Impact assessment of droughts to livelihoods in Rib catchment (upper Blue Nile), Ethiopia

Group Members

1: Emmanuela Lado

2: Tesfa Gebrie Andualem

3: Demelash Ademem Malede

4: Job Rotich Kosgei

5: Wani Nelson Mogga

6: Victor Kongo

7: Elhadi Adam

Outline

- Rational
- Objective
- Study area
- Methodology
- Way forward
- Challenges

The Analytics

Rational

- Most countries in Horn of Africa have continued to be impacted by droughts
- Economies of many countries in SSA dependent on availability of water (rainfall)
- From 2003 – 2013, agriculture (worldwide) absorbed 25% of total impact of climate related disasters
- In SSA, drought was responsible for 89% of losses, amounting to US$ 12.8B
- The US Government spent an average of US $230 Million annually on emergency food aid in Ethiopia (USAID, 2018)

Rational

- A study to investigate the impact of an early humanitarian response and resilience building on humanitarian outcomes in the Tigray and Somali regions of Ethiopia observed that:
  - An early humanitarian response would save an estimated US$151 million per year.
  - Safety net programming saves an estimated average of US$127 million per year.
  - A resilience building scenario saves an average of US$150 million per year.
- Although the benefits are very attractive, droughts continue to ravage Ethiopia's economy due to weak early warning mechanisms

