper includes the data of Affected No. of villages/towns, Area, Population, Human lives, Cattles, Damaged Crop Area due to floods during 1970-2023 in Punjab. And also District-Wise Affected No. of villages/towns, Area, Population, Human lives, Cattles and Damaged Crop Area due to floods in 2023 in Punjab.

Following are the objectives of this paper:

1. To find out the reasons of flood in 2023 in Punjab.
2. To analyze the damaged of affected villages, area, cattle due to flood during 1970-2023
3. To find out the most affected district of Punjab during 2023 flood.
4. To suggest ways and means to prevent the flood in Punjab

IV. DISCUSSION

Punjab derived its name because of presence of five rivers, Satluj, Ravi, Beas, Jhelum and Chenab also endowed with rich water resources. Table 1 shows year-wise affected number of

villages, area, cattle's, damaged area due to floods during 1970-2023 in Punjab state. It reveals that number of affected villages is highest in 2011 (1196) among all the years followed by 1980, 2010. Whereas it is observed that percentage damaged caused to area under crops is maximum in 2023 (11.66 per cent) followed by 2011 (1.30 per cent), 2010 (1 per cent).

Table 1: Year-Wise Affected No. of villages/towns, Area, Population, Human lives, Cattles, Damaged Crop Area due to floods during 1970-2023 in Punjab

Year	No. of Villages/Town Affected	Area Affected (Sq. Km.)	Population affected	Human Lives Lost	Cattle Head Lost (No.)	Damage Caused to Areas Under Crops (Hectares)	% age Damaged Caused to Areas Under Crops	Value of Crops (Rs. 000)
1970	176	118	7541	1	5	6987	0.12	3088
1980	1191	489	85724	44	117	48930	0.72	6559
1990	755	471	90465	13	275	47048	9.75	251086
2000	81	127	319	5	88	12620	0.16	77116
2010	1081	1608	62318	37	109	75645	1	2065182
2011	1196	6954	171773	36	133	102828	1.30	2232525
2019	469	58197	46063	20	20	94671	1.25	345225
2020	764	29876	180466	22	631	67906	0.75	5314155
2021	51	21408	14640	10	6	20771	0.27	592963
2022	117	12010	-	10	25	18692	0.24	541042
2023	219	162	10270	14	6	920727	11.66	381549

Source: Statistical Abstract of Punjab, Various Years.

Above table showed that maximum loss of monetary value of crops is in 2020 followed by 2011, 2010 whereas least is in 1970. In the year 2022, there no loss of population while a major loss of population is occurred in the year 2022.

The inflow in the reservoirs of dams (Pong and Bhakhra dams) alarmingly increased owing to torrential rains in their catchment areas, mainly in the hill state during July 2023. The excess water was discharged from various dams and the downstream Bet area villages were first to get affected as the homes were inundated with 4-4.5 feet of water forcing residents/farmers to evacuate their homes and abandon the fields. Rains also resulted in excess water flowing into streams and rivulets located downstream of the dams. As per records, approximately 2.21 lakh ha of area was submerged due to floods in Punjab. Amongst the different districts in Punjab, the worst-hit districts were Patiala, Mohali and Fatehgarh Sahib.

Overflowing Ghaggar, Beas, Sutlej and Ravi rivers entering the Punjab state from the upstream state of Himachal Pradesh, resulted in devastating impact in these districts. The intensity of inundation decreased with the distance from the floodplain areas of these rivers and their tributaries (Kaur et. al). Table no 2 Shows district-wise shows year-wise affected number of villages, area, cattle's, damaged area due to floods in 2023 in Punjab state. The table reveals that the major area of Firozpur is affected in 2023 i.e 8279 Sq. Km. followed by Kapurthala 3600 Sq. Km. and Ludhiana 131 Sq. Km.

Table 2: District-Wise Affected No. of villages/towns, Area, Population, Human lives, Cattles and Damaged Crop Area due to floods in 2023 in Punjab

District	No. of Villages/ Town Affected	Area Affected (Sq. Km.)	Population affected	Human Lives Lost	Cattle Head Lost (No.)	Damage Caused to Areas Under Crops (Hectares)	% age Damage Caused to Areas Under Crops	Value of Crops (Rs. 000)
Gurdaspur								
Pathankot								
Amritsar								
Tarn Taran								
Kapurthala	55	3600				3600	1.35	106740
Jalandhar								
S.B.S. Nagar								
Hoshiarpur								
Rupnagar								
S.A.S. Nagar								
Ludhiana		131		1	13	131	0.02	3848
Firozpur	62	8279				8279	2.06	77649
Fazilka								
Faridkot								
Sri Muktsar Sahib					1			167526
Moga								
Bathinda								
Mansa								
Sangrur								
Barnala								
Patiala				9		6682	1.31	185279
Fatehgarh Sahib					11			

