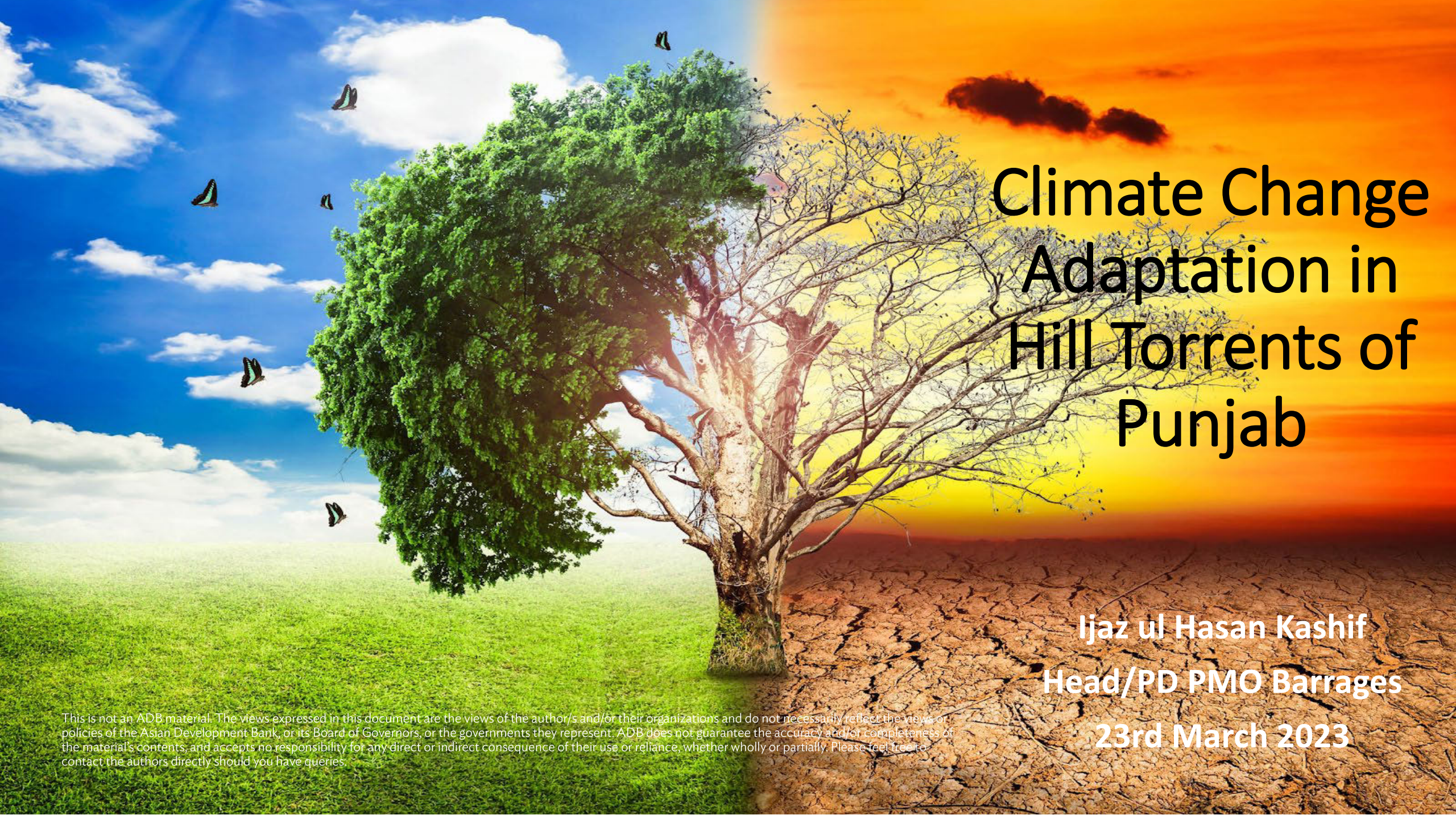

Climate Change Adaptation in Hill Torrents of Punjab

Ijaz ul Hasan Kashif

Head/PD PMO Barrages

23rd March 2023

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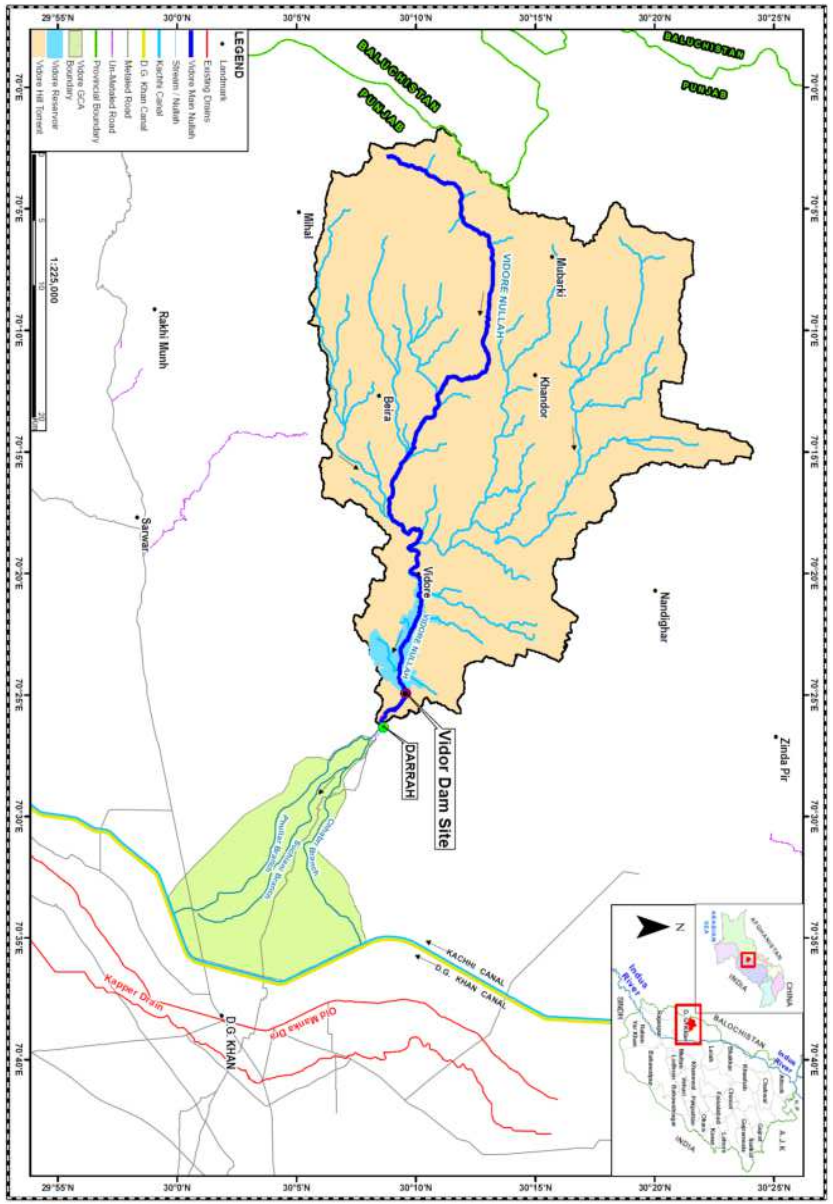
Climate Change Adaptation in Hill Torrents of Punjab