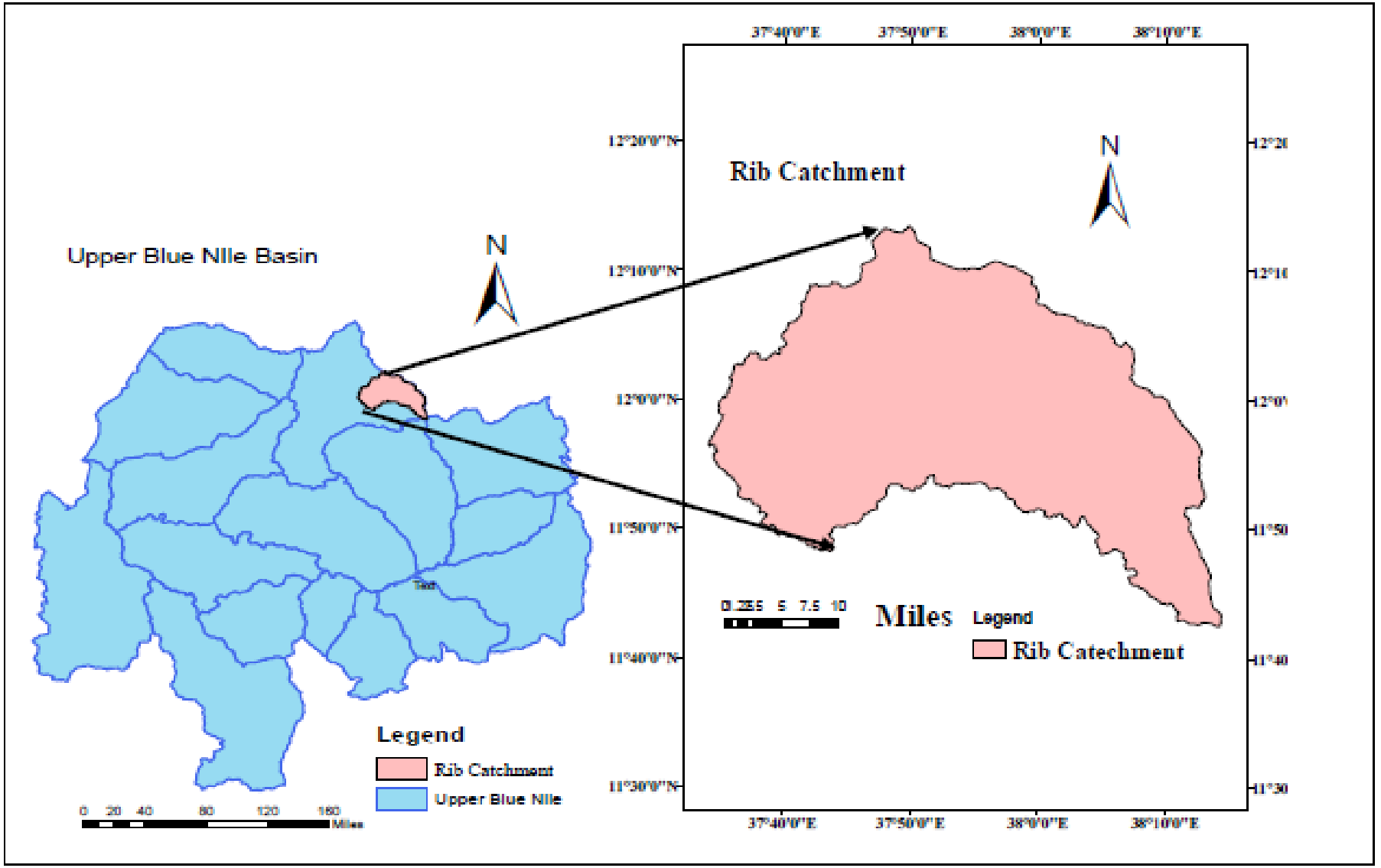
Objective of the study

- The study aimed at assessing trends and impacts of droughts to livelihoods (economy) in the Rib catchment with a focus to develop tools to strengthen the early warning mechanisms

Methodology

- Computed drought indices using AFDM; EN-FDM
- Retrieved GDP values from World Bank website (Total and Agricultural) (not able to downscale to catchment level
- Compare Drought indices, climatic parameters with GDP values
- Draw inferences from the analysis

