Value Assessment of Rainwater Harvesting for Climate Change Adaptation

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Background

- Rainwater harvesting technique for rainfed areas is as old as human civilization
- In Pakistan 12 million hectares (40% of Pakistan's cultivable land) entirely dependent upon rainfall
- Potohar – the northern Punjab Province (5.51 million ha) reported to have 958 mini dams developed since 1970's with a total investment of Rs. 6,198.669 million (56.35 million USD)
- Rain-fed agriculture share is not accounted in national GDP
- Long term investment: lesser impact
- **Climate is changing, financial resources are scarce and population is increasing thus it is necessary to view this problem in "management" perspective**

Rationale

What is the effect of changing climate in Potohar Region?

- Climate Variability in all 04 districts of Potohar
- Climate Change in Farmer's Perspective

How famers are adapting to climate change through Rainwater Harvesting Dams?

- Financial investment of Farmers for Climate Change Adaptation
- Farming activities driven by rainwater harvesting and their financial benefits

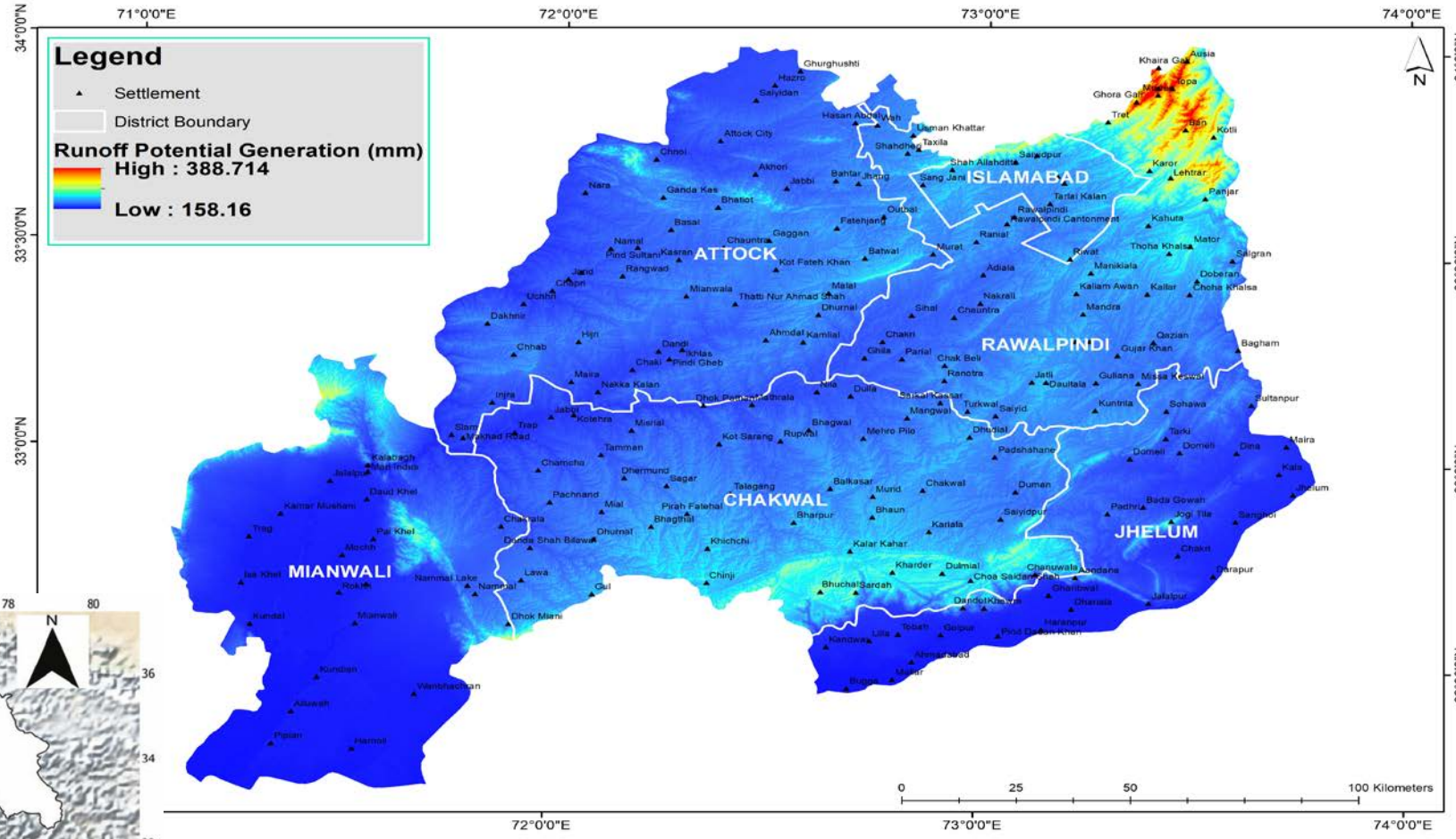
What are intangible benefits of rainwater harvesting?

