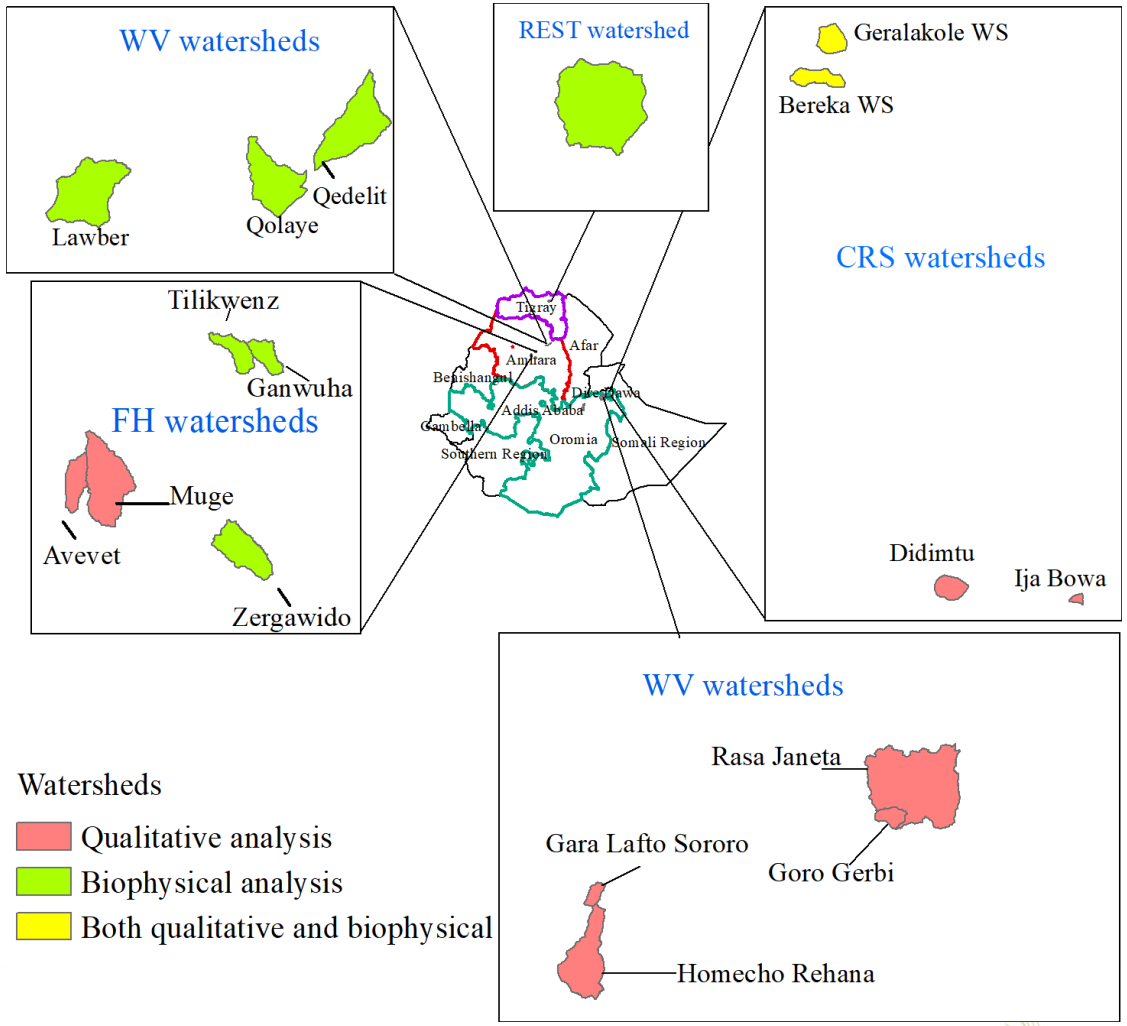
Assessment of watershed rehabilitation and irrigation interventions in USAID Productive Safety Net Program (PSNP) watersheds of Ethiopia