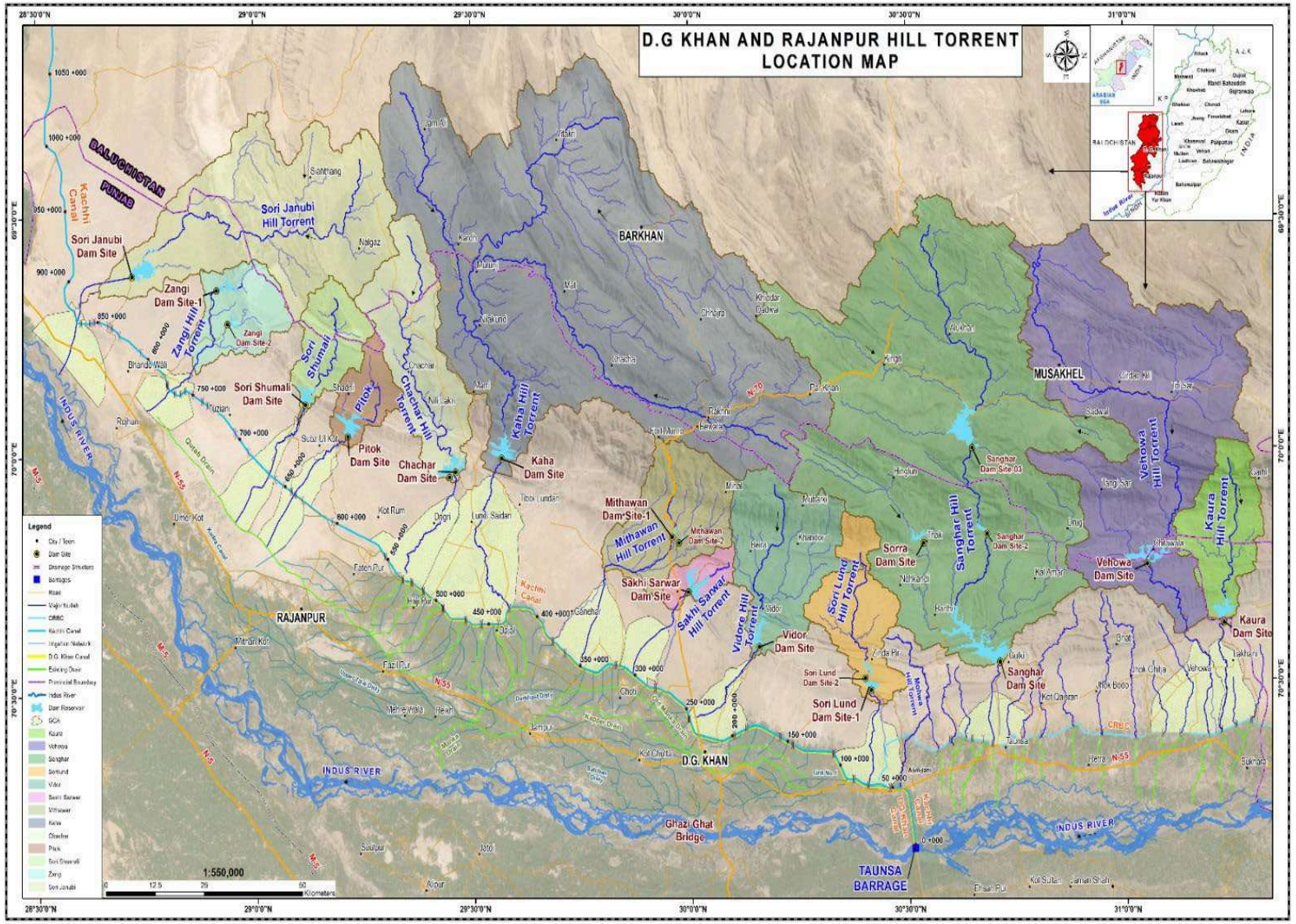
OUTLINE OF PRESENTATION

- INTRODUCTION OF AREA
- PROBLEM STATEMENT
- IMPACT OF CLIMATE CHANGE
- CLIMATE CHANGE ADAPTATION

Climate Change Adaptation in Hill Torrents of Punjab

PROJECT AREA





Climate Change Adaptation in Hill Torrents of Punjab

PROBLEM STATEMENT

- Hill Torrents floodwater in high flow season of Monsoon spreads out across the Piedmont (pachad) region and accumulates along the right embankment of the Kachhi Canal.
- The gushing flow of these Hill Torrents causes damage to irrigated lands, crops, houses, and public and private infrastructure in the Pachad area.
- After passing through cross-drainage structures of Kachhi and D.G. Khan Canals and induced cuts, the floodwater frequently leads to disasters in command areas of DG Khan Canal, extending all the way up to the River Indus.
- In August 2022, devastating flash floods struck the areas of Rajanpur and DG Khan Districts. The immediate infrastructure damage was followed by a long-term ponding of floodwater in the area due to restricted drainage system, complicating and prolonging the rehabilitation process.