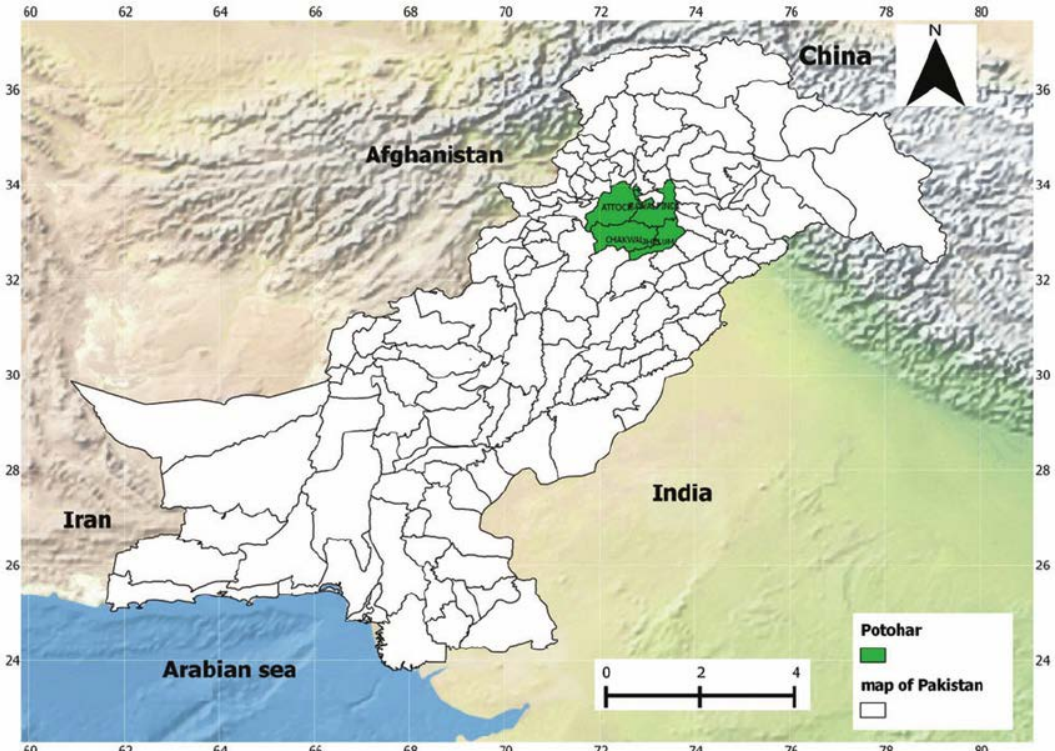
- Long term impacts
- Environmental impacts
- Farming Employment

What are the gaps in complete adaptation of climate change through RWH Dams

- Farmer's actual needs (Subsidies + Knowledge)

The Study Area: Potohar





Total Population: 10 million

Rural Population: 6.0 Million

Study Methodology

Sources of Primary Data	• **Farmers** • **Organizations: PMD, PCRWR**, Barani Agricultural Research Institute **(BARI)** and National Agricultural Research Centre **(NARC), ABAD** (Agency for Barani areas Development)
Data Collection Method	• Farmers through Interviews (21 Farmers: Purposive) • Costs (Farmer share, O&M) **(Farmers and ABAD** • Business activity (Farmers)
Data Analysis Method	**Cost Benefit Analysis comprising of ;** • Benefit Cost Ration (BCR) • Return on Asset Managed (ROAM) **Cost Effectiveness (Farmer's response)**
Limitation of the Study	• Approaching a large number of farmer groups • Farmer's reluctance to reveal their actual income from farms • Farmer's time to participate in interviews • Lack of flood and drought records in Potohar region

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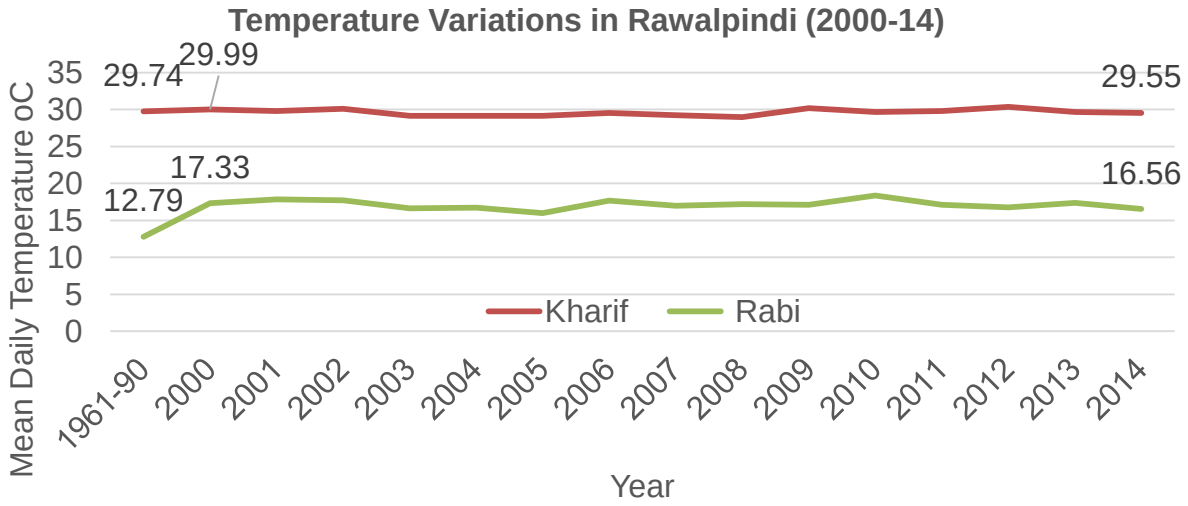
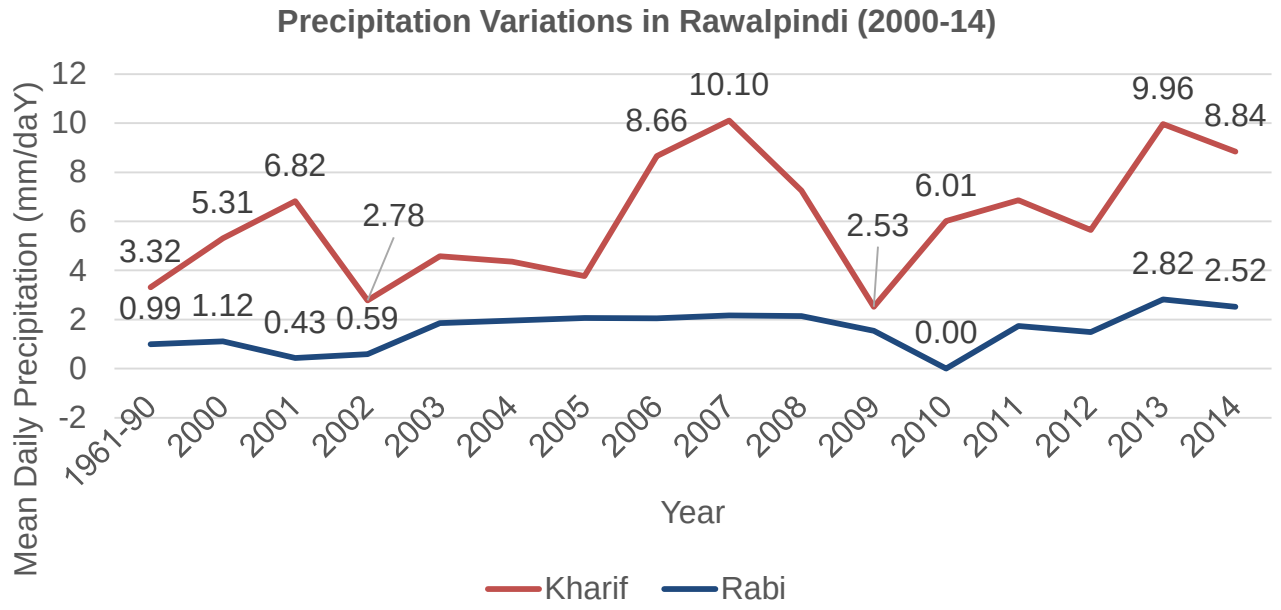
Analysis: Climate Anomaly Rawalpindi

