# EX-POSTE IMPACTS OF FLOOD ON SOCIOECONOMICS CONDITIONS OF LOCAL POPULATION IN DISTRICT KHAIRPUR MIR'S, PAKISTAN

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## ABSTRACT

*This research evaluates the impact of floods on the socioeconomic conditions and environmental well-being of the local population in District Khairpur Mir's, Sindh, Pakistan. For this research secondary data was collected through landset satellite 8and9 from USGS (United States Geographic Service). Coordinate system's WGS 1984 location zone of Pakistan is WG 42. The remote sensing data was downloaded of district Khairpur Mir's, Tehsil Sobhodero for the period of 2021-22. Data was analyzed according to Arc GIS software, the results indicate that the health department of Sindh reported a staggering 10,790,000 cases of disease among the local population during the flood. In addition, the flood had a severe impact on crops in the Khairpur district, affecting 130,000 acres of farmland. Furthermore, the flood left 20,900 people homeless in the study area. The flood has highly hit and damaged many villages' roads and agriculture lands. Therefore, the metrology department should take action for pre disaster information dissemination; where the public health engineering department should improve the derange systems while delisting effluent canals prior to floods.*

*Keywords; Environment, Flood, Socioeconomics, Local Population.*

## INTRODUCTION

Natural disasters are a global growing concern, consequently 185 million people have been affected directly from such catastrophes (CRD, 2023) and their impact on developing countries cannot be ignored (CRD, 2023; ADRSC, 2023). This is critical in developing nations where vulnerabilities

are pronounced and institutional capacities need strengthening (Magsi et al, 2022; Dolman et al., 2018). Floods overwhelm the ground's capacity to absorb water, displacing communities, killing lives, and causing extensive damages, this recurring natural disaster affects millions worldwide, requiring proactive steps such as effective flood management, prevention measures, and community education to mitigate its impact and protect lives and properties (Kuari et al., 2015; Magsi and Torre, 2012).

The climate change intensifies flood disasters, affecting agricultural production and food security, especially in developing countries like Pakistan (Joyo et al., 2018). People in flood prone areas of the developing countries have suffered socially and economically from recent floods (Kumber, 2023). Literature further suggests that, poor farmer's households are the most vulnerable, making it crucial to address climate change's impact on increasing floods and decreasing food supply (Week and Wizor, 2020; Tran et al., 2019).

In Pakistan between (June and September 2022) 33 million people were impacted by flood, resulting in 1,739 deaths and US$ 15 billion economic damage (CRED, 2023). While, in 2010 flood caused the loss of over 2,000 lives, with affecting 20 million people, and responsible for acute food insecurity to 7.8 million people in Pakistan (Rahman et al., 2016). Therefore, National Nutrition Survey conducted in 2018 revealed that 40.2% of children under the age of five were suffering from stunted growth. The impact of floods can be particularly severe in low-resource settings as it can disturb people's livelihood, which can have long-lasting effects on the affected individuals. Natural calamities such as floods and tsunamis do not only lead to immediate economic loss and physical harm, but they can also cause psychological disorders such as post-traumatic stress disorder and anxiety (Mahmoud at el., 2021).

According to disaster management agency, the 2022 flood affected about 50 million population and from which 1,000 people were died in Sindh province (Kumber, 2023). An estimated 500 millimeters of rainfall have been recorded in Sindh (Henson, 2023).The flood 2022 led to an estimated 88% loss in major crops in Sindh (Qamer et al., 2023).Therefore 4.4 million acres of agricultural land were destroyed and 5.1 million hectares of farmland were badly damaged, resulting in a negative impact on livestock sector during flood (Teshin, 2022). In Sindh province mostly affected district was Khairpur Mir's during 2022 heavy rain fall, in that district so, it was highly affected over 800000 people, causing significant damage to agriculture and housing. This

disaster has impacted 157,490 individuals in four Talukas, 13 union councils, and 380 villages (Foundation, 2022). While, in Khairpur, 3,027 homes were destroyed, and Sukkur, Ghotki districts also face the aftermath. Therefore, the district Khairpur has been severely affected by flooding, resulting in the destruction of crops that were spread over 130,000 acres of land. The impact of this natural disaster has been devastating for the local community, and immediate measures are required to support those affected and help them recover (DAWN, 2022).