Climate Change Adaptation in Hill Torrents of Punjab

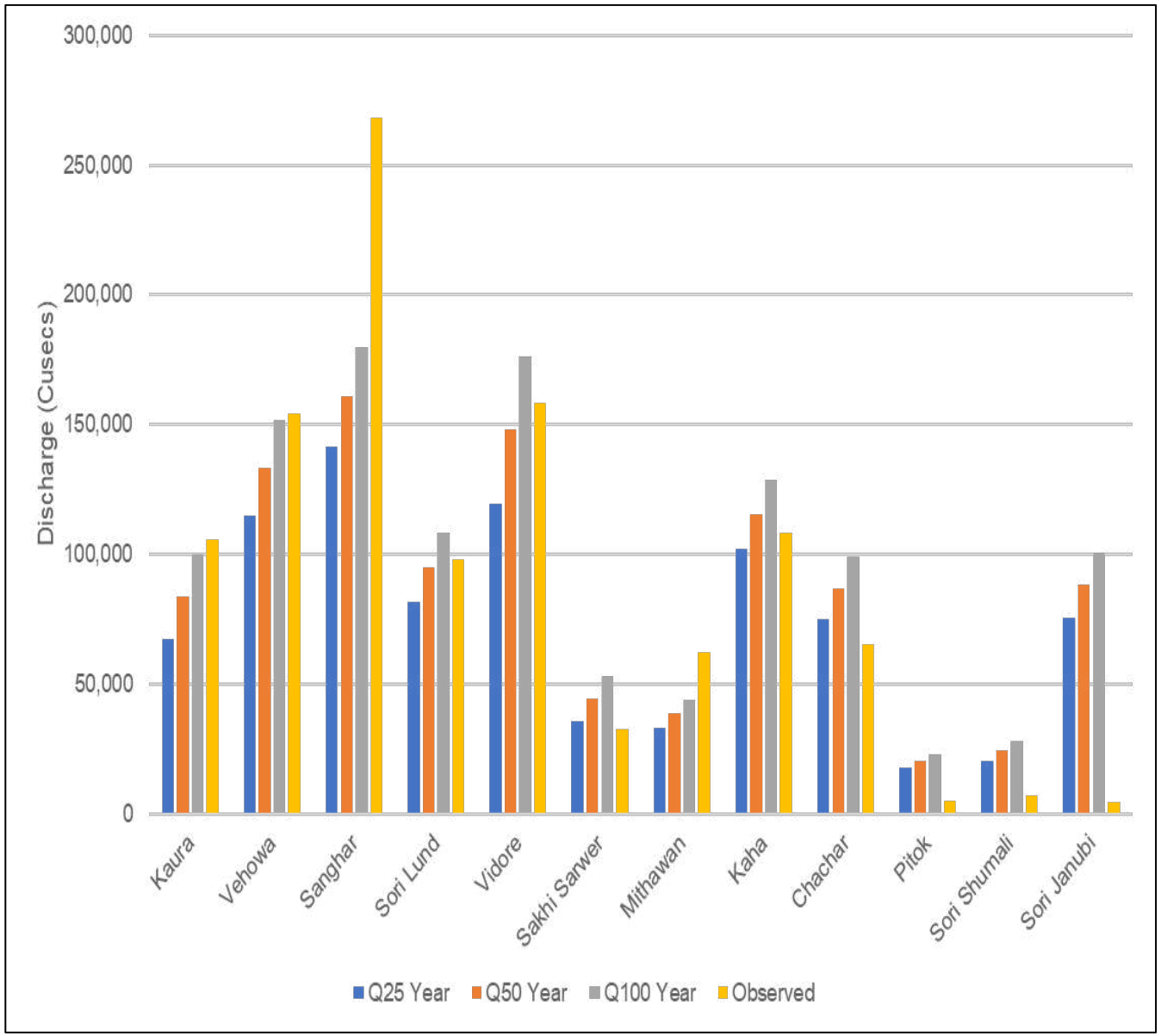
Flood Damages

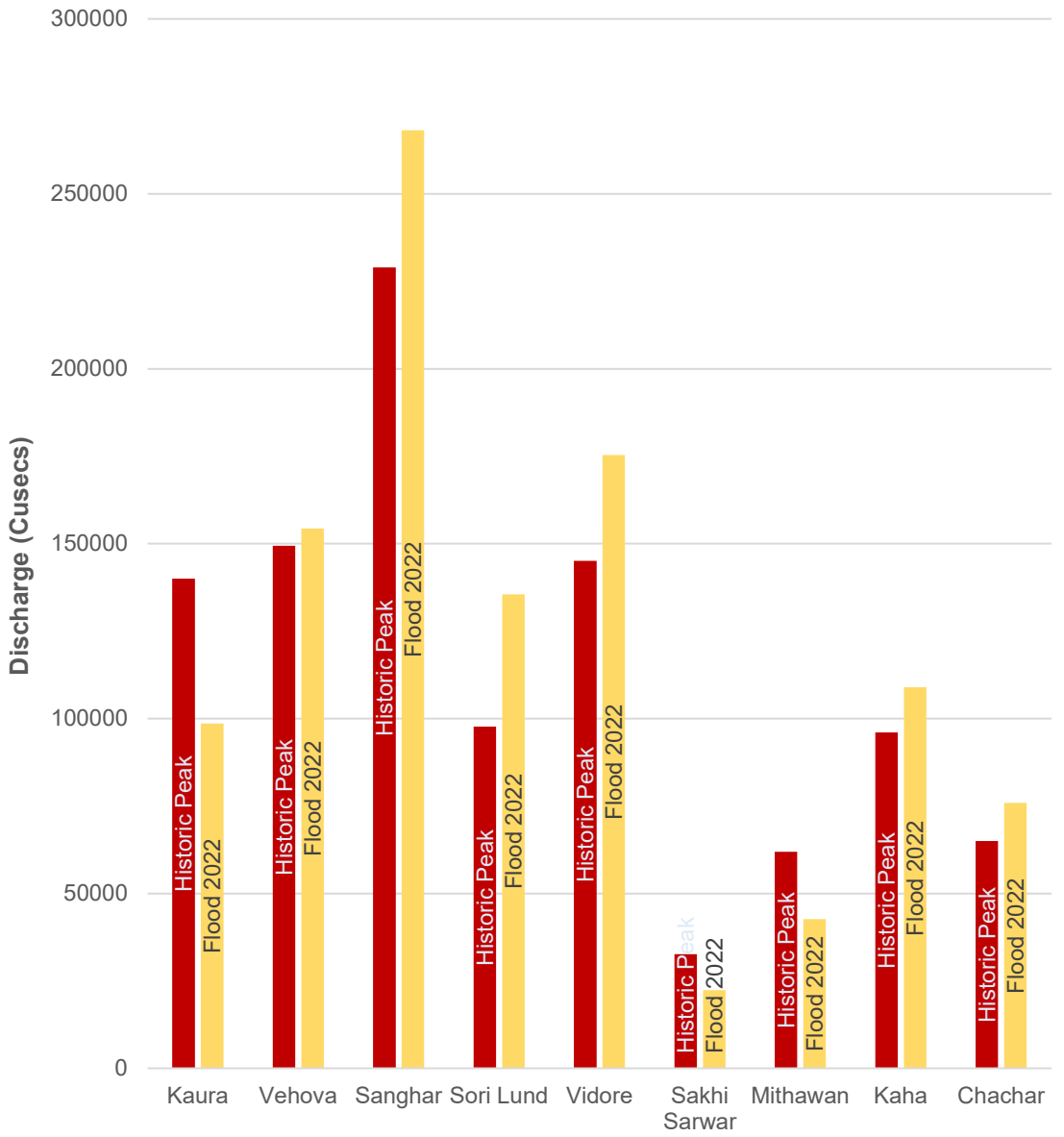
KAHA PACHAD AREA
17.08.22

KACHHI BREACH AT RD 504 WITH FLOOD WATER FROM KAHA
17 AUGUST 2022

Climate Change Adaptation in Hill Torrents of Punjab

Comparison of Flood Discharges





Climate Change Adaptation in Hill Torrents of Punjab

Impact of Climate Change in Hill Torrents of Punjab

Rainfall Results based RCMs

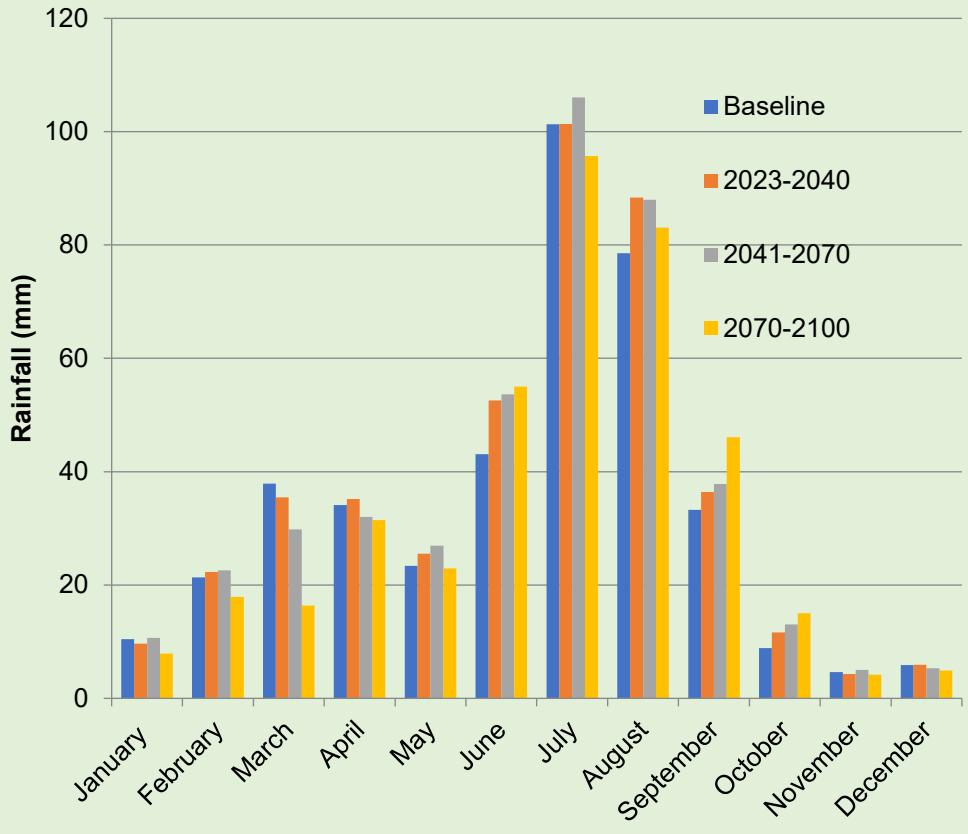
- The median scenario change projection of hill torrents in Punjab indicates the annual rainfall change in the area will not be substantial. Although there is a little increase in annual rainfall, 6.5% for 2040 , and 7.% for 2070.

