

An Analysis Of Flood Hazard In Udaynarayanpur Blocks Of Howrah District, West Bengal

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Abstract

Floods are commonly defined as situation where the quantity of water in a region exceeds its normal capacity, resulting in damage to physical, infrastructural, economic, and social aspects of an area. Heavy rainfall is a primary cause of flooding when natural water channels fail to manage the excess water. In this area, it has been observed that the majority of water channels are small in size. As a consequence, riverbanks are unable to contain the heavy water flow during intense rainfall, leading to inundation. Areas lacking proper drainage systems also experience flooding during heavy rainfall. Floods have a significant impact, causing damage to socio-economic assets and regional infrastructure. Houses, bridges, agricultural land, and roads are often destroyed, leading to substantial economic losses. The destruction of communication lines, infrastructure, and transportation networks further disrupts connectivity between different locations. This study focuses on analyzing the post-inundation scenario of the Udaynarayanpur CD block in the Howrah District of West Bengal. Flood frequency analysis is a commonly employed technique that relates the magnitude of extreme runoff or river flow events to their frequency using probability distribution functions. Illustrates the impact of yearly flooding on major households in the region. In 2013, approximately 74.14% of total population was affected, followed by 76.39% in 2015, a staggering 92.02% in 2017 and 94% affected 2020-21. This data suggests a recurring pattern of significant population impact due to flooding each year. Historically, various flood control methods have been employed. These strategies include planting vegetation to retain excess water, terracing hillsides to slow downhill flow, and constructing flood ways-man-made channels designed to divert floodwater.

Keywords: Flood Hazard Analysis, Socio-economic impact, Flood Frequency Analysis, Drainage System, Infrastructure Damage, Udaynarayanpur Block.

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I. INTRODUCTION:

Flood is the third most common environmental hazard worldwide related to several environmental processes. Therefore, its causes are as diverse as its consequences, both of which vary with the nature of the flood prone environment as with the other major facts of flood impacts. Some districts of West Bengal are under high risk and vulnerability.

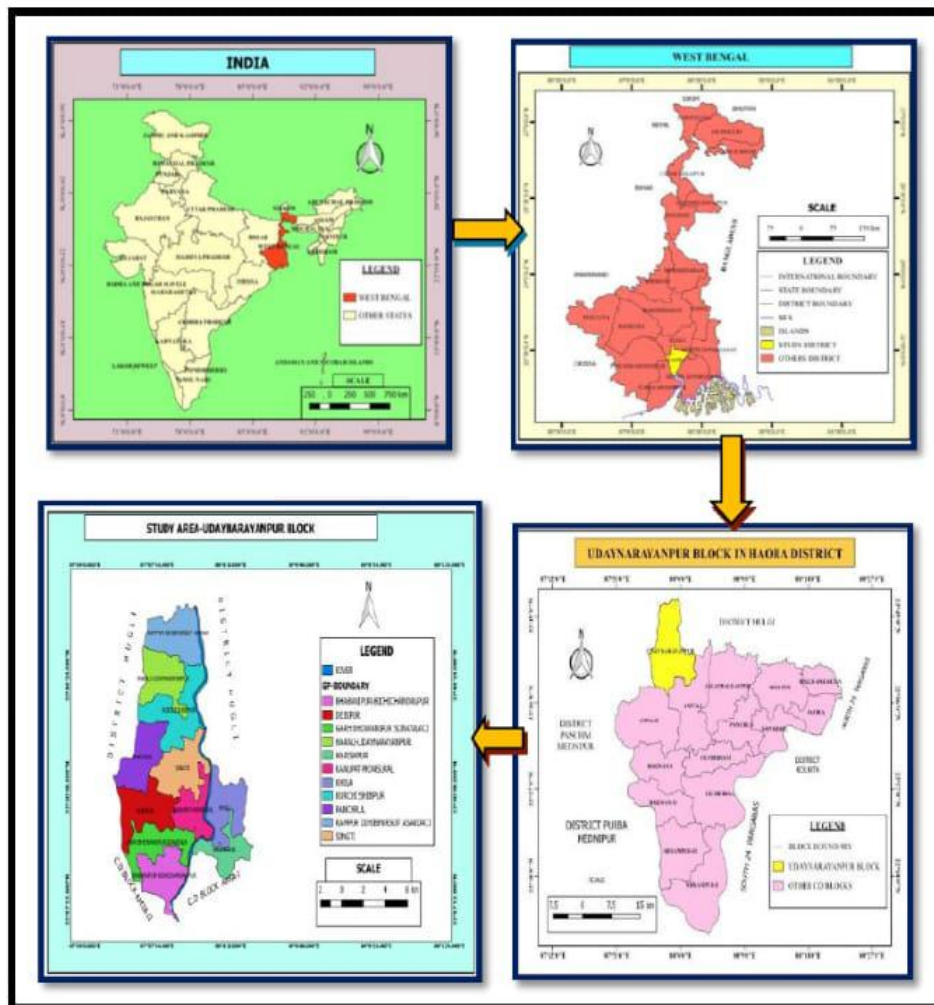
Udaynarayanpur that belongs to Howrah district is a community development Block that forms an administrative division. Flood occurred in 2015-2017, 2020-21 respectively and affected the entire block. Many villages like Burshut, Rampur, Pancharul, Dihl affected mostly. The recent floods of 2015-2017, 2020-21 was too vulnerable that left their significant imprints on the villages. The duration of flood was not long, yet magnitude was very high. The present analysis the effects of flood in the study area, as well as physical and cultural problems etc.