May 25, 2023

Source: NASA SERVIR

STUDY WATERSHEDS



Sno	Watersheds	Area (ha)	Type of Interventions
I	**Relief Society of Tigray (REST)**		
1	Feresmay	7662	14
II	**Catholic Relief Services (CRS)**		
1	Bereka	484	6
2	Garalakole	440	4
3	Didimtu	406	6
4	Ija Bowa	65	5
II	**World Vision (WV)**		
1	Laweber	1051	10
2	Qolaye	770	9
3	Qedelit	940	11
4	Rasa Janeta	67764	
5	Goro Gerbi	4853	
6	Garalafto Sororo	3168	
7	Homecho Rehana	27735	
IV	**Food for the Hungry (FH)**		
1	Zergawido	4843	14
2	Ganwuha	1900	12
3	Tilikwenz	2265	8
4	Muge	8497	
5	Avevet	2664	

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LANDSAT IMAGERIES *BEFORE* AND *AFTER* THE INTERVENTION (FERESMAY WATERSHED)

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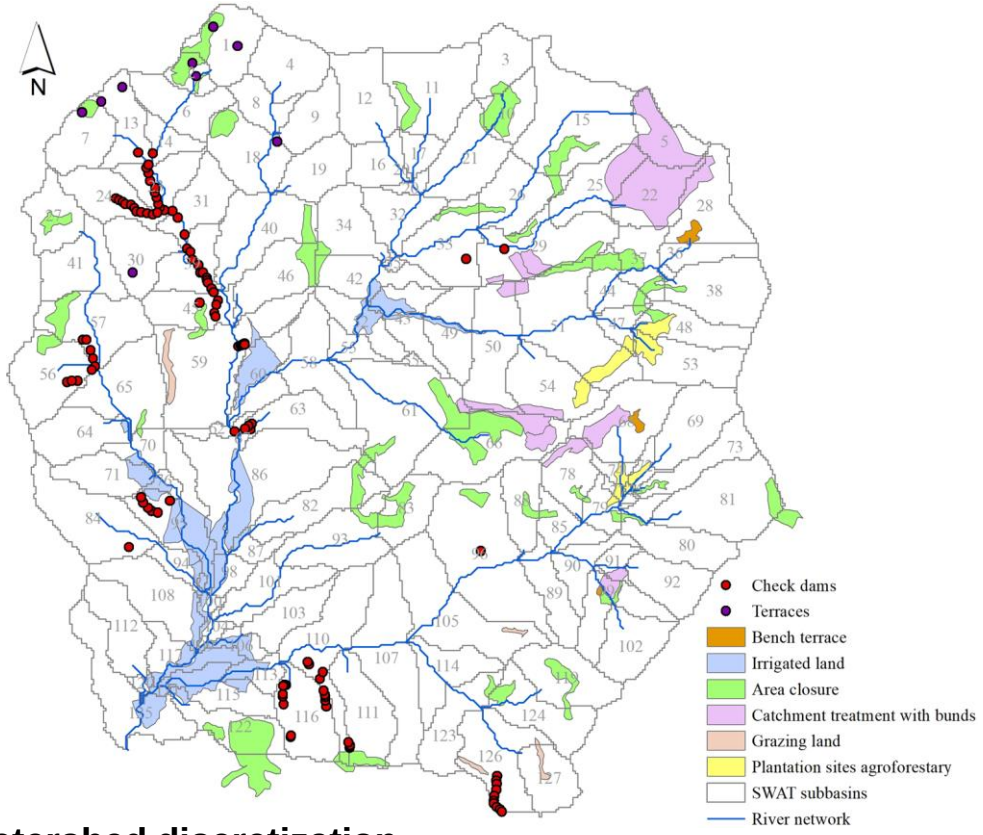
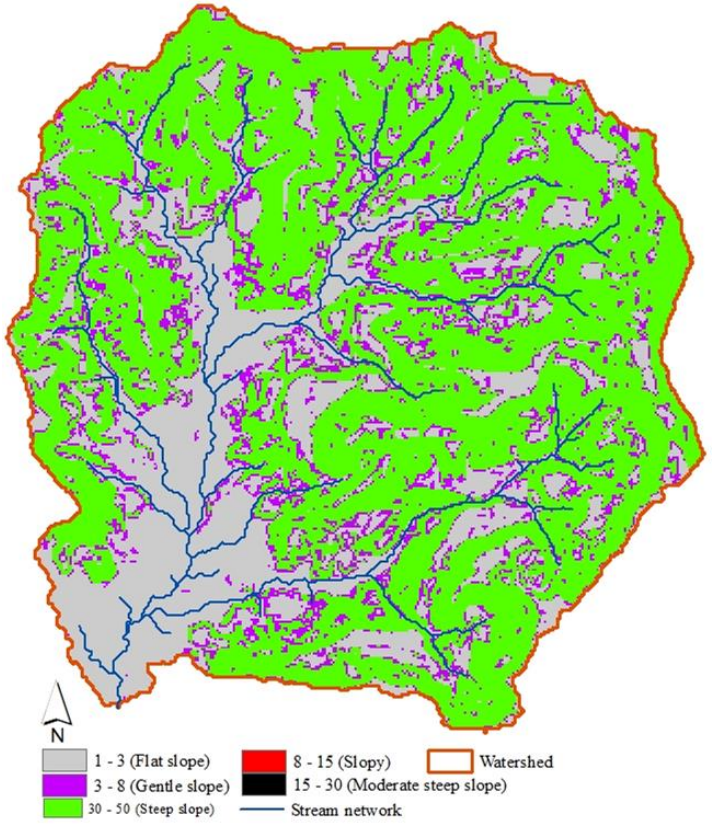
TEXAS A&M AGRILIFE RESEARCH