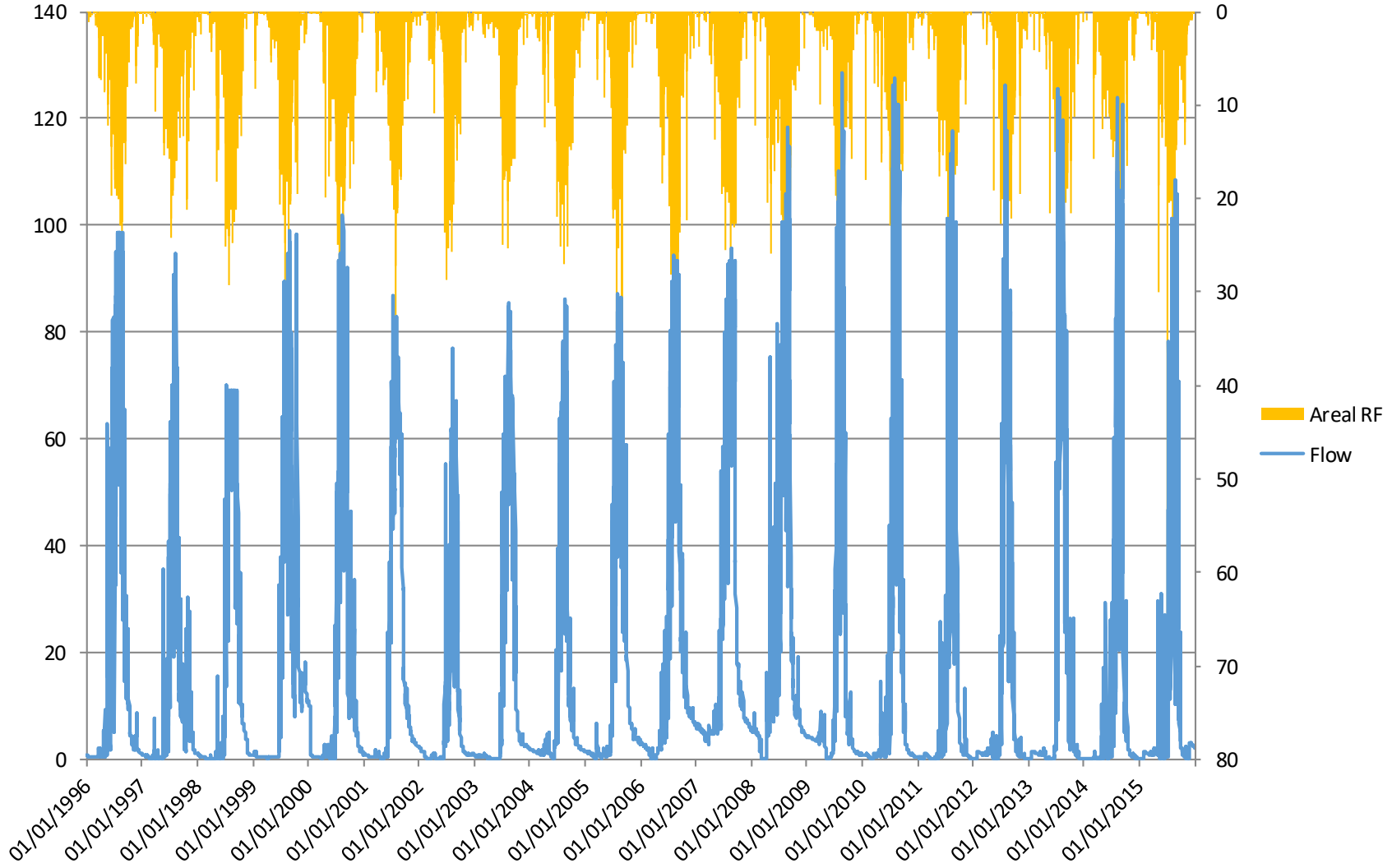
Study area



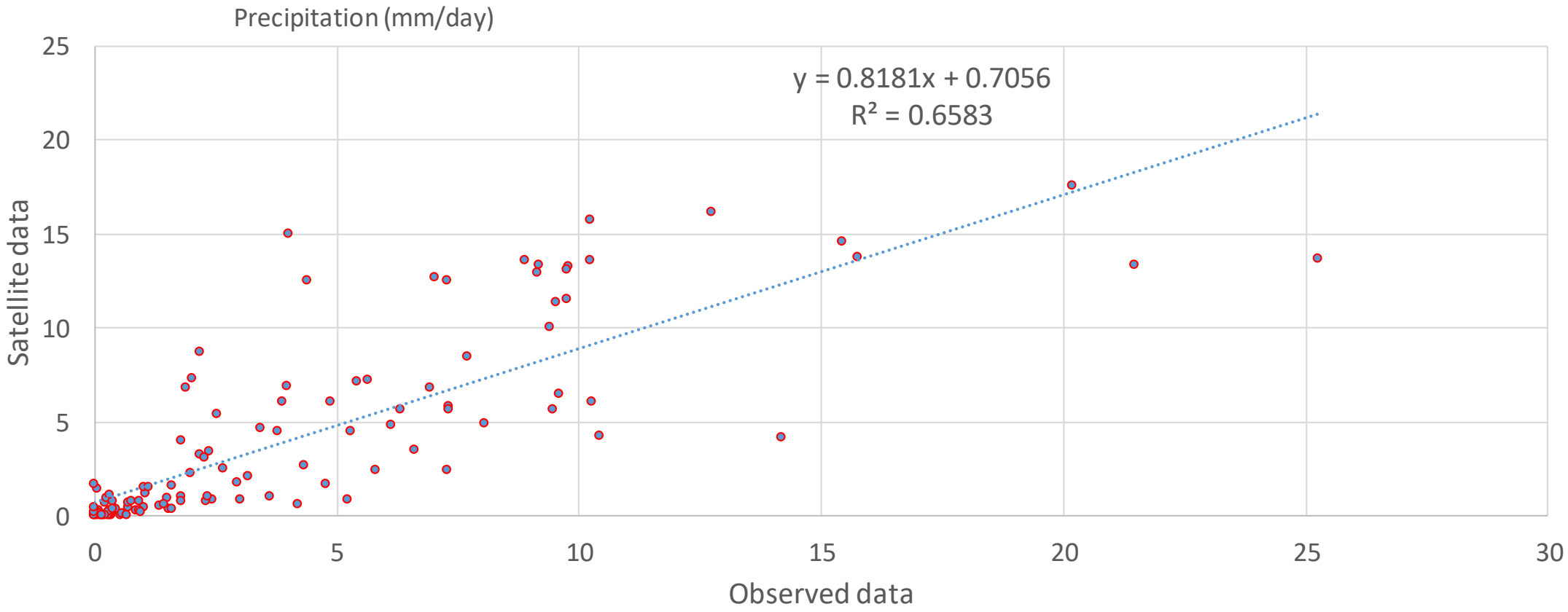
Area:
199,160 hectares