II. METHODOLOGY:

The present report has been prepared based on secondary sources, like literature, research papers, administrative reports and websites. Data and information have been shown by cartographic symbols on the maps or by graphical diagrams. The image has been interpreted based on findings and secondary source information collected.

STUDY AREA: West Bengal has 37.660 sq. km flood prone area out of 88,752 km² (42.4% of total geographical area) of total area. Flood affected areas are spread in 111 blocks of West Bengal. Udaynarayanpur is a community Development Block that forms an administrative division in uluberia subdivision of howrah district in West Bengal. It is situated 46 Km north of Howrah railway station. The longitude of study area is

87°58'30" E and latitudes are 22°71'30" N. It covers an 55.4 sq km and with a population of 190186 as per census 2011. Literacy rate of this area is 81.05%, 141545 out of total 190186 population are educate here.



III. AIMS AND OBJECTIVES :-

The main objectives are as follows –

1. To find out the causes of flood in lower Damodar basin area in Udaynarayanpur block.
2. To identify the impact of flood on agricultural land and other sectors in the affected areas.
3. To assess the nature of loss of public and private property due to flood.
4. To identify suitable measures for the flood management in this area.

IV. LITERATURE REVIEW:-

The Present study is related to various ground aspects of impact of flood and implementation practise of several measures in flood prone areas.

- Doocy S, Daniels A, Murrays, and Kirseh T.D (2013) Stated in ‘Human impact of floods : Attlistorial Review of Events 1980-2009’ and depicted the impact of floods on human life in terms of mortality rate, Risk and Vulnerability to flood increasing due to growth of population, urbanisation, Landuse change and climatic factors like extreme rainfall, coupled by modification of river channel.
- Bera, S and Mistry B (2014) mentioned in flood in the lower Damodar basin and channel Morphology: A case study spoke about bifurcation zone into Damodar and Mundeswari River , due to low carring capacity and high discharge of river creates flood in the region .
- Sivarajah, V (2019) analysed in “A Geo Spatial analysis of flood hazard impact Assessment in vavuniya District , Sri Lanka “ – that the construction of unplanned tritup, disturb of drainage basin.

V. BRIEF PROFILE:-

TOPOGRAPHY:- Topographical, the entire area is a monotonously flat alluvial plain with no marked slope. Howrah district is located on the west bank of the Hooghly. The Rupnarayan flows on the west and south of the district and the Damodar intersects it. The district consists of a flat alluvial plain. Udaynarayanpur CD block has an area of 109.61 km² with the udaynarayanpur panchayat samity having 11 Gram Panchayets under it. The Block has 75 inhabited villages. The district is a flat alluvial plain with maximum as low as 3 meter, below 10 metre areas are most flood prone area in villages. These lowlands are mostly ill – treated and usually from marshes.