WATERSHED REHABILITATION INTERVENTIONS IN FERESMAY WATERSHED

Watershed rehab and irrigation intervention



Slope and stream networks



Watershed discretization

Subbasins: 127; Hydrological Response Units (HRUs): 6431

METHODOLOGY

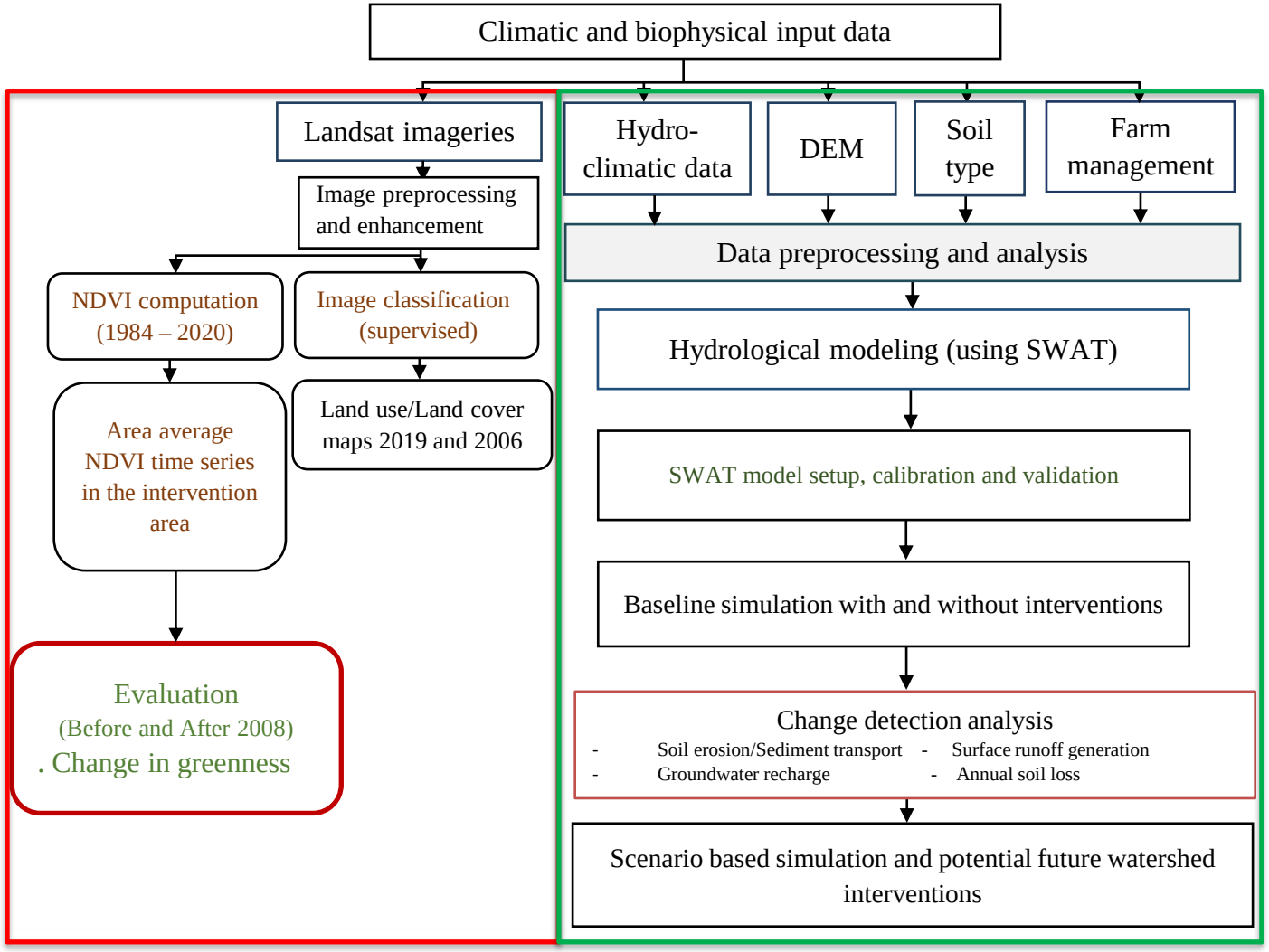
Remote sensing

Remote sensing-based vegetation greenness assessment

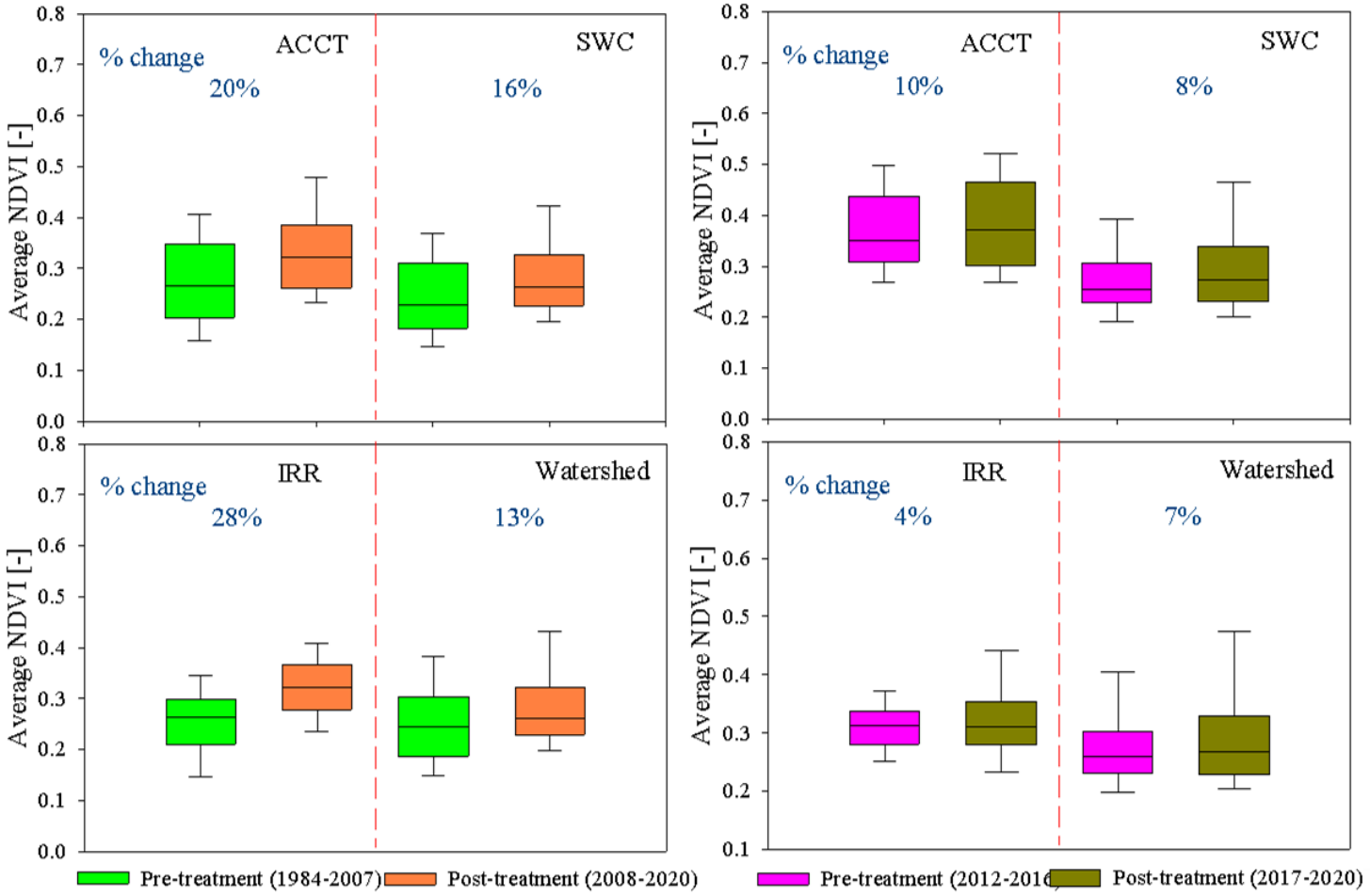
- Before and after intervention analysis
  - First analysis period 1984-2007 (before) & 2008-2022 (after)
  - Second analysis period 2012-2016 (before) & 2017-2020 (after)
- Vegetation enhancement during shock years due to interventions
  - Drought years Before (1984, 1989, 1990), and after (2009, 2013 and 2015)
- Impacts of interventions on vegetation greenness during wet and dry seasons
  - Dry season Nov – Feb
  - Wet season Jun - Sep