Altitudinal range
1785 - 4000 m.a.s.l

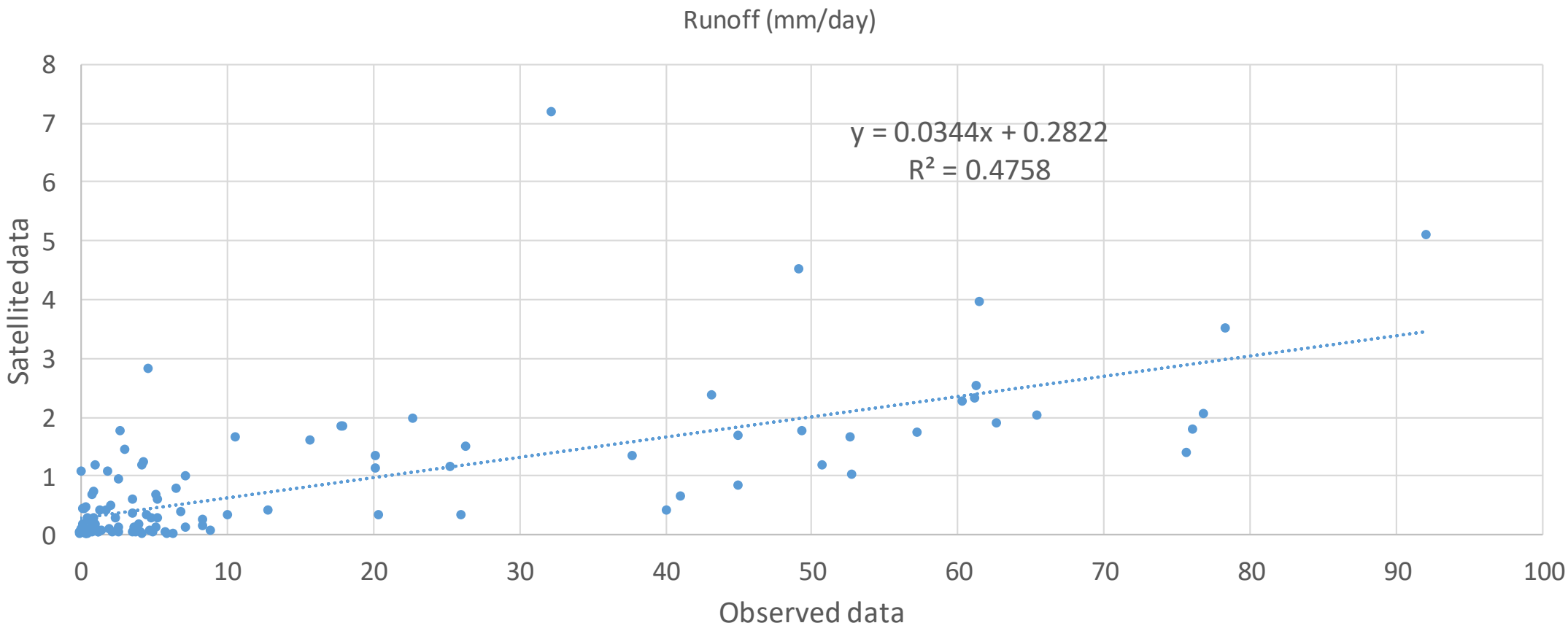
Historical Data showing Rainfall and Runoff