Extreme Event Analysis

- An increase of 10% to 15% at all return levels may be considered in sensitivity analysis of the project's engineering design
- Any structures exposed to the flood events should be designed to withstand flood magnitude resulting from the effects of the climate change

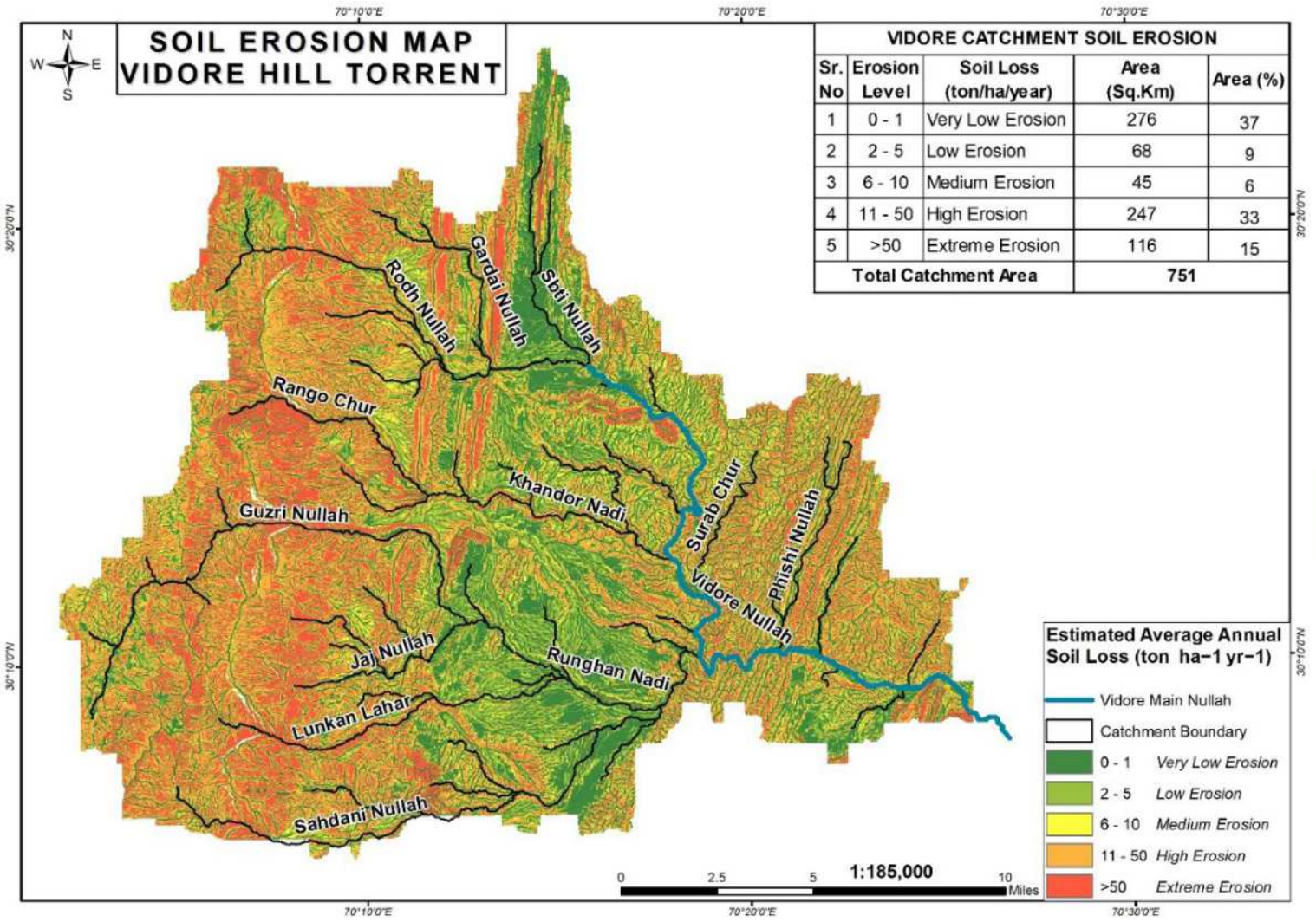
Temp Results based on CORDEX RCMs

- For year, 2040, 2070 and 2100 there will be about 0.45, 1.64 and 1.94 ^{o}C increase in maximum temperature and 0.85, 1.84 and 2.34 ^{o}C for minimum temperature respectively



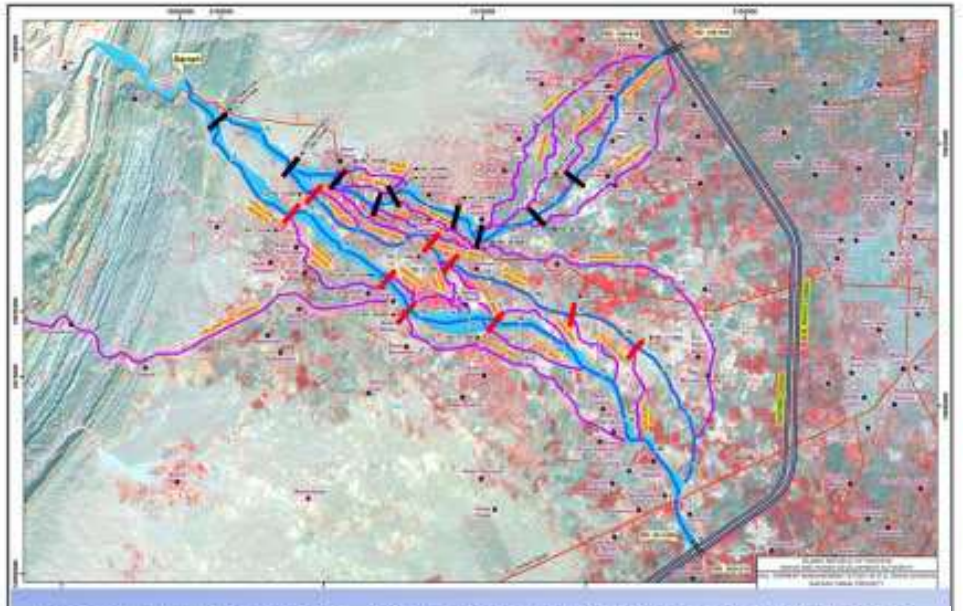
Climate Change Adaptation in Hill Torrents of Punjab

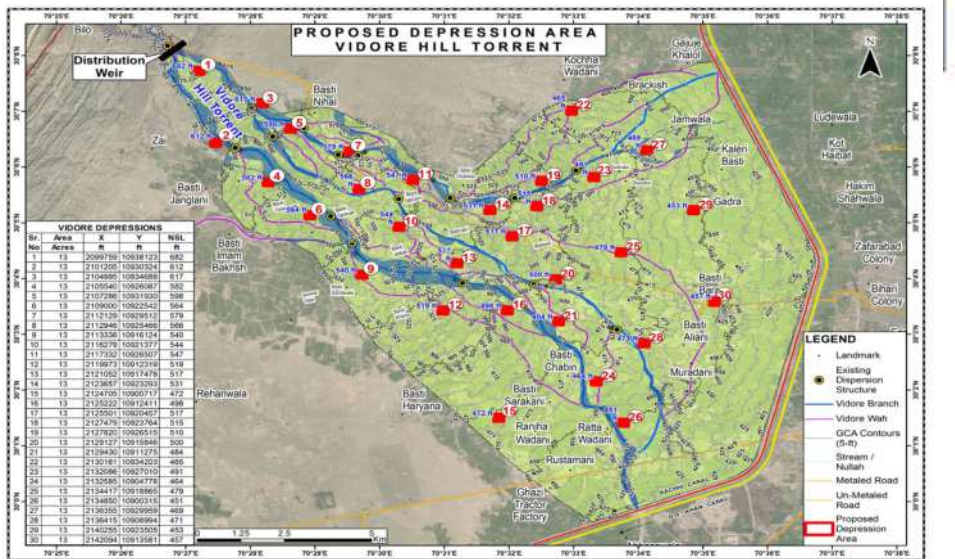
VIDORE - SELECTED HILL TORRENT



VIDORE CATCHMENT SOIL EROSION

Sr. No	Erosion Level	Soil Loss (ton/ha/year)	Area (Sq.Km)	Area (%)
1	0 - 1	Very Low Erosion	276	37
2	2 - 5	Low Erosion	68	9
3	6 - 10	Medium Erosion	45	6
4	11 - 50	High Erosion	247	33
5	>50	Extreme Erosion	116	15
Total Catchment Area			751	





Climate Change Adaptation in Hill Torrents of Punjab

Identification of Erosion Risks (VIDORE)

- Sensitivity of land cover to erosion
- Sensitivity of slopes to erosion
- Sensitivity of lithology to erosion
- Cumulative erosion risk