Biophysical modeling (SWAT)

- Model setup, calibration and validation
- Baseline SWAT model simulation for BHA watersheds
- Model simulation with and with out interventions



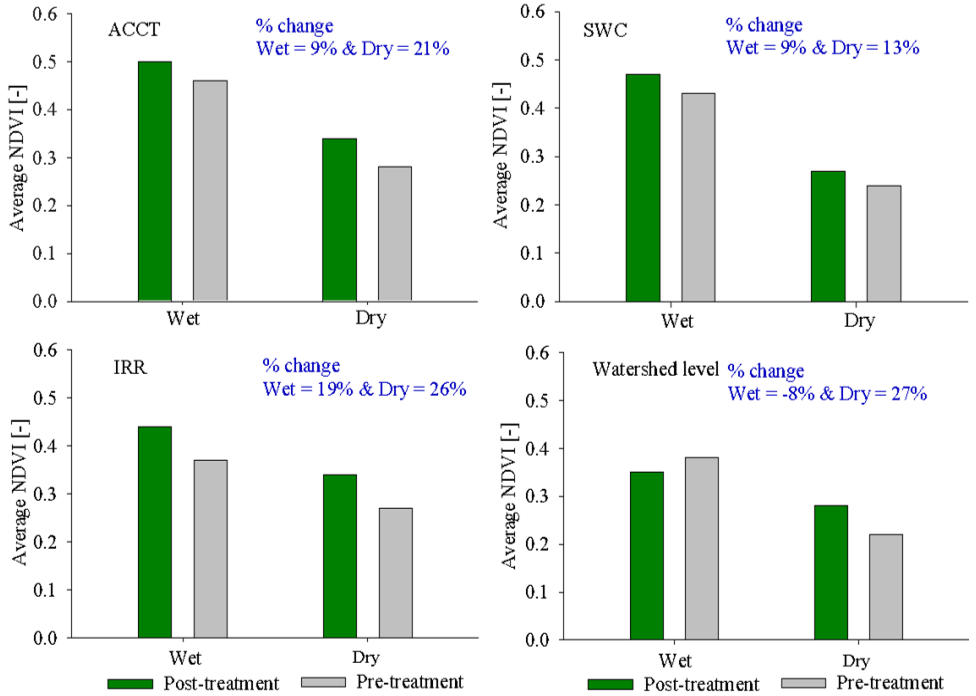
BEFORE- AND AFTER-INTERVENTION ANALYSIS (FERESMAY WATERSHED)



- There is improvement in vegetation greenness in the treated area:
  - Post-interventions (2008-2020) compared to pre-intervention(1984-2007)
  - ACCT and IRR improved the vegetation greenness 20 and 28%
  - Watershed-level analysis revealed an overall improvement in vegetation greenness across the watershed