Validation of Precipitation data

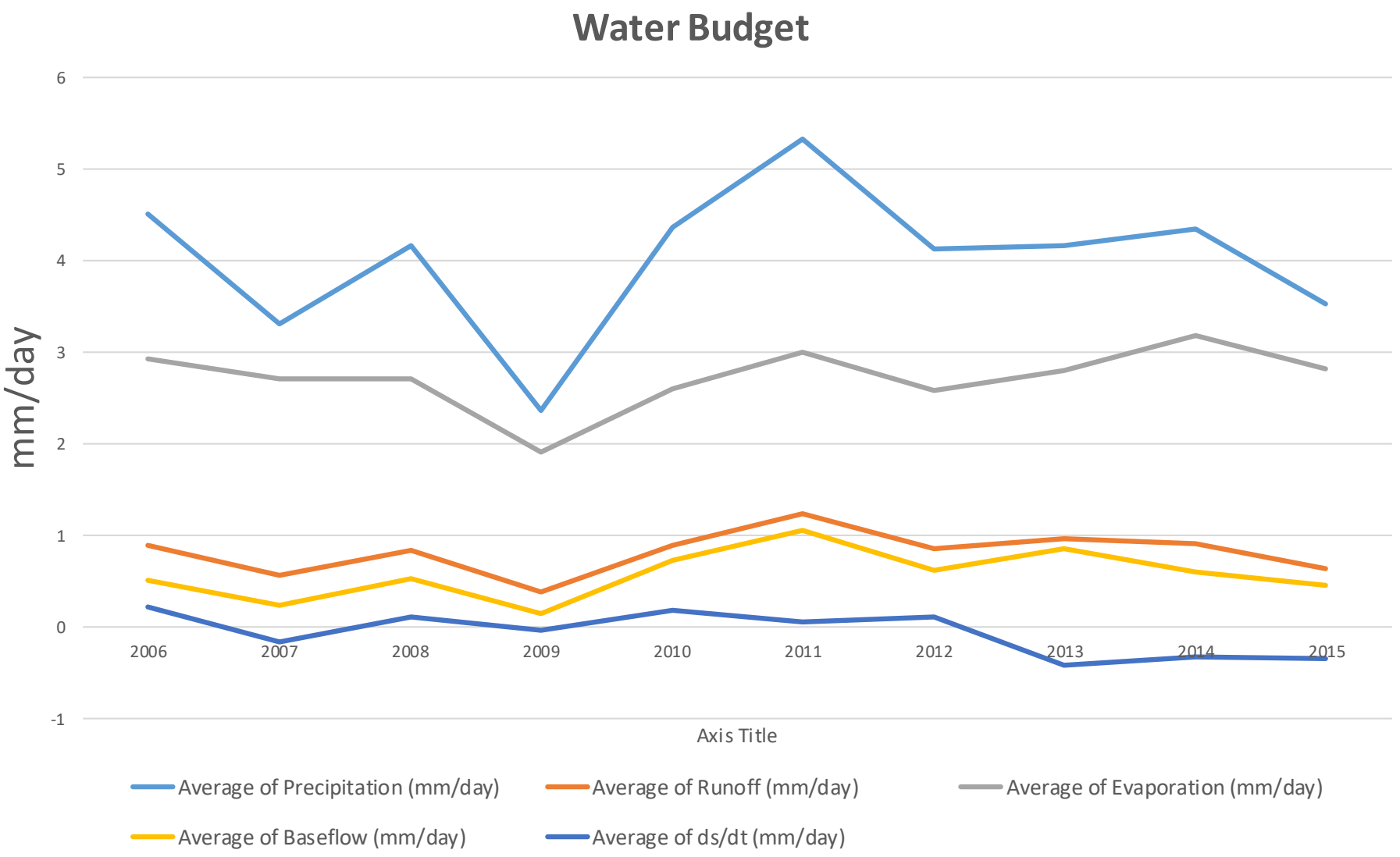


Validation of Runoff data

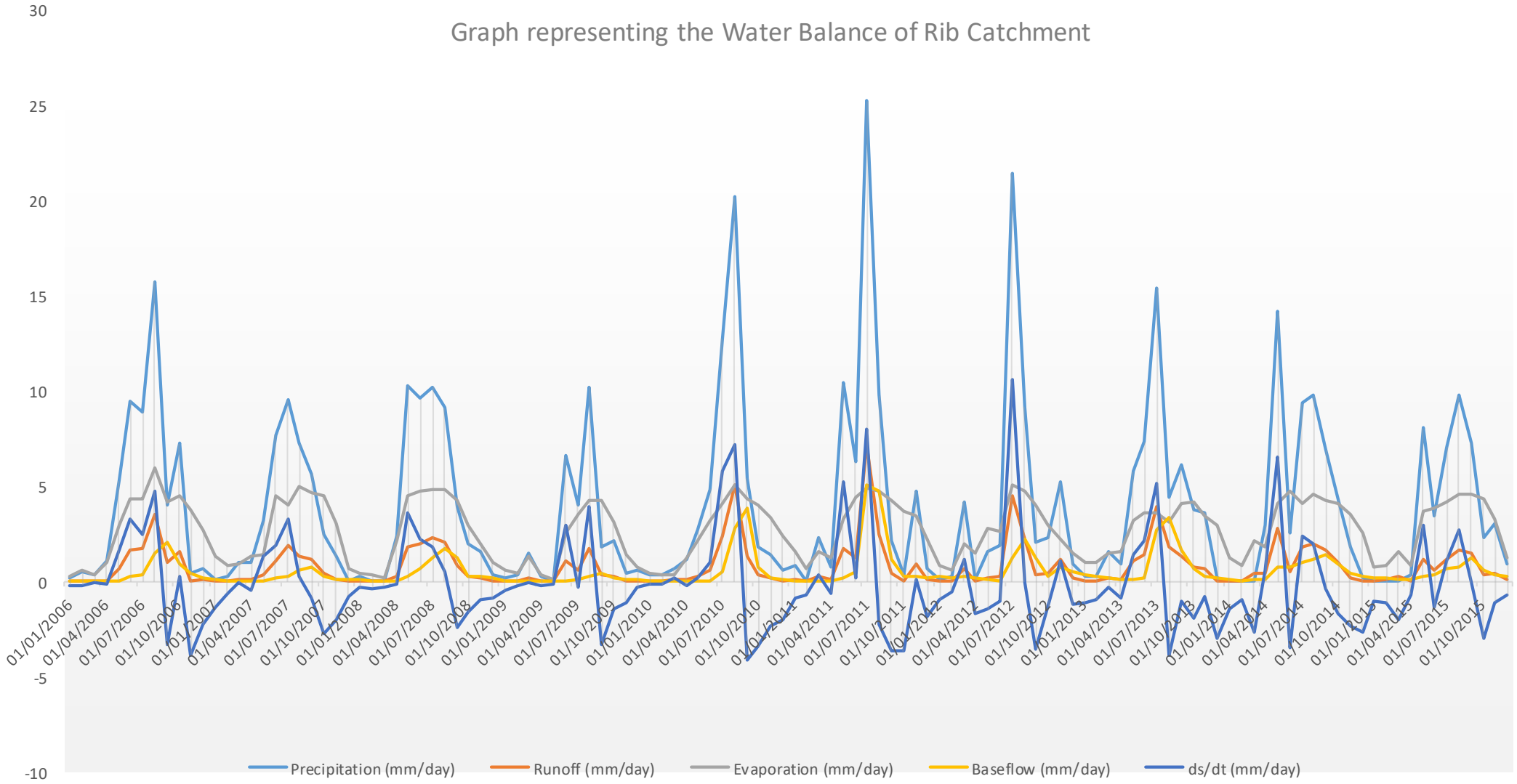


Water Balance of Rib catchment

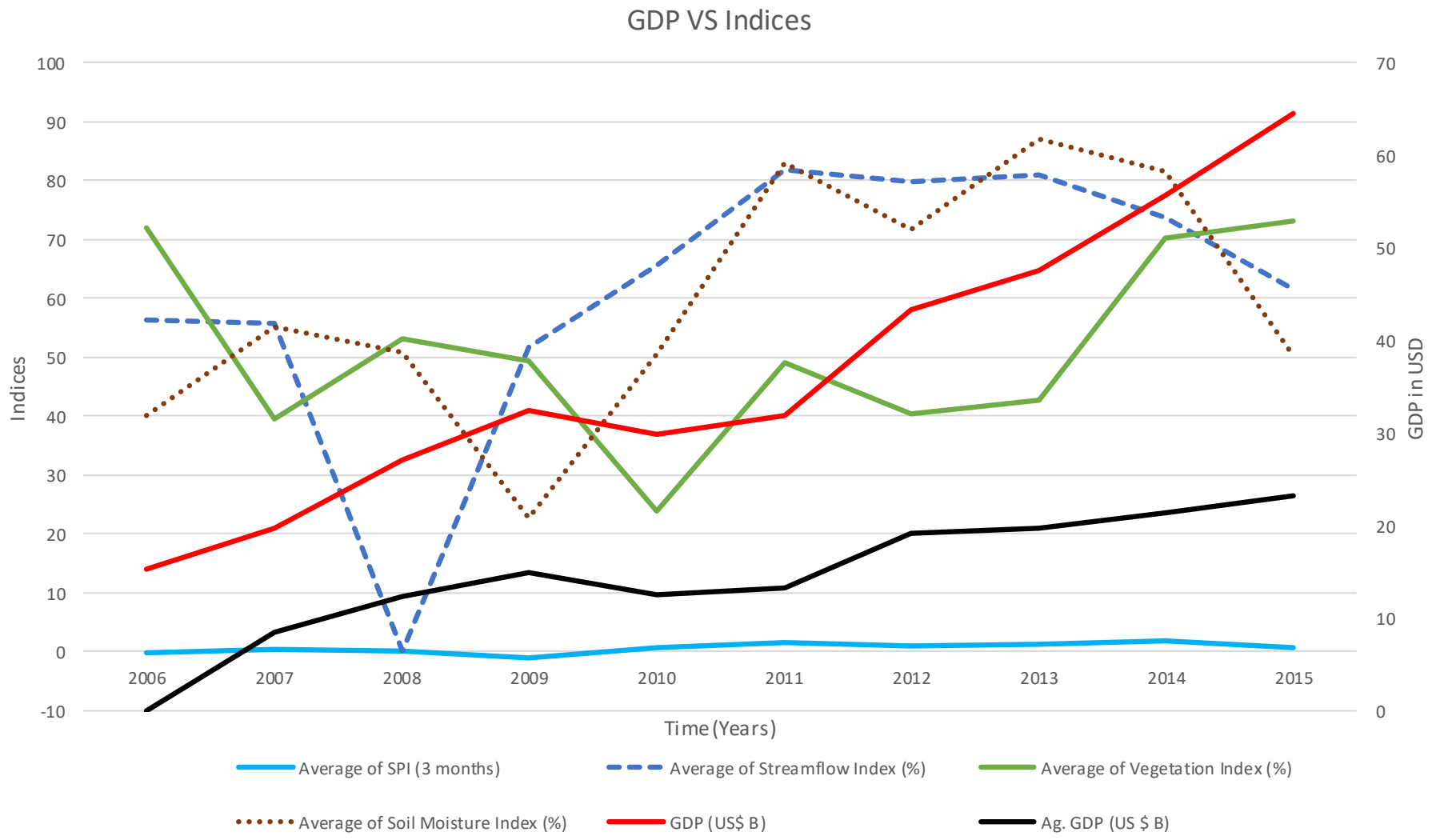
Year	Average of Precipitation (mm/day)	Average of Runoff (mm/day)	Average of Evaporation (mm/day)	Average of Baseflow (mm/day)	Average of ds/dt (mm/day)
2006	4.50	0.88	2.92	0.50	0.21
2007	3.31	0.56	2.70	0.22	-0.17
2008	4.15	0.82	2.71	0.52	0.10
2009	2.36	0.37	1.90	0.13	-0.04
2010	4.36	0.88	2.60	0.72	0.17
2011	5.32	1.22	3.00	1.05	0.05
2012	4.13	0.84	2.58	0.61	0.10
2013	4.16	0.95	2.79	0.84	-0.42
2014	4.34	0.91	3.18	0.59	-0.34
2015	3.53	0.62	2.82	0.45	-0.35


Water Budget
mm/day
6
5
4
3
2
1
0
-1
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Axis Title
Average of Precipitation (mm/day)
Average of Runoff (mm/day)
Average of Evaporation (mm/day)
Average of Baseflow (mm/day)
Average of ds/dt (mm/day)