DEMOGRAPHY:-

Population is the major part of any area. As per 2011 census udaynarayanpur CD Block had a total population of 196,165, all of which were rural and incurring a decadal growth rate of 11.32% from 172,465 total population in 2001 (5.11%) Udaynarayanpur CD block 2011 census are sonatola 5093, BidhiChandrapur 5290, Density is comparatively low in 5 villages moderate in 30 villages, very high and high in 40 villages. Growth of the population is showing the actual population during 2001 to 2011. The bar is showing increasing trend. After 2001, the growth of the population is continuously high till 2021. An estimated population bar has shown where during 2021 the estimated population is greater than the actual whereas during 2001 to 2021.

LANDUSE AND LANDCOVER :-

Since, the use of accurate Landuse and Land Cover maps Can improve the results of flood risk management. In this study satellite image of sentinel 2A with a spatial resolution of 10, 20 and 60 m for different bands were used to generate the landuse and landcover map. Udaynarayanpur landuse as like many other blocks of howrah has agriculture land pre – dominating along with agricultural land. Settlement pockets are compact and distribution throughout the area , the Damodar river flows on the North – South part of the block. Natural Vegetation of this block is scattered in nature. Roads are associated with the statement area. The block development office is located in Udaynarayanpur village. There are many hospitals, schools, flood shelters sparsely distributed all over the block.

ANALYSIS OF FLOOD OCCURRENCE :-

The first record of flood in this districts dates back to 1825 and since then floods of various intensities have been occurring from time to time. A rough estimate shows that between 1825 and 1955 (the DVC started flood controlling), serious floods ravaged the district at least on 19 occasions, while the number of flood from 1955 to 1988 period was 10. One of the most disastrous floods which surpassed all the previous records of discharge magnitude, took place in 1978. Incidentally this is gravest flood recorded so far. This brings out the fact that the frequency of flood occurrences has increased since the inuption of the of the DVC , not only floods have been more frequent, but larger areas are involved in this annual menace as the flood waters penetrate deep into the block through numerous interlinked canals and distributaries.

It has been observed that excessive discharge of water from the dam is main causes of flood in this study area. Others factors is minor causes of flood in this block Udaynarayanpur Block testified by history of last 16 years, from 2000 to 2017, and 2020-21.

This peak month of the flood occurrence in the villages was August. During this time the river banks over flow the water heavy rainfall in the upper catchment areas of the Damodar river sudden increase in the volume of the water downstream. This causes over topping of river banks by enormous volume of water and consequent inundation and flooding of flood plain area. The river maintain very low flow and low discharge of the water during most of the part of the year and hence, sudden torrential rainfall causes. Sudden increase in the volume of the water which cannot be disposed of by the rivers immediately and thus the river banks are overtopped by the swelling water and instantaneous flood are caused.

FLOOD PRONE AREAS:-

Udaynarayanpur block as testified by history of last 16 years and recent year. From 2000 to 2017 and 2020-21. Flood occurred in 2003-2007. The 2015 and 2017 floods severely affected the entire block. In the year 2015 there was maximum occurrence of flood 65% from total area of the village. In the July 2017 flood area was 34.54% of the villages. The major common villages were Rampur, Dakshin Rampur, Kumiramora etc. That were the most flood prone villages .

There are 109 vulnerable mouzas, villages or areas out of 225 mouzas under the study area of Udaynarayanpur block of lower Damodar area; and the intensity and frequency of flood varied according to the year 2013, 2015,2017,2020-21.

FACTORS OF FLOOD IN STUDY AREA:-

During the month of monsoon (June to September) this area has received excessive amount of rainfall. Out of total rain- fall almost 82% rainfall occurred during the monsoon season... The study area of lower Damodar area has received an average annual rainfall of 1516-66 mm during 1978-2015. In this same period, eighteen years ie 1978, 1984, 1985, 1986, 1987, 1990, 1995, 1996, 2001, 2004, 2006, 2007, 2008, 2009, 2010, 2011, 2013 and 2015 the study area has received more than 400 mm rainfall in a Season and 11 times I,e 1978, 1984, 1986, 1996, 2007, 2008, 2010, 2011, 2013 and 2015. It crossed 500 mm. Devastating flood occurred almost in the same years and month when rainfall crossed 500 mm in a month.

GENTLE SLOPE:-

Due to gentle longitudinal slope 2 feet/1500 feet to 2 feet/1 mile of the study area of lower Damodar area, the drainage efficiency is very low.”

LOW CARRING CAPACITY:- This area has been suffering from flood hazard due to low carrying capacity. The waited perimeters of Damodar have been reduced and carrying capacity of Damodar River has also been declared.