Watershed parts classified as high erosion will have priority to manage

VIDORE CATCHMENT SOIL EROSION				
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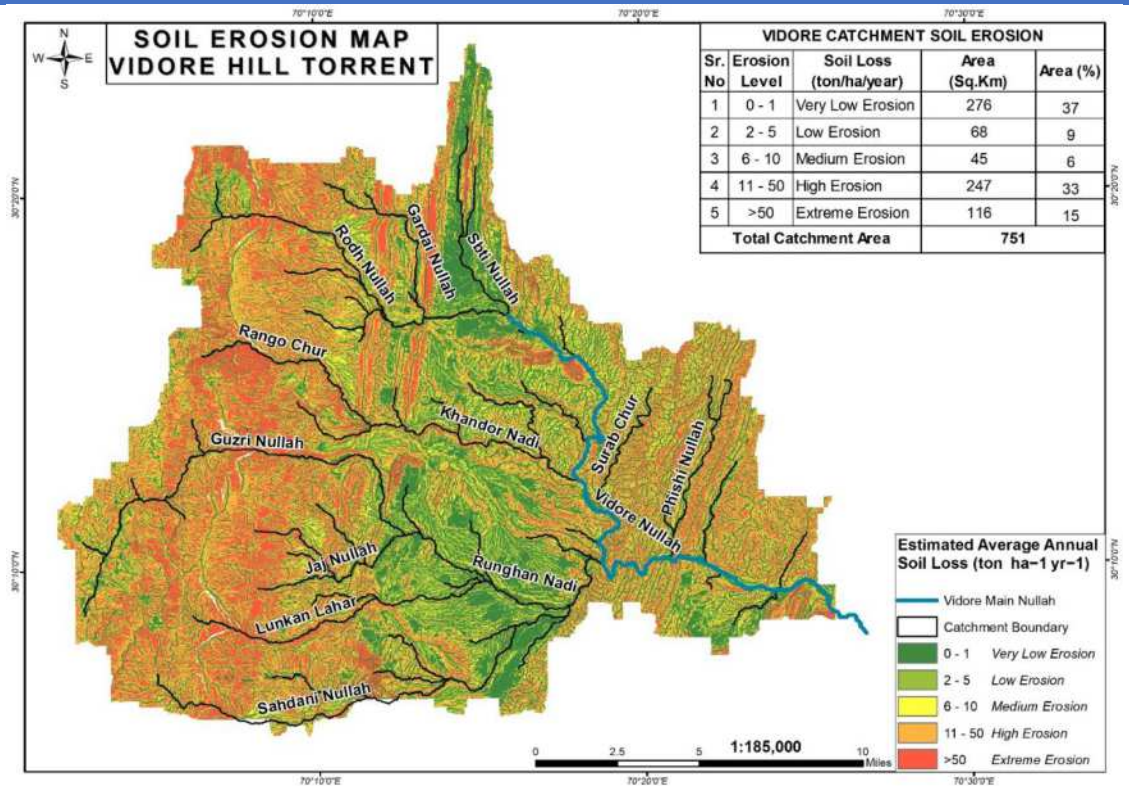
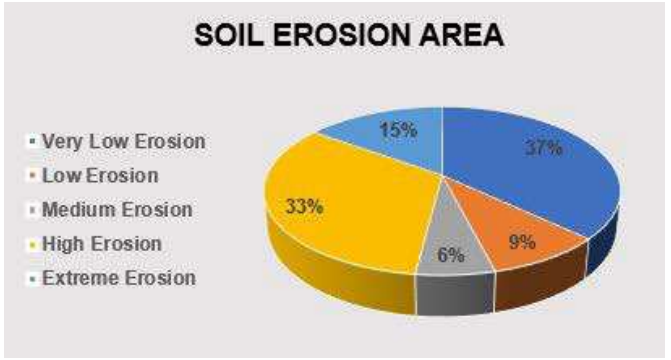
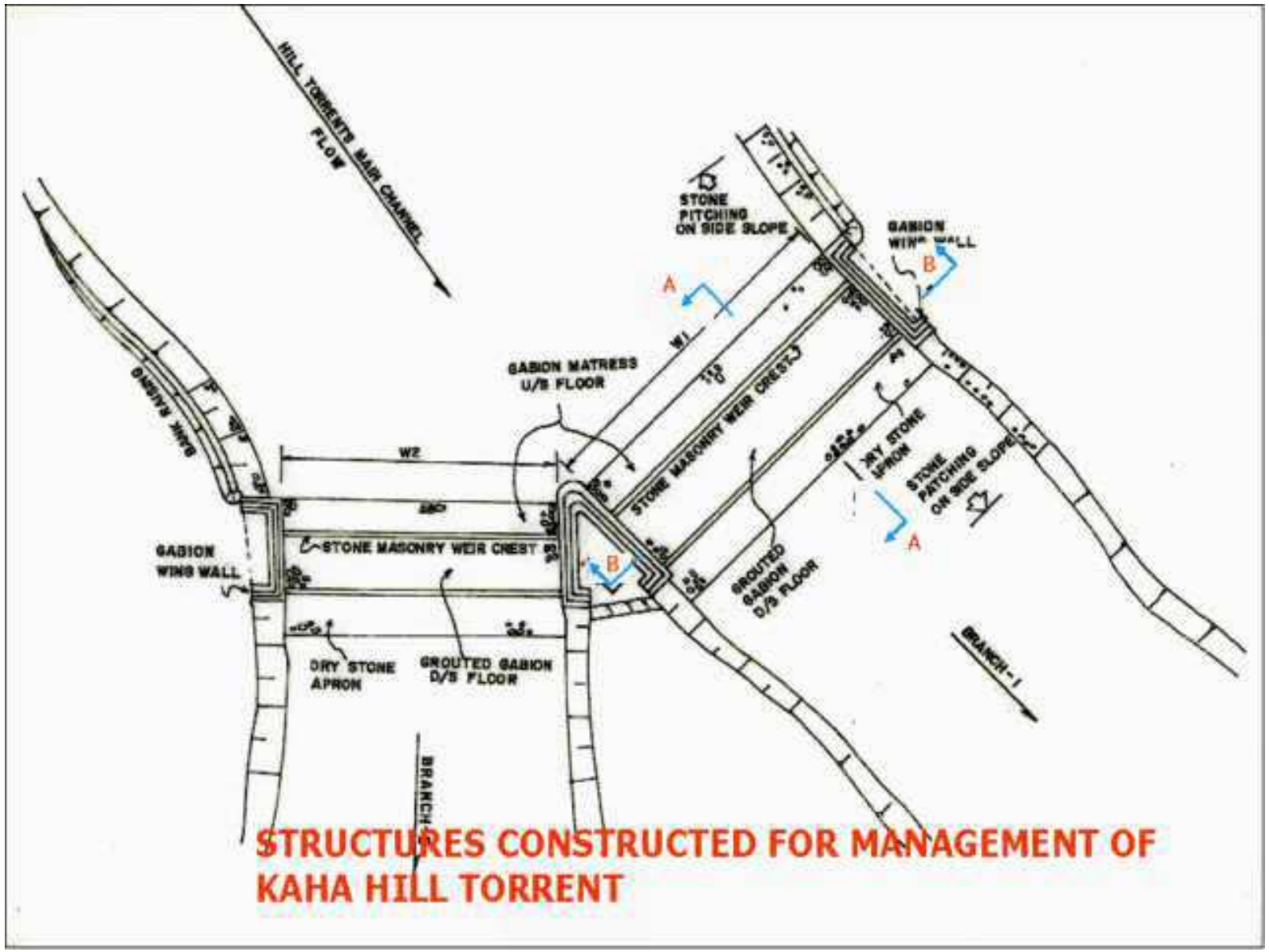
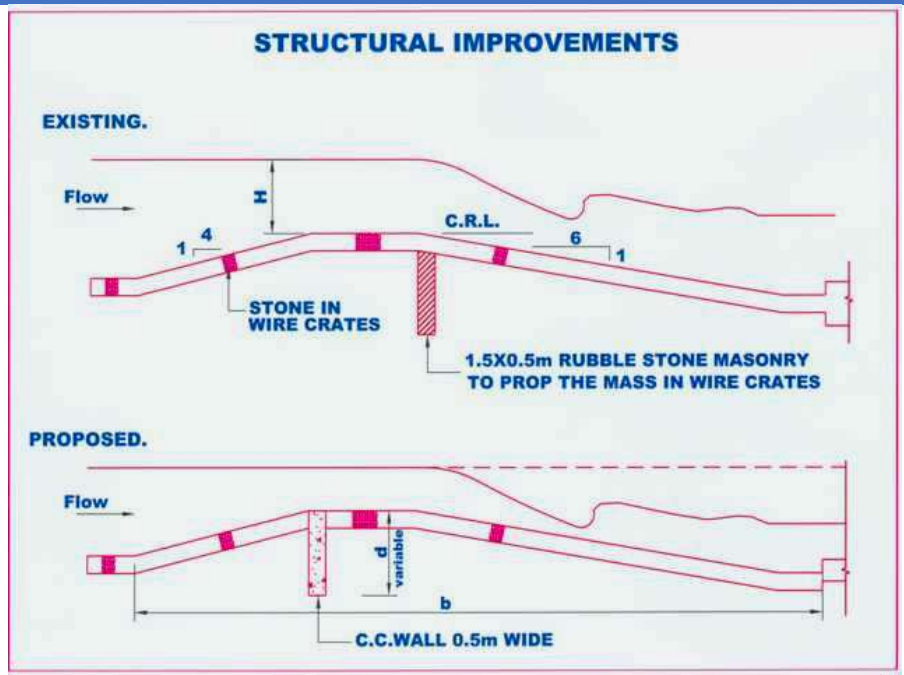