### Justification of this study

During the course of my research, I downloaded the first research paper from Scholar Google and also referred to several other websites after reviewing those papers. Using this information, I designed my research model paper. Throughout the research process, I made extensive use of the computer facilities available at the Department of Economics at Sindh Agriculture University Tandojam. The primary goal of my research was to estimate the impact of floods on the economic, social, and environmental well-being of the local population.

## MATERIAL AND METHODS

For this research, secondary data was collected from *landset* satellite 8 and 9 from USGS (United States Geographic Service). Coordinate system's WGS 1984 location zone of Pakistan is WG 42. The remote sensing data was downloaded of district Khairpur Mir's, tehsil Sobhodero for the period of 2021-22. Then, data analysis through the process of supervisor classification tool, using Arc GIS software. The computer lab for GIS at Mehran University Engineering and Technology Jamshoro, Pakistan was used to treat the maps as per objectives.

### Supervised classification

ArcGIS is a process in which you train a machine learning algorithm to classify pixels in a raster image into predefined classes based on the feature. The technique is commonly used in remote sensing and image analysis to categorize land cover, land use, and other satellite or aerial imagery features. ArcGIS provides tools and functionalities to perform supervised classification,

### Data Preparation

Start by acquiring the satellite or aerial imagery you can want to classify. Ensure you have the spatial and spectral resolution for your classification task.

### Training Data Collection

Collect a set of training sample that represent the different classes. And use training samples should be polygons in that regions of interest to which you have visually identified and assigned class labels.

### Data Pre-Processing

Preprocess the imagery by performing task like atmospheric correction, radiometric calibration, image enhancement as per needed.

### Accuracy Assessment

It's important to assess the accuracy of your classification, use validation sample or ground-truth data to compare the classified results with the actual condition on the ground. ArcGIS provides tools of the purpose of the data analysis.

## RESULTS AND DISCUSSION

After the recent heavy floods in the province, the Sindh Health Department has reported a staggering 1,079,000 locals now grappling with infectious diseases. The situation is dire and requires urgent attention from the authorities and relief organizations. During a recent visit to the flood-stricken zones, Chief Minister Murad Ali Shah highlighted that essential medications have been distributed to fend off dengue fever. He also expressed concerns about people in these areas falling ill with conditions like diarrhea, gastroenteritis, in addition to dengue (Web desk, 2022 relief cam Khairpur).

**Table-1: Impacts of flood 2022 at Khairpur Mir's**

| Description | Statistics |
|---|---|
| Human death during a flood in number | 93 |
| Injured during flood in number | 63 |
| Animal death during a flood in number | 34373 |
| Houses affected by flood in number | 120000 |
| People affected during a flood in number | 800000 |
| A girl Child died in gastro during a flood in number | 05 |
| The child died of measles during a flood in number | 02 |
| Diarrhea affected people during the flood | 500000 |
| Gastroenteritis in number | 200000 |
| Malaria in number | 100000 |
| Dengue fever in number | 50000 |
| Typhoid fever in number | 25000 |
| Hepatitis in number | 5000 |

*Source: PDMA report 2022, DAWN, 2022,*

In the district of Khairpur Mir's in Sindh province, 93 people died and 63 were injured during the flood in 2022 During the flood, there were 34373 animal deaths, 120000 houses were affected, and 800000 people were also affected As a result, five girl children died from gastro-intestinal diseases, and two children also died from measles diseases During the flood in 2022, there were five million people suffering from diarrhea, two million from gastroenteritis, one million from malaria, and five thousand people suffered from malaria suffered in dengue fever. And 25000 people in typhoid, 5000 people suffered hepatitis during 2022 flood. Similarly, (Rahman et al., 2016) investigated that during 2010 flood caused the loss of over 2,000 lives, with affecting 20 million people, and responsible for acute food insecurity to 7.8 million people in Pakistan. According to (CRED, 2023) investigated the annual report 33 million people were impacted flood, resulting 1,739 death and losses 15 billion economics damage.