HUGE SILTATION AND SAND DEPOSITION :-

Damodar River has also lost carrying due to siltation and Sand deposition. At Beghuahana, Jamalpur police station. Bhardhaman, where Damodar (Amta channel) and Mundeswari bifurcated from each other a mid-channel bar formed on the mouth of River Damodar and obstacle in free flow of water through Amta channel.

TIDAL EFFECT :-

In the days of new moon and full moon, the spring tide Occurs in Rupnarayana river. When Spring, tide occurs in mainy Season: the river water height crosses extreme danger level (5.54 meter) and devastated the island area i.e Bhortora and Ghoraberia chitman Gram panchayet's of Udaynarayanpur block.

EX ZAMINDARI BUNDHS

Ex-zamindari constructed some circuit embankment to Protect their zamindari area from flood but this bundh was made of Soft clay and sandy soil and these are old too. But now the zamindari Bandh has been breach and flood water enters into the area closed by the embankments. For this reason. Flood water cannot fbw down quickly from this area.

ELEVATED EMBANKMENT

In the past both banks of Damodar were opened and no embankment was there. Number of distributaries, and Canals were joined with of bifureated from Damodar and flood water early moved to Bay of Bengal throught Hugli River. But drainage problem had to be acquitted when loftly embankment was made (probably around 1865) in the left bank of Damodar. Because of that, the rivers and canals Which were joined with Damodar were disrupted from Damodar and not able to drain water to Damodar. For the time being the rivers and calats got silted up and Collapsed the drainage System.

CONSTRUCTION OF DAMS AND BARRAGES :-

Before construction of dams and barrages over Damodar and its tributaries, there was free flow through the river and river was capable of carrying adequate flood discharge After construction of dam's and barrage this flood carring capacity of the river has reduced due to siltation. Not only the downstream and up stream of the river but also the dams and barrages gets silted up and the reserve capacity of flood water has reduced. For this reason, DVC administration is faced to release water from dams” and barrages.

CONVERTING THE RIVER-BED TO CULTIVATED LAND :- People of the river of lower Damodar area used both bank 'Char' as agricultural field. Human intervention in a river is very dangerous for a river. This activity destroys the carrying capacity of river and river gets Silted up. Because of the water not freely moved towards out fall.

AFFECT OF FLOOD:-

Flood not only just hamper on environment, it also have a great impact on daily lives, human lives, economic sector as well as Social Sectors. It totally effects the whole system.

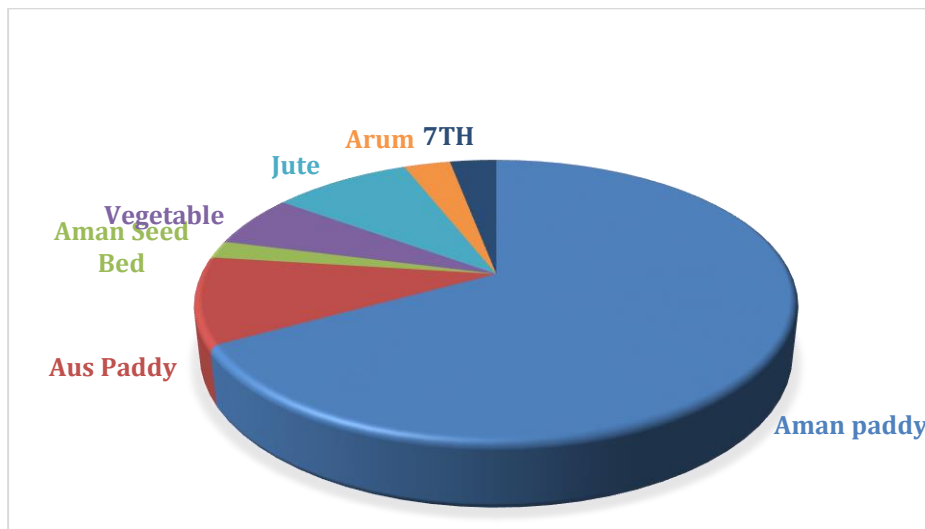
DAMAGED IN ECONOMIC SECTOR :-

In Udaynarayanpur, blocks of 70%. Area in under agricultural land which indicates that all villages paddy are mostly damaged from flood hazard. Also the rural household which is almost 43586 units, got impact and some destroyed due to Flood.