Ref. to Baseline:
Kharif: (0.19) ^{o}C
Rabi: 3.77 ^{o}C rise





Ref. to Baseline:
Kharif: 5.52 mm/day
Rabi: 1.53 mm/day

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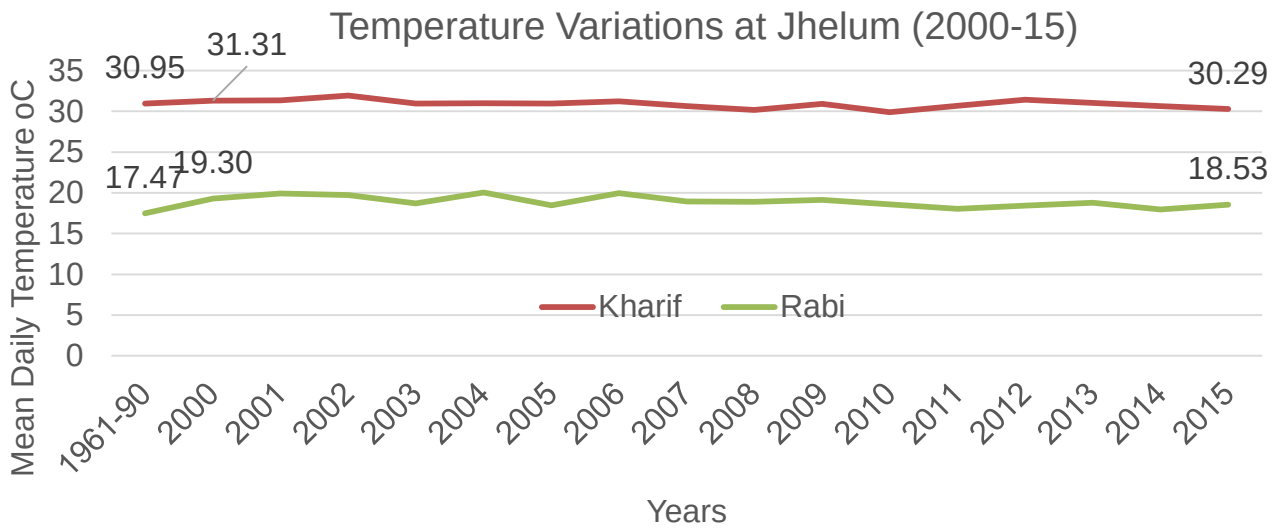
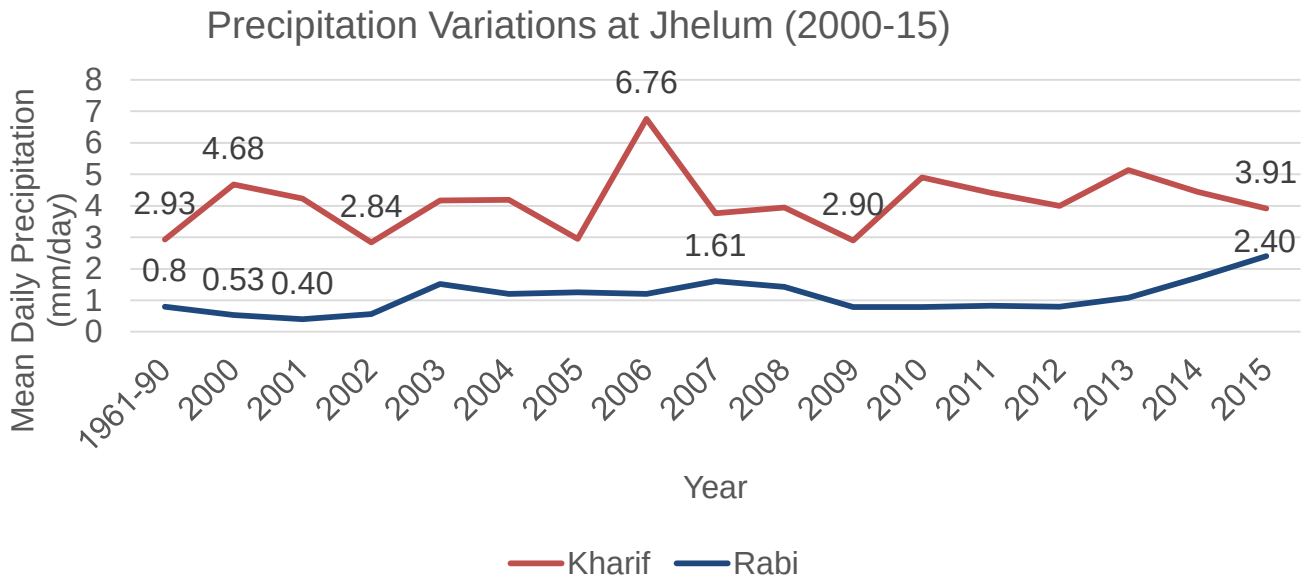
Analysis: Climate Anomaly in Jhelum