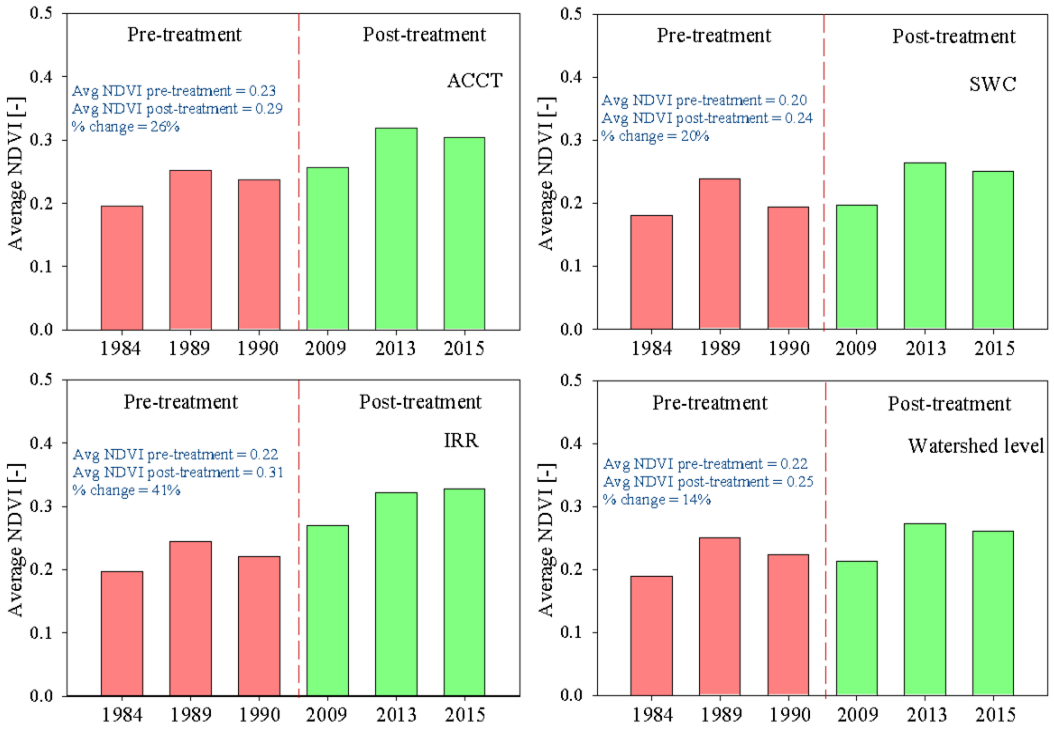
VEGETATION GREENNESS ENHANCEMENT IN FERESEMAY WATERSHED

WET AND DRY SEASONS



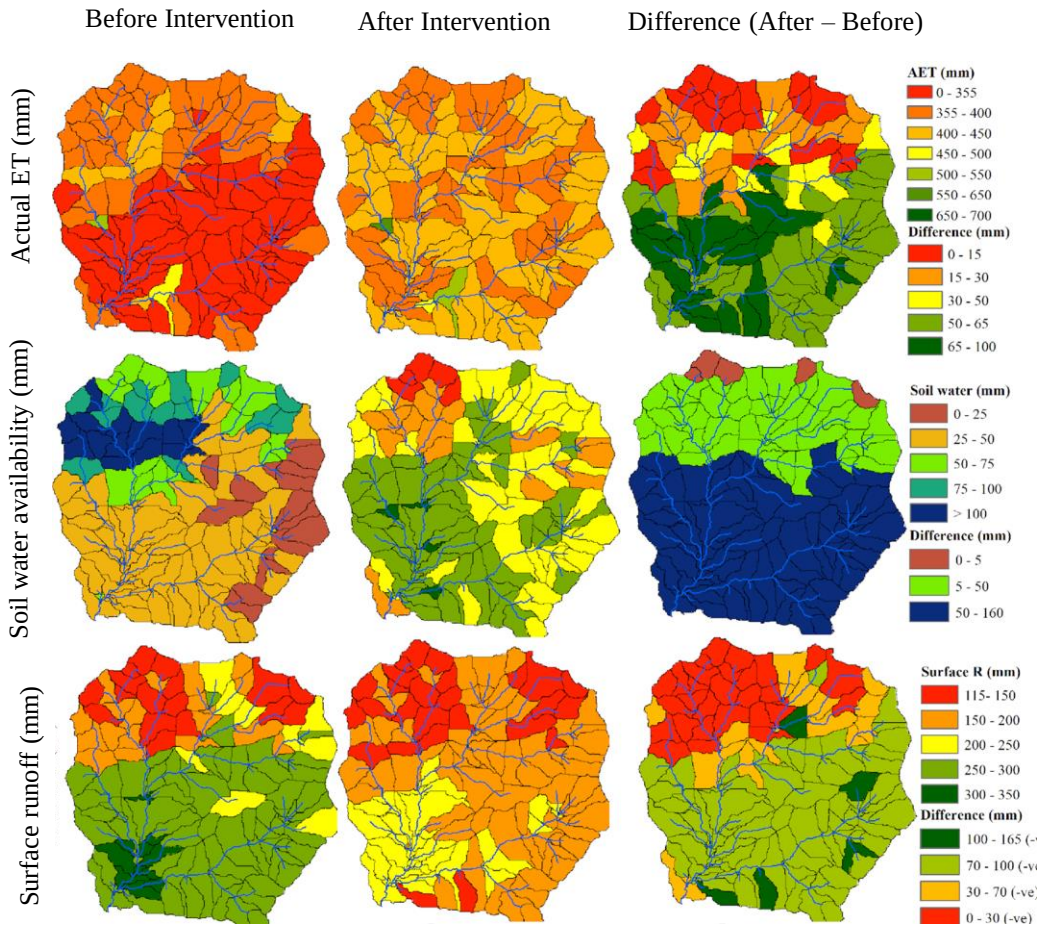
- Vegetation greenness enhancement during wet and dry seasons
- There is upto 27% change in greenness at watershed scale during dry season