DAMAGED AREA IN SOCIAL SECTOR :-

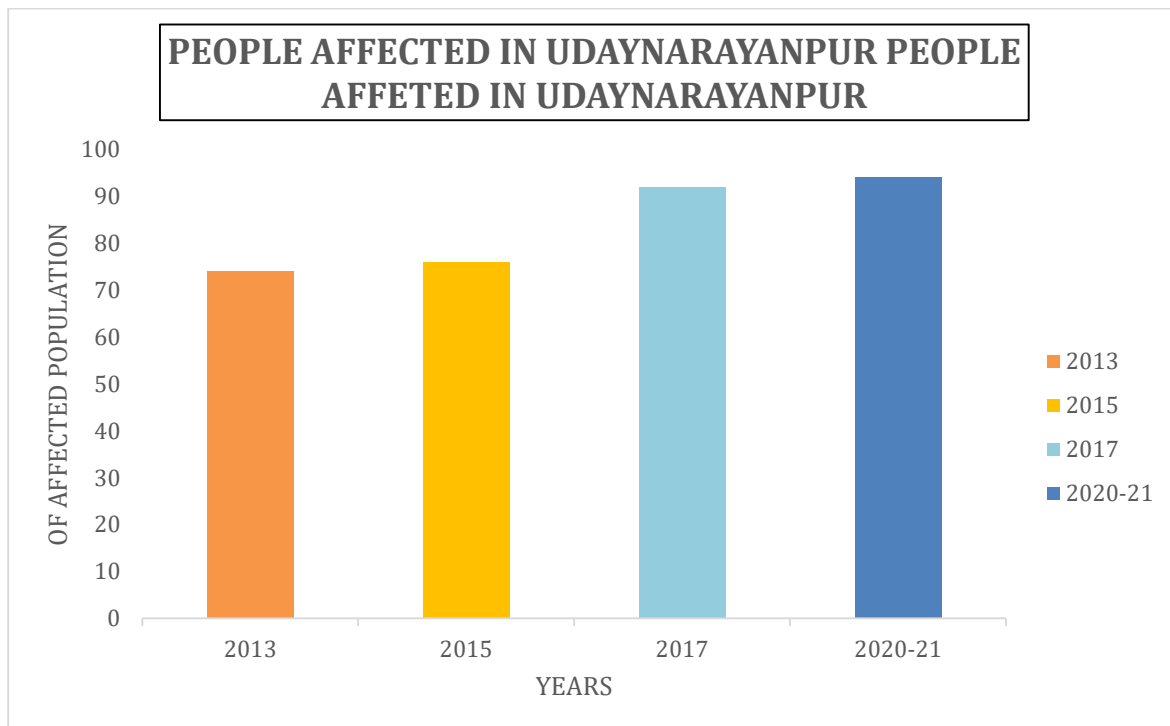
In Udaynarayanpur Several villages were flooded as DVC water entered through bridges. Wooden bridges had been damaged; roads, houses, also damaged due to flood.

AFFECTED AREA OF CROPS :- Among the total agricultural land of 5953 hectare about 5199 hectare area got affected by inandation in 2017. This is about 96.57% of total cropped area affected in Udaynarayanpur CD Block.



AFFECTED POPULATION :-

Major household of the region got affected by every year of flooding which is represented by fig1. About 74.4% of total population affected in 2013, followed by 76.39% of total population in 2015 and 2017 about 92.02% of total population affected by flood.