Ref. to Baseline:
Kharif: (0.64) ^{o}C
Rabi: 1.06 ^{o}C rise





Ref. to Baseline:
Kharif: 0.98 mm/day
Rabi: 1.6 mm/day

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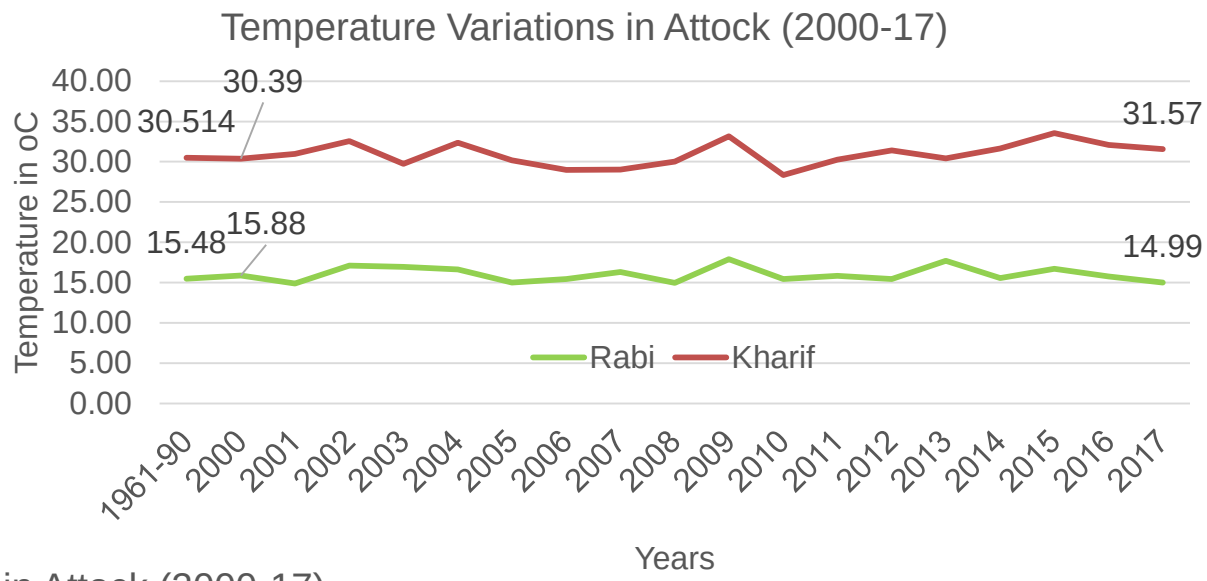
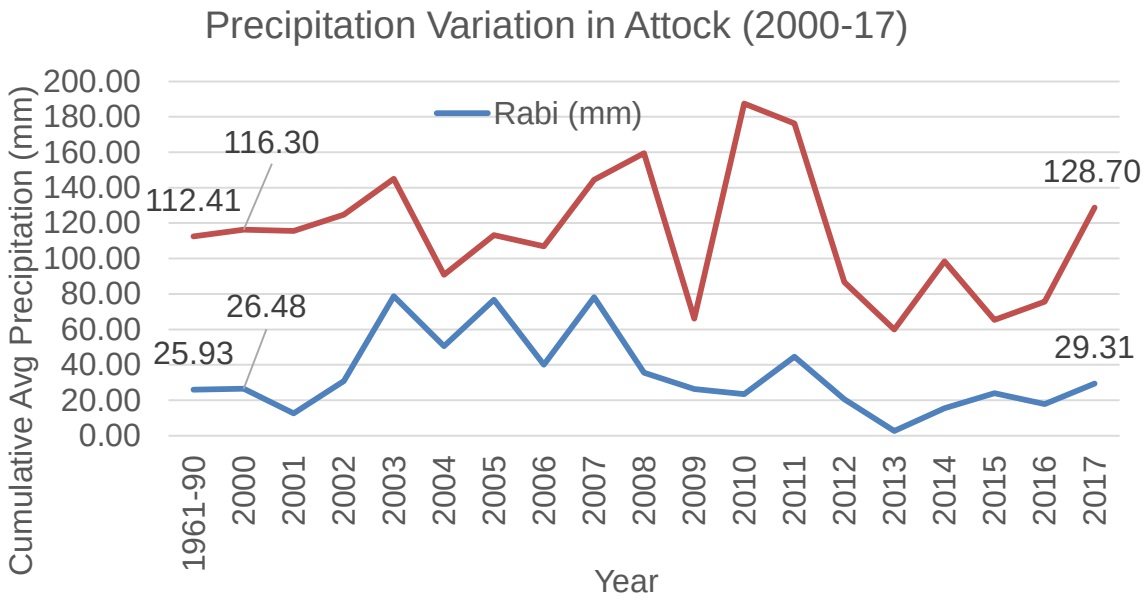
Analysis: Climate Variations in Attock