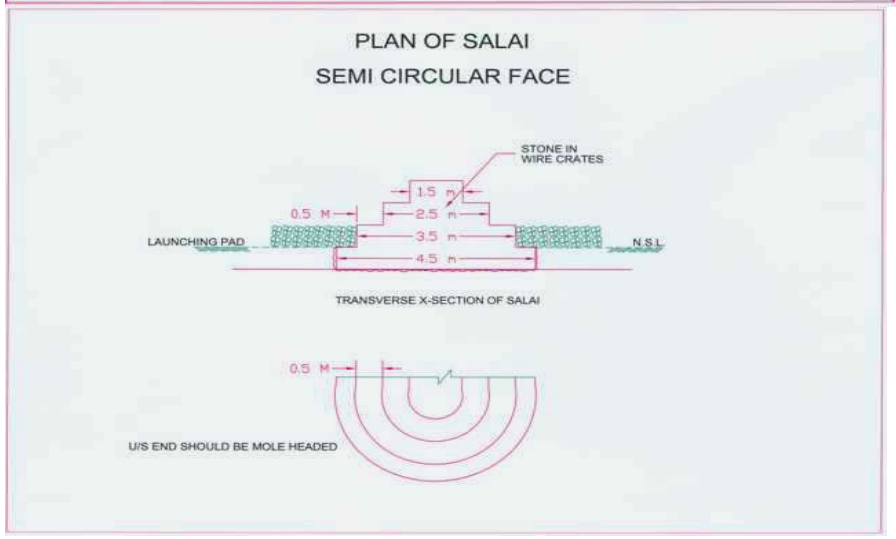


Climate Change Adaptation in Hill Torrents of Punjab

DISPERSION STRUCTURES

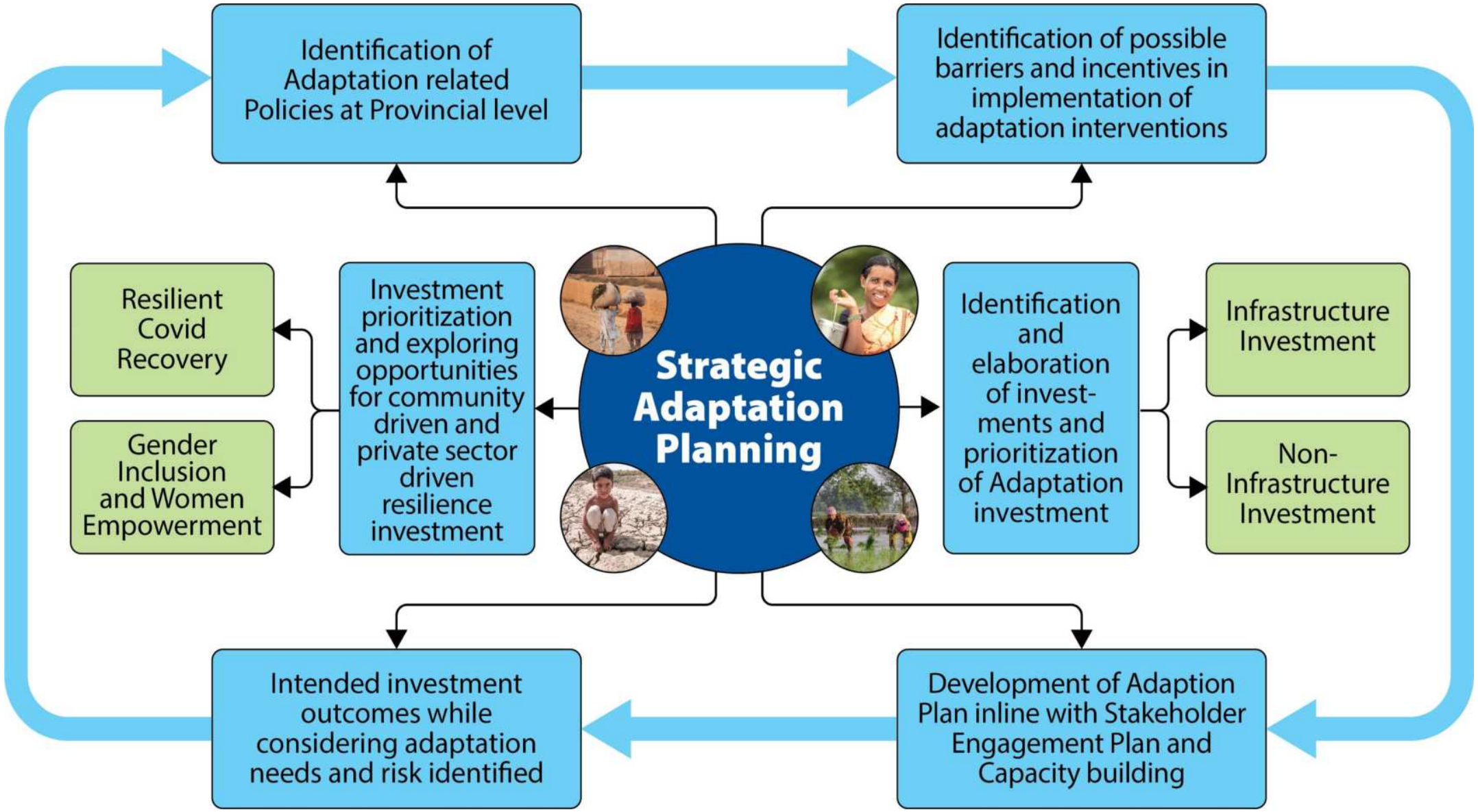






Climate Change Adaptation in Hill Torrents of Punjab