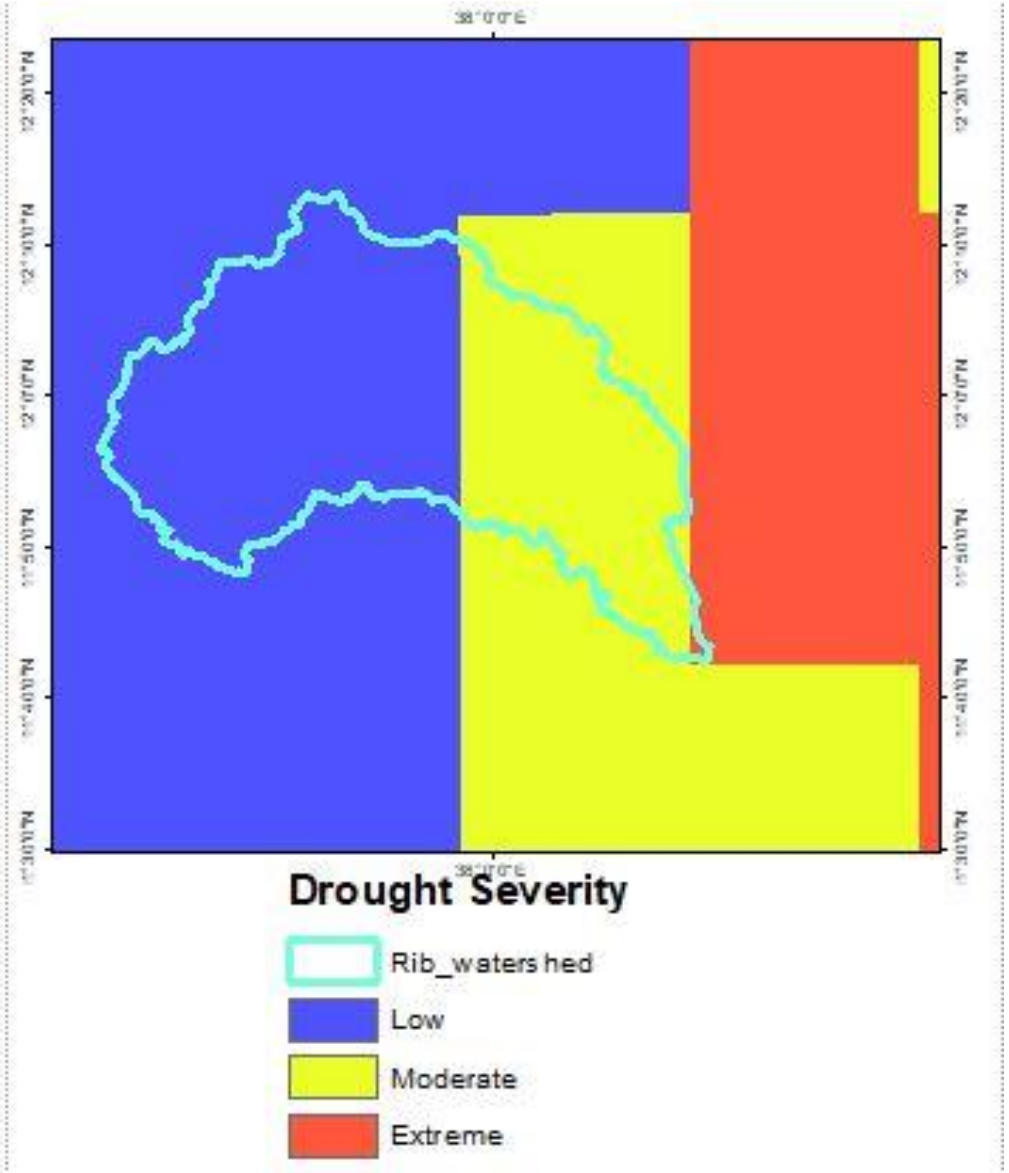
Water Balance cont....



Drought Indices vs GDP



Drought Severity



Drought severity	AREA (km2)
Extreme	2273.28
Moderate	5304.33
Low	7577.62

Way Forward

- Watershed management could be done in the upper watershed parts to reduce the drought impacts
- Ground water recharge shall be implemented
- Ground observation data should be done for soil moisture to validate the SMAP data
- Hydrological and meteorological stations should be installed at appropriate locations

Challenges

- Unable to download Soil moisture due to large size file
- Unable to extract study area drought
- The runoff from satellite didn’t much with observed data (poor correlation 0.47
- The satellite data couldn’t give > 1000 timesteps