Increase from Baseline:
Kharif: 1.05 ^{o}C rise
Rabi: (0.49)^{o}C





Increase from Baseline:
Kharif: 16.29 mm
Rabi: 3.38 mm

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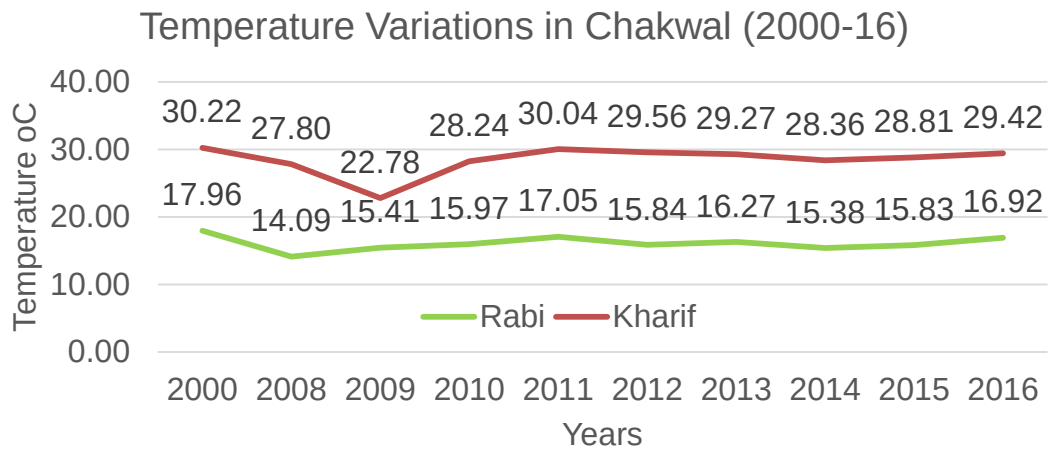
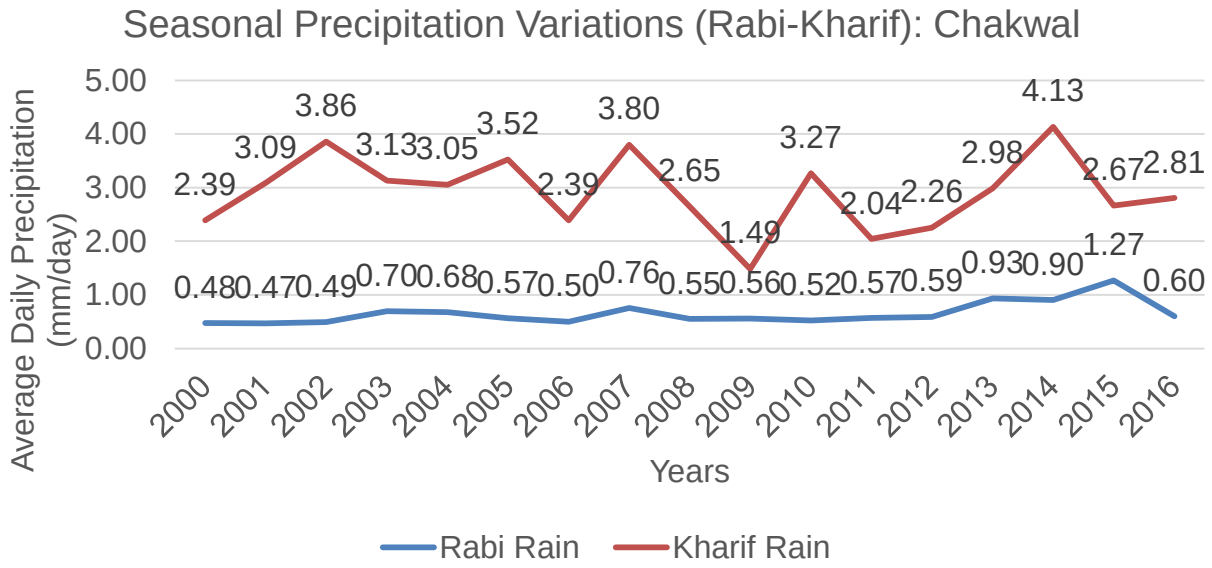
Analysis: Climate Variations in Chakwal

Ref to Baseline:
Kharif: (0.8) ºC
Rabi: (1.04)ºC





Ref to Baseline:
Kharif: 0.42 mm
Rabi: 0.60 mm/day
(Going to increase further in 2017)

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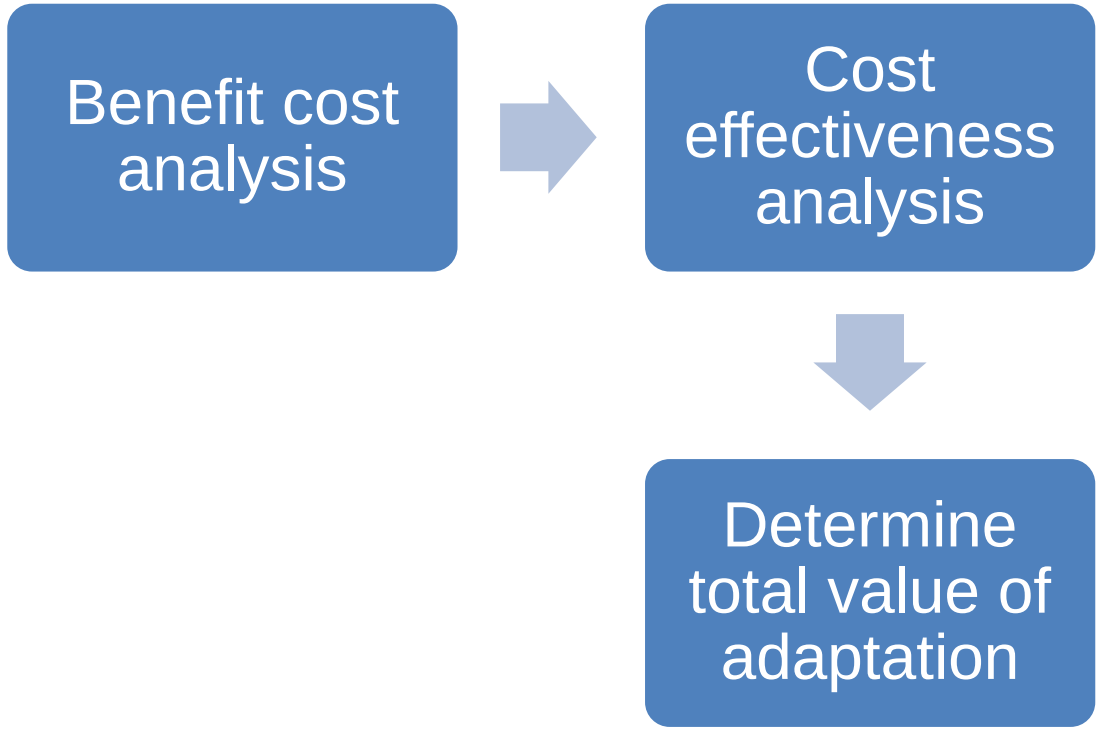
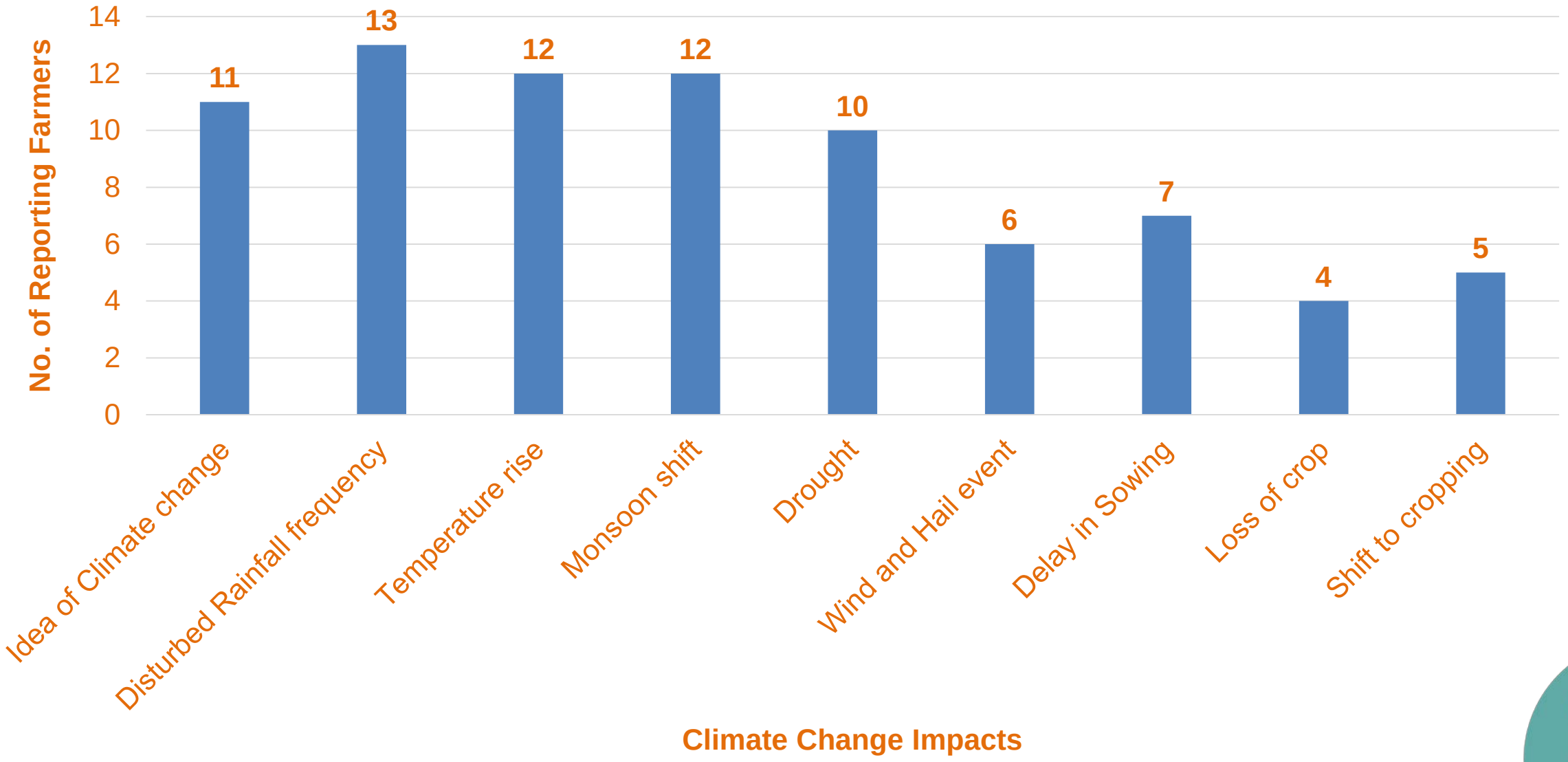
Value Assessment Construct