Source: Statistical Abstract of Punjab, 2023

Above data showed that maximum damaged areas under crops is of Firozpur i.e. 2.06 per cent followed by Kapurthala, Patiala and Ludhiana. As per records, approximately 2.21 lakh ha of area was submerged due to floods in Punjab. Amongst the different districts in Punjab, the worst-hit districts were Patiala, Mohali, Tarn Taran, Gurdaspur and Fatehgarh Sahib. Overflowing Ghaggar, Beas, Sutlej and Ravi rivers entering the Punjab state from the upstream state of Himachal Pradesh, resulted in devastating impact in these districts (Department of climate and Agriculture Meteorology, Punjab Agriculture University, Ludhiana)

As per the reports, some places had 5-7 feet of flood water in the fields. In Punjab during kharif season, nearly 31.49 lakh ha of the area is under paddy cultivation and the transplanting of paddy starts from 15th June onwards. Approximately 2.21 lakh ha area was submerged due to floods which means, nearly 7% of the paddy area was flooded. An estimate revealed that a loss of nearly Rs 2800 crore would have occurred if the retransplanting of the rice crop was not done. The other crops growing in fields during the time of floods were maize, fodder; vegetables, etc. also suffered huge losses. Moreover, vegetables, maize, sugarcane and cotton farmers suffered huge losses due to the flooding. The livestock was badly affected and farmers suffered huge losses due to flooding in two ways. Firstly, animals died due to drowning and many animals were carried away by flood water. Secondly, the non-availability of fodder/ feed during and after the flooding was a major setback to livestock productivity (Department of climate and Agriculture Meteorology, Punjab Agriculture University, Ludhiana).

The primary cause of the 2023 floods was unprecedented heavy rainfall during the monsoon season. A monsoon surge, coupled with a western disturbance, led to the highest rainfall in decades in some parts of the region, causing nearby rivers to overflow. This resulted in flooding and landslides that washed away vehicles, destroyed bridges and roads, and disrupted power and electricity. Major rivers such as the Ghaggar and Sutlej were in spate, exacerbating the flood situation. The overflow of these rivers led to inundation of nearby areas, including urban centers like Patiala and Dera Bassi. The floods resulted in numerous fatalities and injuries. Many residents were evacuated to relief camps, and thousands were displaced from their homes. The floods caused extensive damage to infrastructure, including roads, bridges, and buildings. In Punjab, nearly 150 rural roads and 10 bridges were damaged, disrupting transportation and communication networks. Agriculture, a vital component of Punjab's economy, suffered significantly. Floodwaters inundated vast tracts of farmland, destroying crops and leading to substantial economic losses for farmers. The state government ordered the closure of all schools during the floods, which remained closed until July 17, 2023, disrupting the education of thousands of students. Stagnant water and compromised sanitation facilities led to an increased risk of waterborne diseases. The healthcare system faced challenges in addressing the surge in medical needs during and after the floods.

V- CONCLUSION AND POLICY IMPLICATIONS

From the study it is observed that the areas adjacent to the Sutlej, Beas, Ravi, Chenab and Ghaggar rivers are the worst affected. The 2023 floods in Punjab underscored the vulnerability of the region to natural disasters, exacerbated by climatic and anthropogenic factors. Addressing these challenges requires a multifaceted approach, combining infrastructure development, environmental conservation and community engagement to build resilience against future floods. It is suggested that by taking a proactive and integrated approach, the

impact of floods in Punjab can be significantly reduced. It requires coordinated efforts from government agencies, non-government organization and local communities.

REFERENCES

- Alam, Javed and Muzzammil, Mohammad (2011), "Flood Disaster Preparedness in Indian Scenario", International journal on Recent Trends in Engineering & Technology, Vol. 05, No. 03, Mar, pp 33-38
- All India Coordinated Research Project on Agrometeorology Department of Climate Change and Agricultural Meteorology Punjab Agricultural University Ludhiana, Punjab, A report, 2024
- Goyari, Phanindra (2005), "Flood Damages and Sustainability of Agriculture in Assam", Economic and Political Weekly, Vol. 40, No. 26, pp. 2723-2729
- Kaur, Parmjit and Sukhdarshan Singh (2024), "Environmental Crisis in Punjab in Context of Agriculture: Role of the State and Central Government", International Journal for Multidisciplinary Research (IJFMR), Vol 6, Issue 2, pp 1-14
- Kaur, Prabhjyot, Singh Sandeep and Kaur Simerjeet (2023), "Punjab flood 2023, causes, impacts and learnings", Punjab Agriculture University, Ludhiana.
- Mohanty, Mohit P. , Mudgil , Sahil and Karmakar, Subhankar (2020) "Flood management in India: A focussed review on the current status and future challenges", International Journal of Disaster Risk Reduction, Volume 49, October
- Rongchen Liu., Sanyal, Anirban., & Singh, Nirvikar. (2020). Environmental Issues, Economic Policies and Agricultural Development: The Case of Punjab, India. Indian Public Policy Review, Vol. 2 (2), p. 337.
- Singh, Komaljot (2014), "Disasters and Agriculture in Punjab (India): Damage caused by floods in 2011", Asian Resonance, Vol. III, Issue III, July 2014.
- Statistical Abstract of Punjab, Various Years.
- Vijender (2019), "Temporal Analysis of flood in Punjab, India 1990-2010", IJRAR, Vo. 6, Issue 1, pp 105-113