**Figure-1: Pictures collected during flood 2022**

Above pictures show that District Khairpur was highly affected during flood 2022. People were leaving the city and moving towards a safe places with their children. While, their resources including houses, roads were inundated, which has deteriorated life of rural population. The literature suggest that socioeconomic wellbeing is directly associated with quality infrastructure (Magsi et al, 2021; Magsi and Torre, 2012)

**Figure-2: Comprises land cover change during the flood**
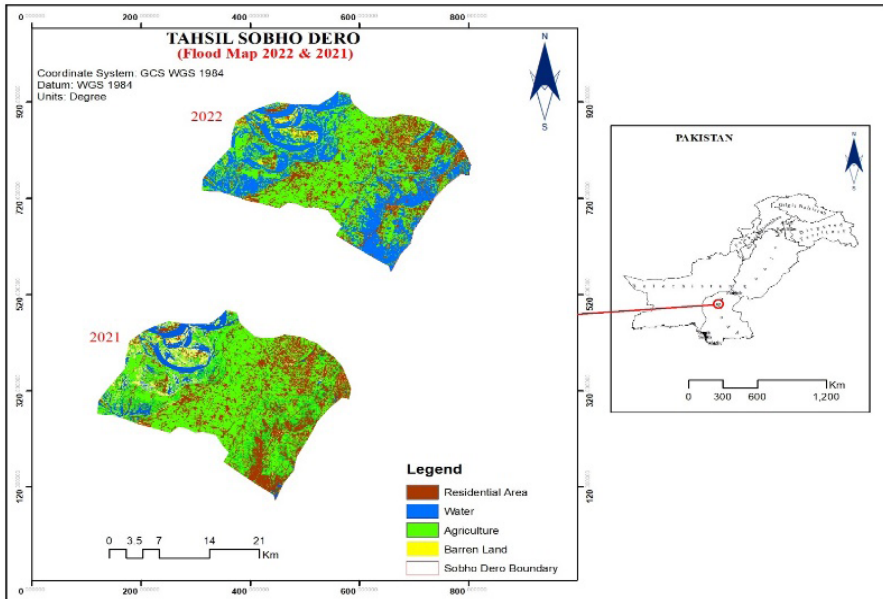


The above figure showed data before the flood and after the flood of district Khairpur Tehsil sobhodero, according to these maps. In 2022, flood water was highly damaged agricultural land and residential area will also affect areas of the south-east area as compared to 2021. Similarly, (Sholihah, 2020) Found that during 2022 flood were highly effected to infrastructure and badly damaged to agricultural, industrial areas.

## CONCLUSION RECOMMENDATION

The recent floods have severely impacted the district of Khairpur, causing extensive damage to critical infrastructure, including roads, schools, electricity networks, and communication towers. Thousands of residents have been displaced, leaving them homeless and vulnerable. The 2022 floods in Tehsil Sobhodero were particularly devastating, submerging low-lying areas where most farmers resided. Tragically, the disaster claimed around

a hundred lives and left 63 people injured, further highlighting the urgent need for effective disaster management and relief efforts. To mitigate future risks, it is imperative that the Sindh Government takes immediate action to accommodate, facilitate, and compensate the flood-affected population. Providing temporary shelters, financial aid, and rehabilitation support should be prioritized to help victims rebuild their lives. Additionally, the Metrology Department must enhance its early warning systems to alert communities about impending natural disasters, particularly floods, allowing sufficient time for evacuation and preparedness.

Moreover, the Public Health Engineering Department should focus on improving infrastructure resilience by de-silting canals and water channels to ensure proper drainage and reduce flood risks. Strengthening embankments and constructing flood-resistant structures can also minimize future damage. Community engagement is equally crucial in disaster preparedness. The local government, in collaboration with NGOs, should organize awareness seminars and training programs to educate residents on emergency response measures, evacuation protocols, and sustainable farming practices in flood-prone areas. Such initiatives will empower communities to better cope with natural calamities. In conclusion, a multi-faceted approach involving government intervention, infrastructure development, early warning systems, and public awareness is essential to mitigate the impact of floods and safeguard vulnerable populations in Khairpur and other at-risk regions of Sindh.

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