- Recoding/surveying farmer's adaptation of public sector funded projects
- Farmers and climate needs to maximize the benefits
- Accounting for all costs
- Accounting for all benefits



Farmer’s Perspective of Climate Change



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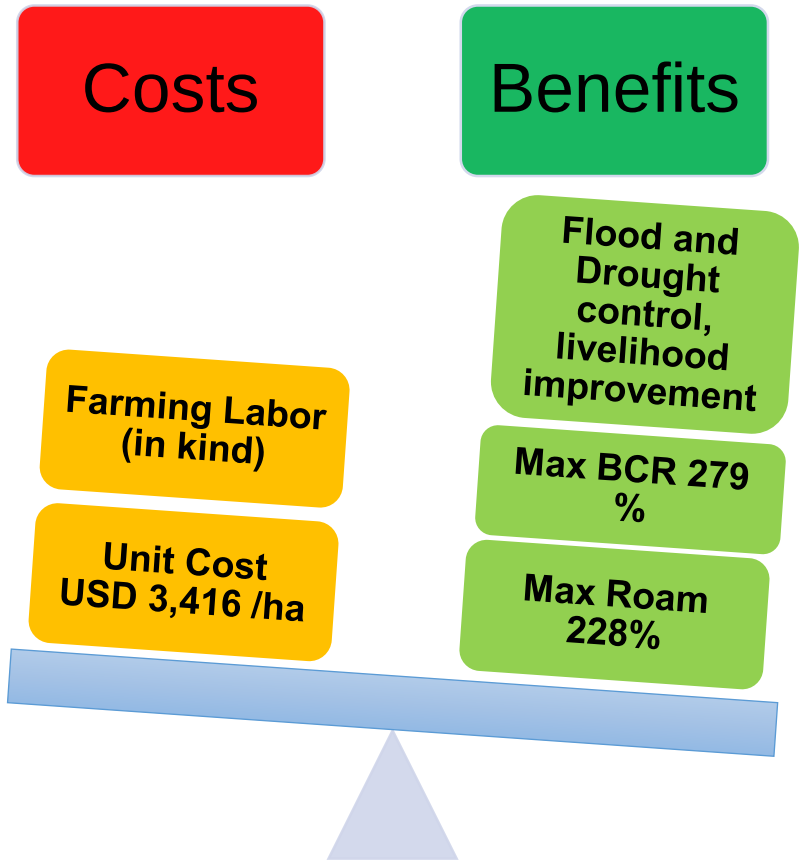
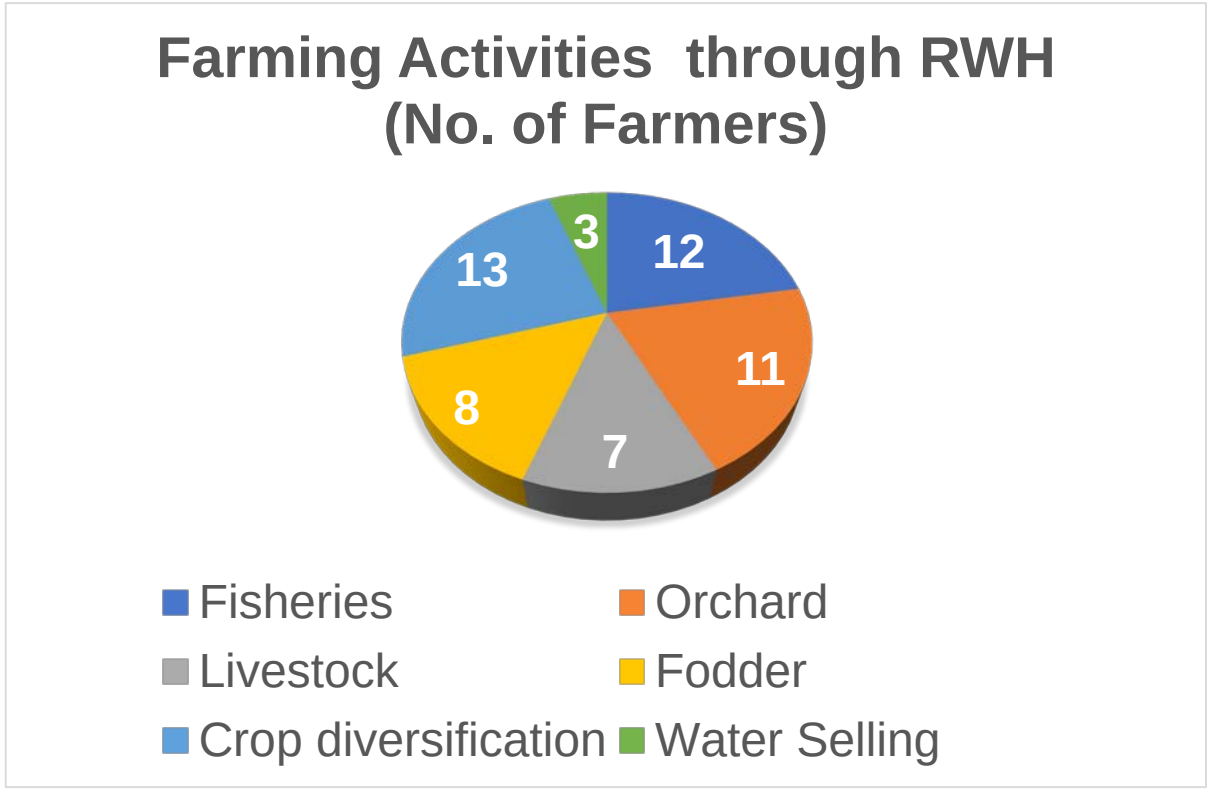
Cost Benefit Balance of Farmers