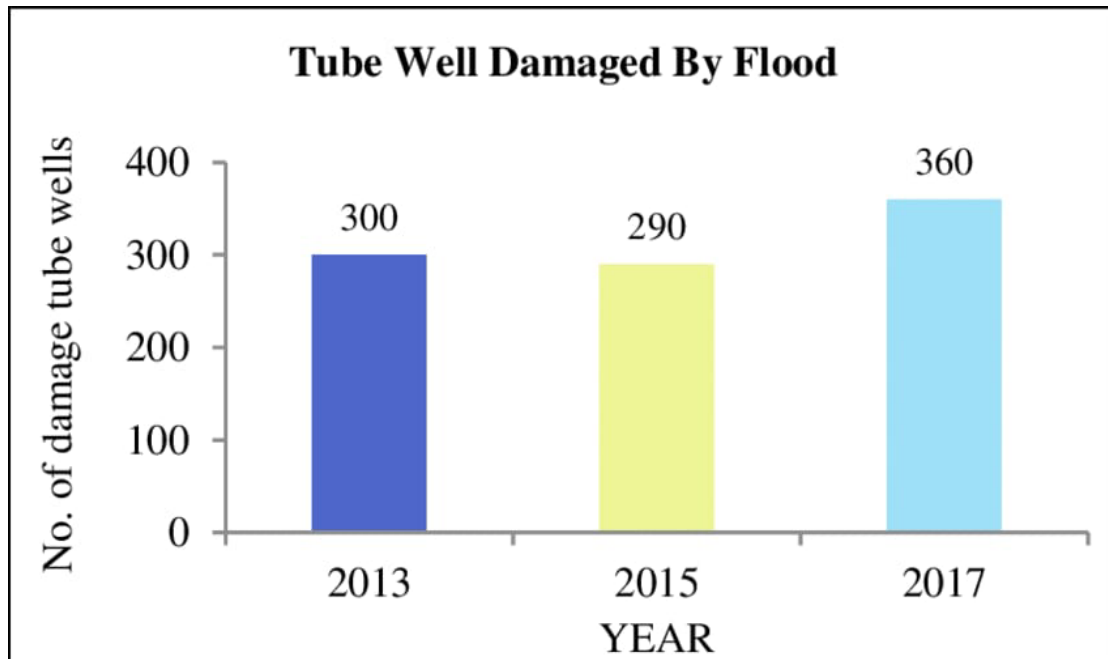
AFFECTED BY DISEASE :- Many types of disease that, affected people during floods. The diseases includes diarrhia, Fever, Acute Respiratory Infection Snake bile and Dengue. 39% of people Suffered from diseases.

AFFECTED ROADS :-

The flood water damaged the rural roads in the region. Mainly bricked road, concrete road and earthen road. In 2013, the brick road damaged about 17.89% and concrete road 11.45% . In 2015 brick road damaged about 24.1% followed by 20.75% of eastern road and 12.45% of concrete road by flood.

TUBE – WELL DAMAGED BY FLOOD:-

Flood depicts the number of damage tube wells by flood in Udaynarayanpur CD Block of three Concerned roads. In 2017, the maximum damage of tube wells. Was about 360 in number. Where as. about 290 tube wells were damaged in 2015 and 300 tube wells damaged in 2013 flood in Udaynarayanpur.



VI. MAJOR FINDINGS :-

- The habitats of study area got affected by flood in every year about 70 percent of the total households fully damaged in every year.
- The rate of economic losses increases year by year. The region got suffer in source of drinking water, Sanitation, drainages, culvert, kachha houses and public health facilities by flooding.
- Due to improper knowledge of flood mitigation. Strategies of people by the region Suffer during flood.
- The flooded area is directly related with affected population roads and agricultural land.

HAZARD AND RISK MANAGEMENT SHELTER :-

RECOMMENDATIONS

BEFORE FLOOD

- A proper warning, system of flood needs to be established by local and concerned authorities in the area.
- potential flood prone area can be predicted by flood risk analysis and mapping techniques with the help of modern technologies which may help to reduce the losses of economic property.
- Including floods, daily use products, clothes and drinking. Water should be sorted.

POST FLOOD

People of the area should be advised to settle indoors as much as possible and not to touch any open electrical elements. Post flood relief measures should be immediately taken to avoid higher risk of loss of life and properly in the region. Rehabilitation of affected people to safe and protected places should be prepared immediately to control devastating impacts.

PREVENTION OF FLOOD

Channel Improvement > channel improvement should be done. By deepening, widening straightening lining and clearing out of vegetation and sediments from the river channel so the river channel increase the transportation capacity of river.

Increase of Vegetation cover > More trees and grasses should be planted in flood plains to avoid soil erosion by flowing water. Trees can control the excessive the flow of water thus plantation of trees should be compulsory. Practices in bank area.

VII. CONCLUSION:-

• Flood in Damodar River is a regular and recurrent phenomenon. It has occurred in the past and will continue to occur in future as well. It is neither possible to completely stop floods nor to completely eliminate flood damages. However, it is possible to minimize the severity of the impact and damage by suggested strategies in Udaynarayanpur CD block. People of the region should take suggested management strategies and measures to withhold the inundation situation.

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