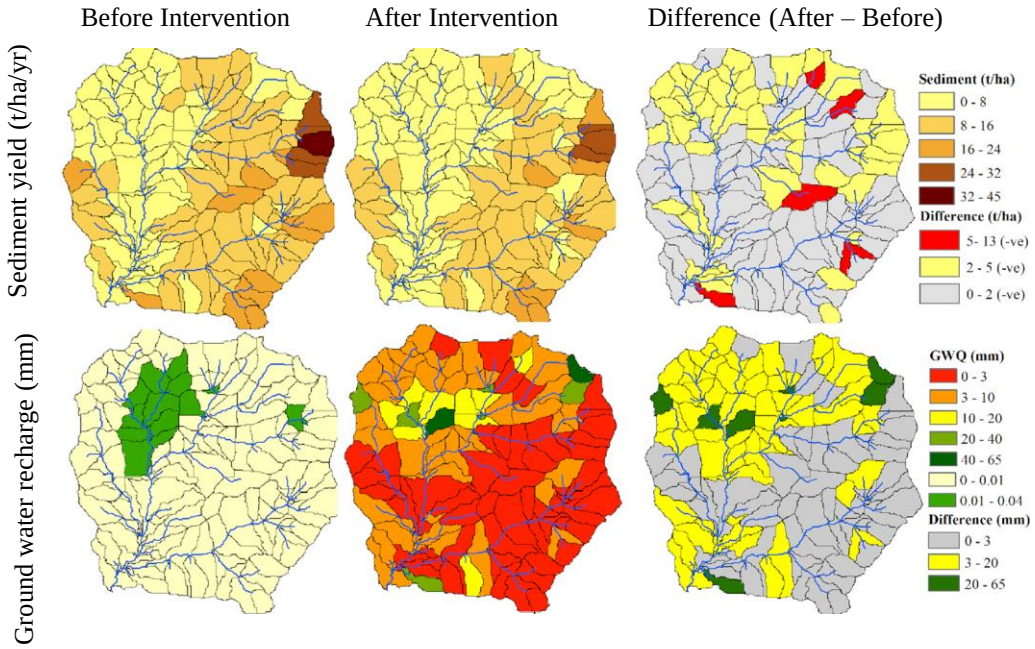
DROUGHT YEARS



- Average percentage change for different treatment ranges b/n 14-41%

WATER BALANCE COMPONENTS BEFORE AND AFTER INTERVENTIONS, FERESMAY WATERSHED





- Relatively high actual ET mainly in irrigation intervention area
- Soil water content is also enhanced while surface runoff reduced
- Sediment yield is reduced in some of the subbasins
- Ground water recharge enhanced in Northern and northwest parts of the watershed

Before intervention period -> 1982-2007 After intervention period -> 2008-2020

SUMMARY

Overall, watershed interventions contributed to:

- Improvement in vegetative greenness and water budget (Actual ET, Surface Runoff, Soil water Availability)
- Pronounced improvement in greenness during the dry season compared to the wet season (most watersheds)
- Enhanced resilience to drought (due to improved water availability)
- Enhancement in actual ET, Soil moisture and groundwater recharge
- Reduced soil erosion and surface runoff losses
- The longer the treatment period, the higher the impact (benefits)

Recommendation:

- Follow-up research using an integrated approach (remote sensing, biophysical modeling, site observation and measurement, and household economic analysis)

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