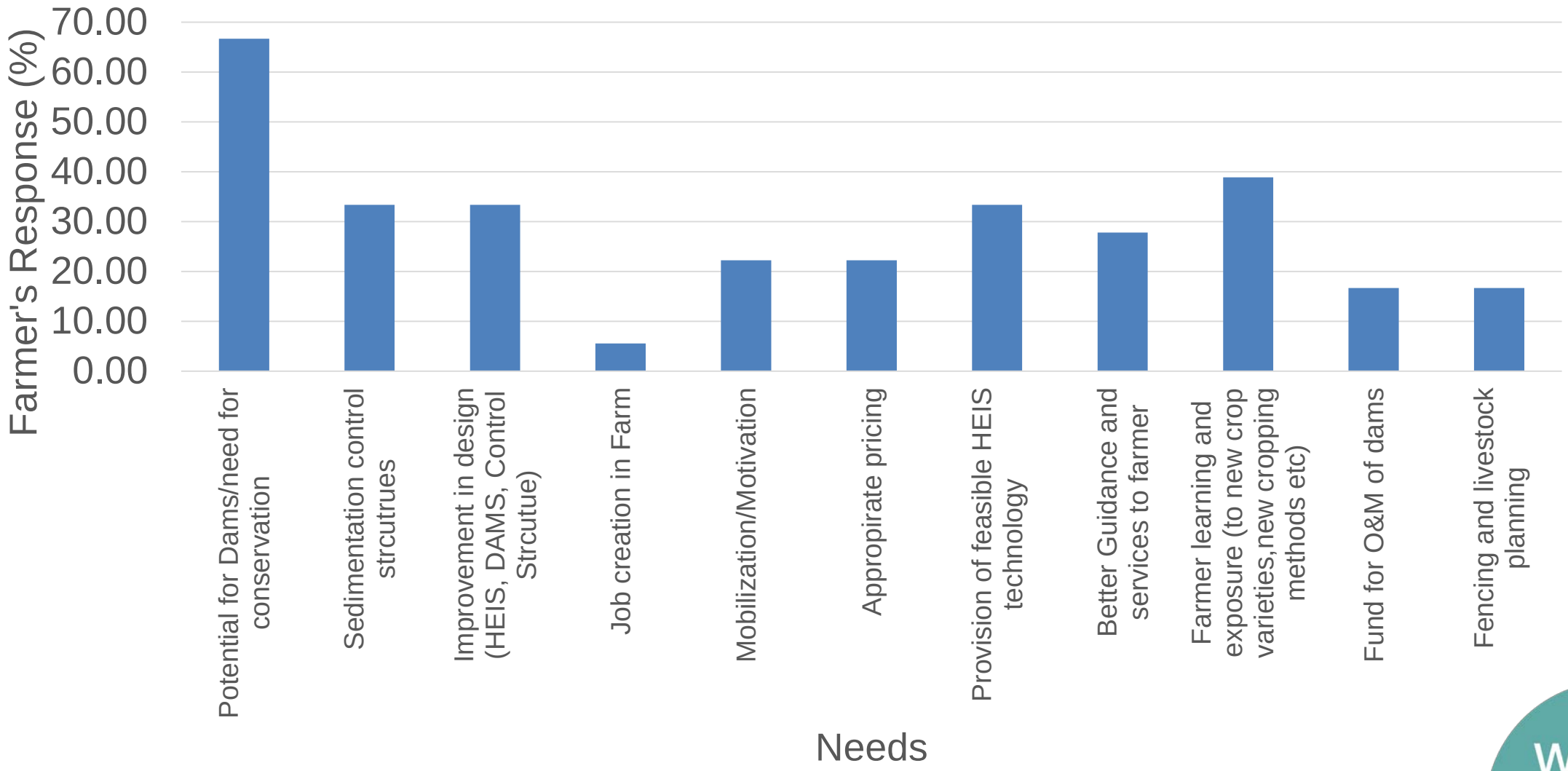
- Small dams constructed during (2000-15)
- Benefit Cost ratio was calculated for 2-3 year old dams
- ROAM (Return on Asset Managed) was calculated for (5-17) year old dams
- No such thing like “Dam Life” applied to these structures
- Farmers continue to invest both “in kind” and in cash