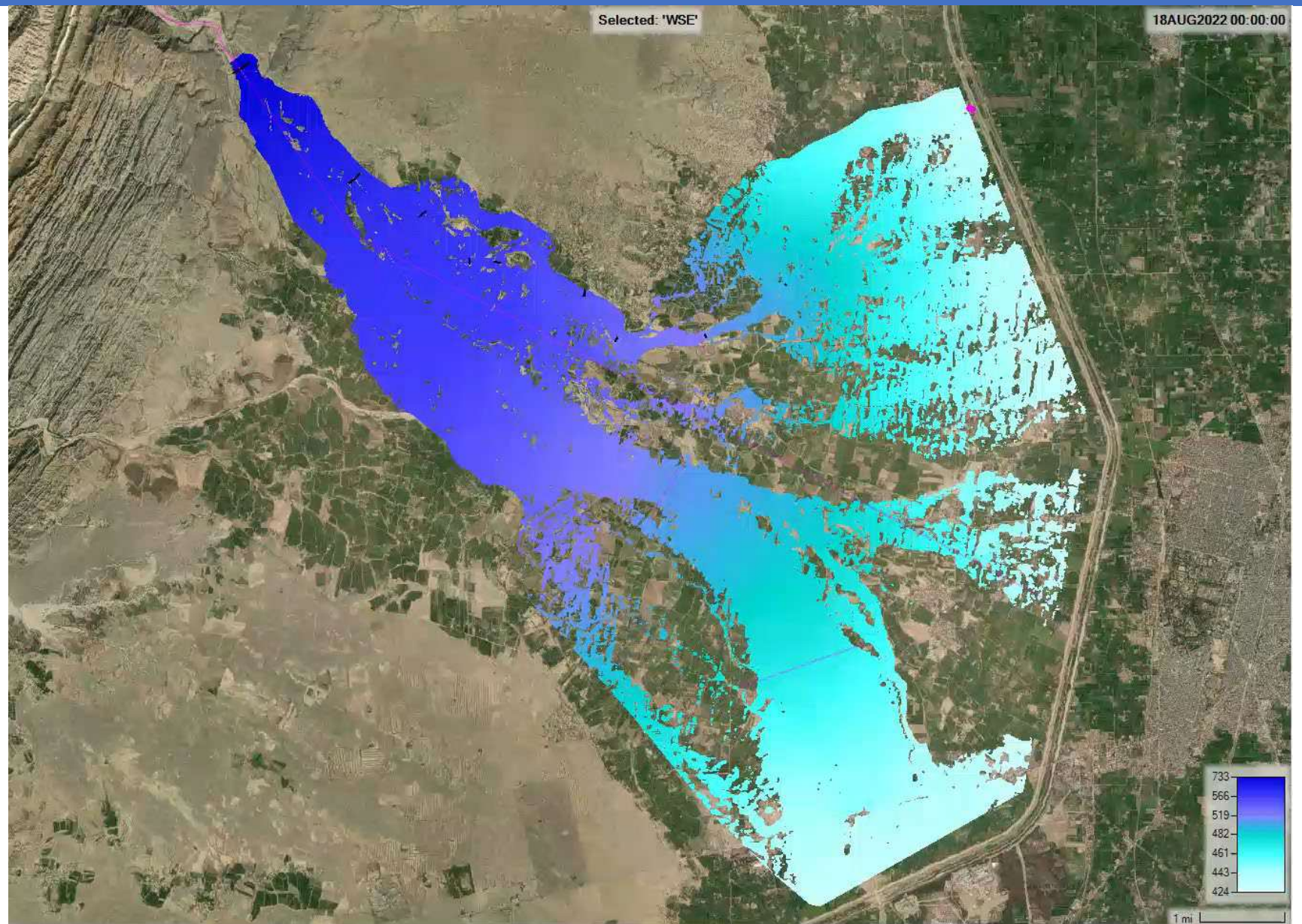
Strategic Adaptation Planning



THANKS

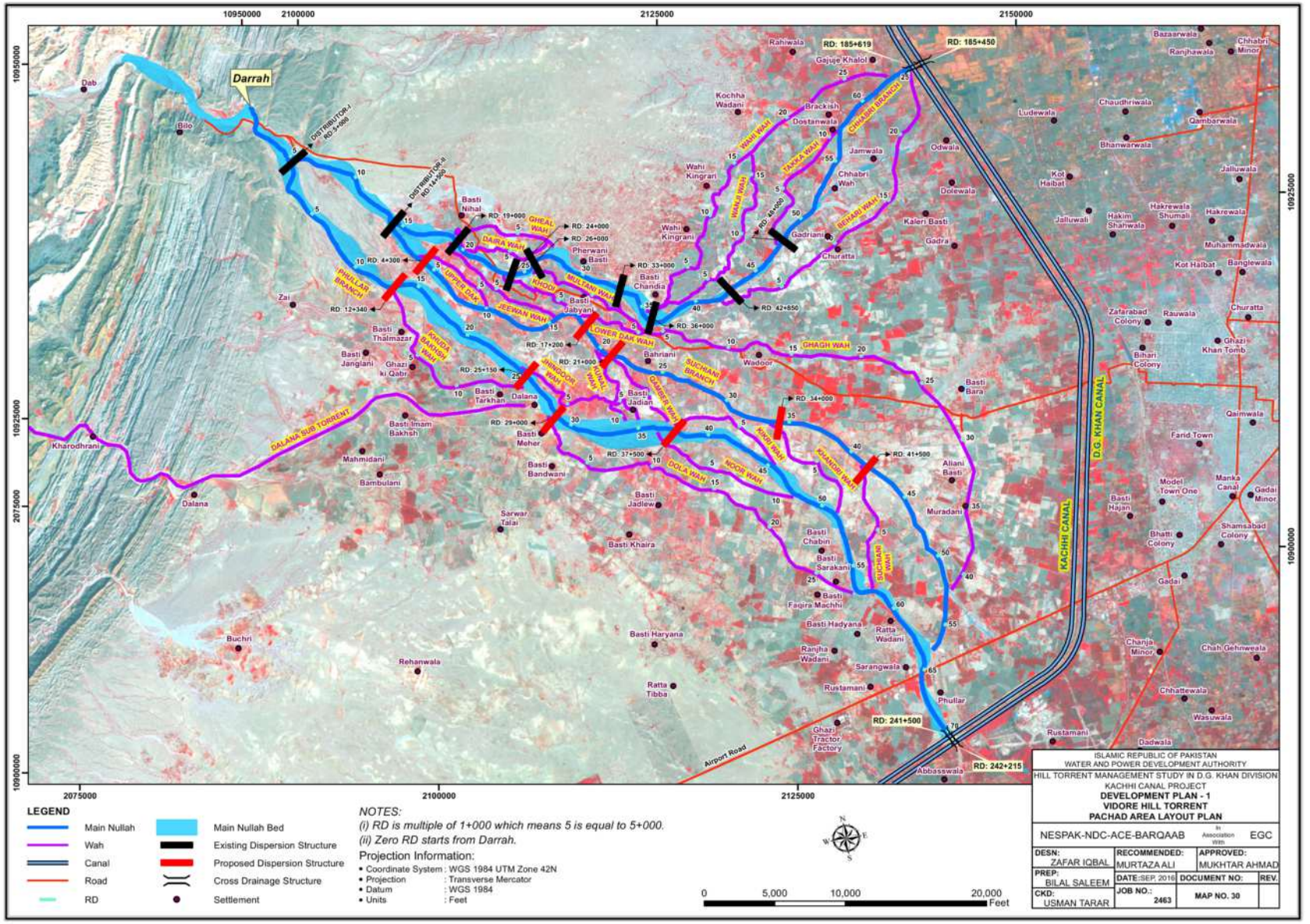
Climate Change Adaptation in Hill Torrents of Punjab

2D Model Output – Water Surface Elevation (Q: 158,000 cusec)