Distribution of Economic Activities by Farmers



- **Total land studied: 1098** Ha
- **Rain-fed land shift to irrigated land : 343** Ha
- **Land Covered by lakes: 100 ha**
- **Balance:** Development of barren and marginal lands (meeting the balance)

Farmer Needs (Meeting the Balance)



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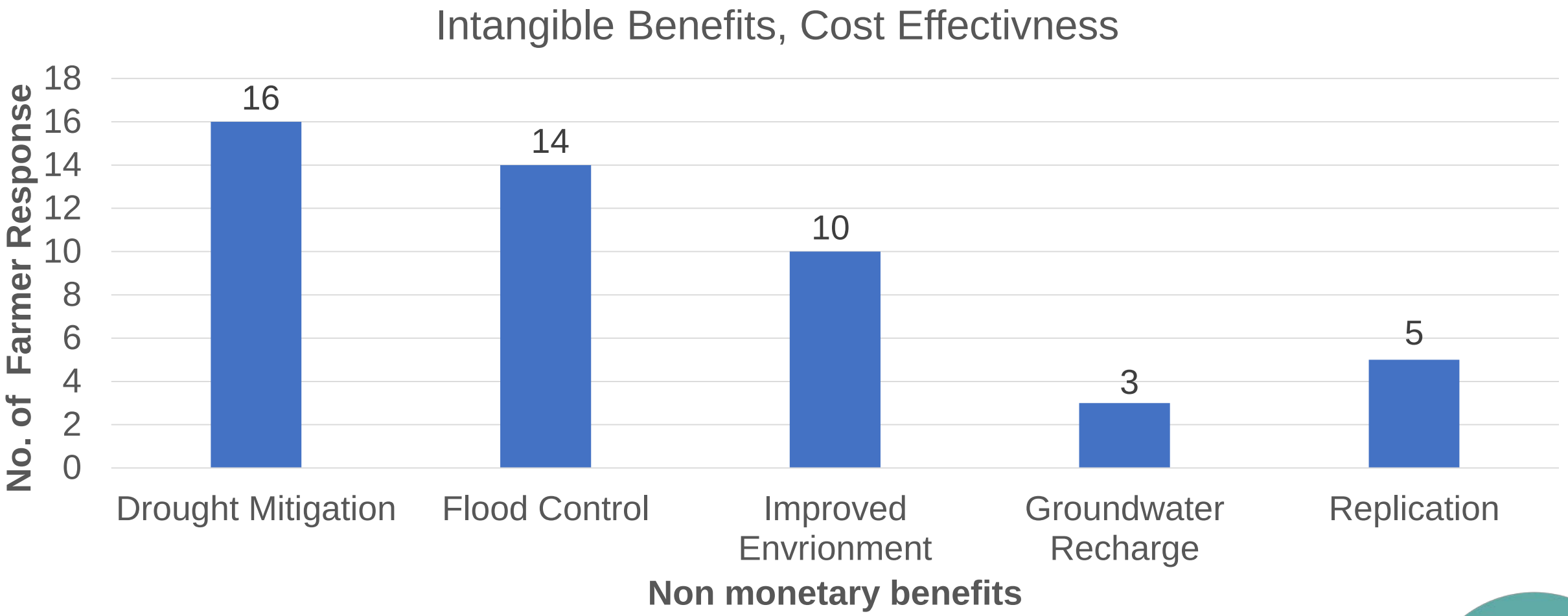
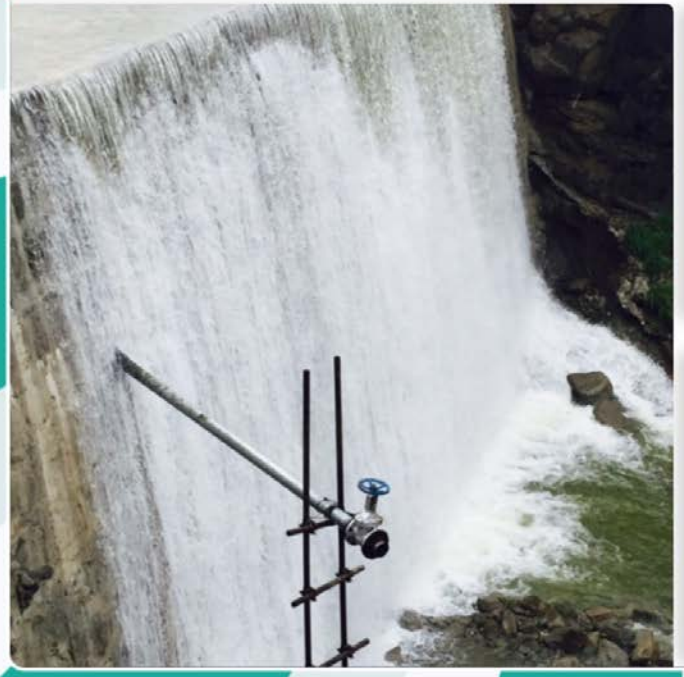
Cost Effectiveness



Lessons Learnt

- Actual value and use pattern for harvested rainwater is yet to be realized
- Rainwater harvesting enables farmers to stay engaged in farming business preventing workforce migration
- There is a need to adopt to Innovative learning approaches for farmers to achieve higher degree of adaptation
- The existing rainwater harvesting dams need optimization rather than constructing new ones
- Farmers can be more efficient in water use if cost of their produce is justified
- Limited communication/coordination mechanism between progressive and reluctant farmers has affected regional progress as a whole

Glimpses of Farmer Operated Rainwater Harvesting Facilities









Glimpses of diverse Farming/Economic Activities

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In Climate Change there lies an opportunity for Pakistan towards self sufficiency and a future founded on their own knowledge resources …..

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