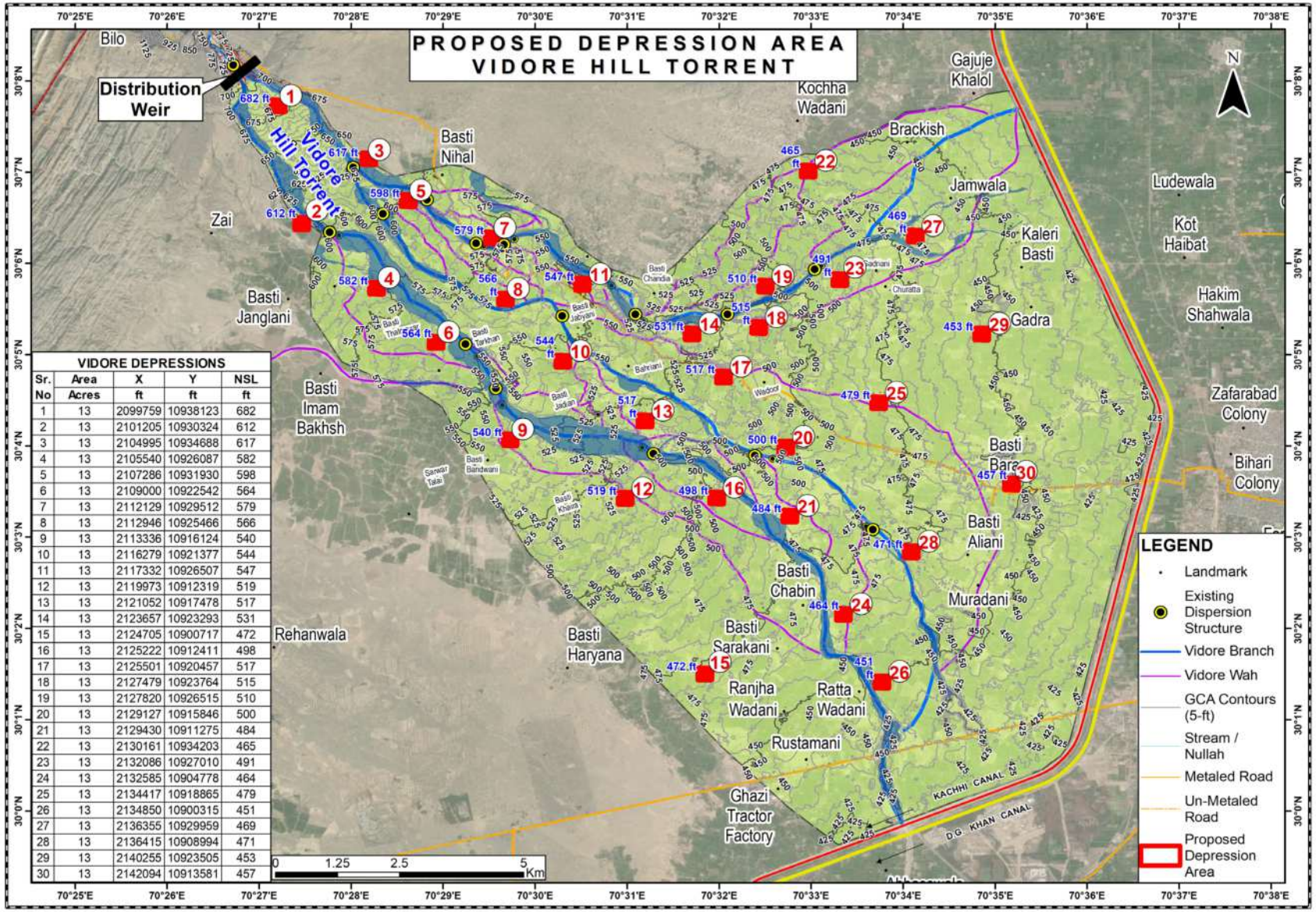
Climate Change Adaptation in Hill Torrents of Punjab

Vidore Hill Torrent – Existing and Proposed Dispersion Structures



Climate Change Adaptation in Hill Torrents of Punjab

Proposed Ponds in Vidore Pachad Area



VIDORE DEPRESSIONS

Sr. No	Area Acres	X ft	Y ft	NSL ft
1	13	2099759	10938123	682
2	13	2101205	10930324	612
3	13	2104995	10934688	617
4	13	2105540	10926087	582
5	13	2107286	10931930	598
6	13	2109000	10922542	564
7	13	2112129	10929512	579
8	13	2112946	10925466	566
9	13	2113336	10916124	540
10	13	2116279	10921377	544
11	13	2117332	10926507	547
12	13	2119973	10912319	519
13	13	2121052	10917478	517
14	13	2123657	10923293	531
15	13	2124705	10900717	472
16	13	2125222	10912411	498
17	13	2125501	10920457	517
18	13	2127479	10923764	515
19	13	2127820	10926515	510
20	13	2129127	10915846	500
21	13	2129430	10911275	484
22	13	2130161	10934203	465
23	13	2132086	10927010	491
24	13	2132585	10904778	464
25	13	2134417	10918865	479
26	13	2134850	10900315	451
27	13	2136355	10929959	469
28	13	2136415	10908994	471
29	13	2140255	10923505	453
30	13	2142094	10913581	457

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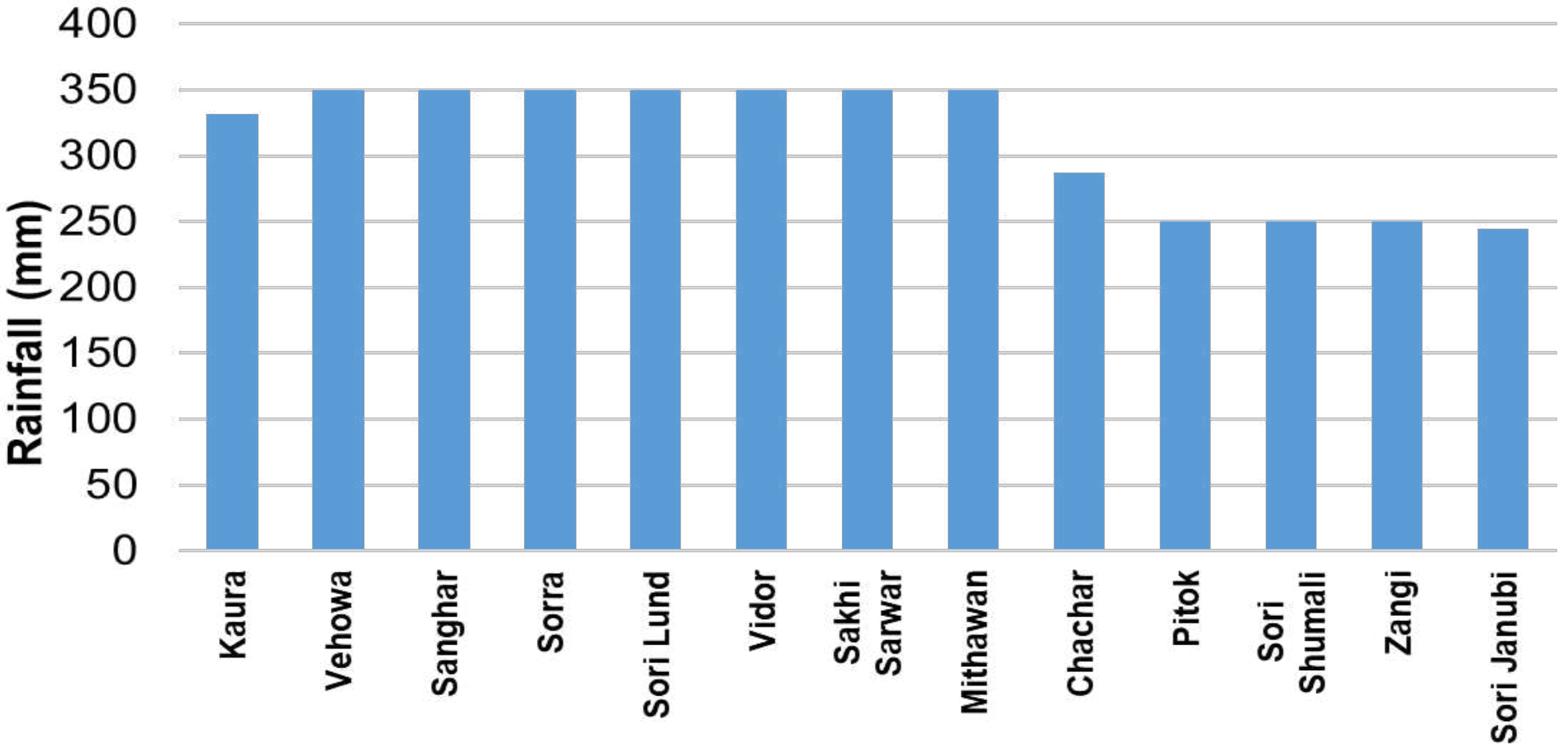
Annual Rainfall within Hill Torrents in Punjab