

## Introduction and background

- Millions of people in Africa's low-lying Great Rift Valley are routinely exposed to both drought and flooding, which have a negative impact on livelihoods. While upland highlands produce sudden yet significant runoff during the wettest months, flash floods happen in low-lying places. (Belay et al., 2015). These arid lowlands are endowed with abundant land resources and numerous seasonal rivers and, if these resources are utilized effectively through the development of sustainable flood-based farming systems, they have the potential to contribute to the development of these regions.
- With changing climates and more frequent extreme events expected in the Ethiopian highlands, flooding in the region may lead to catastrophic results if it coincides with the existing vulnerable systems.

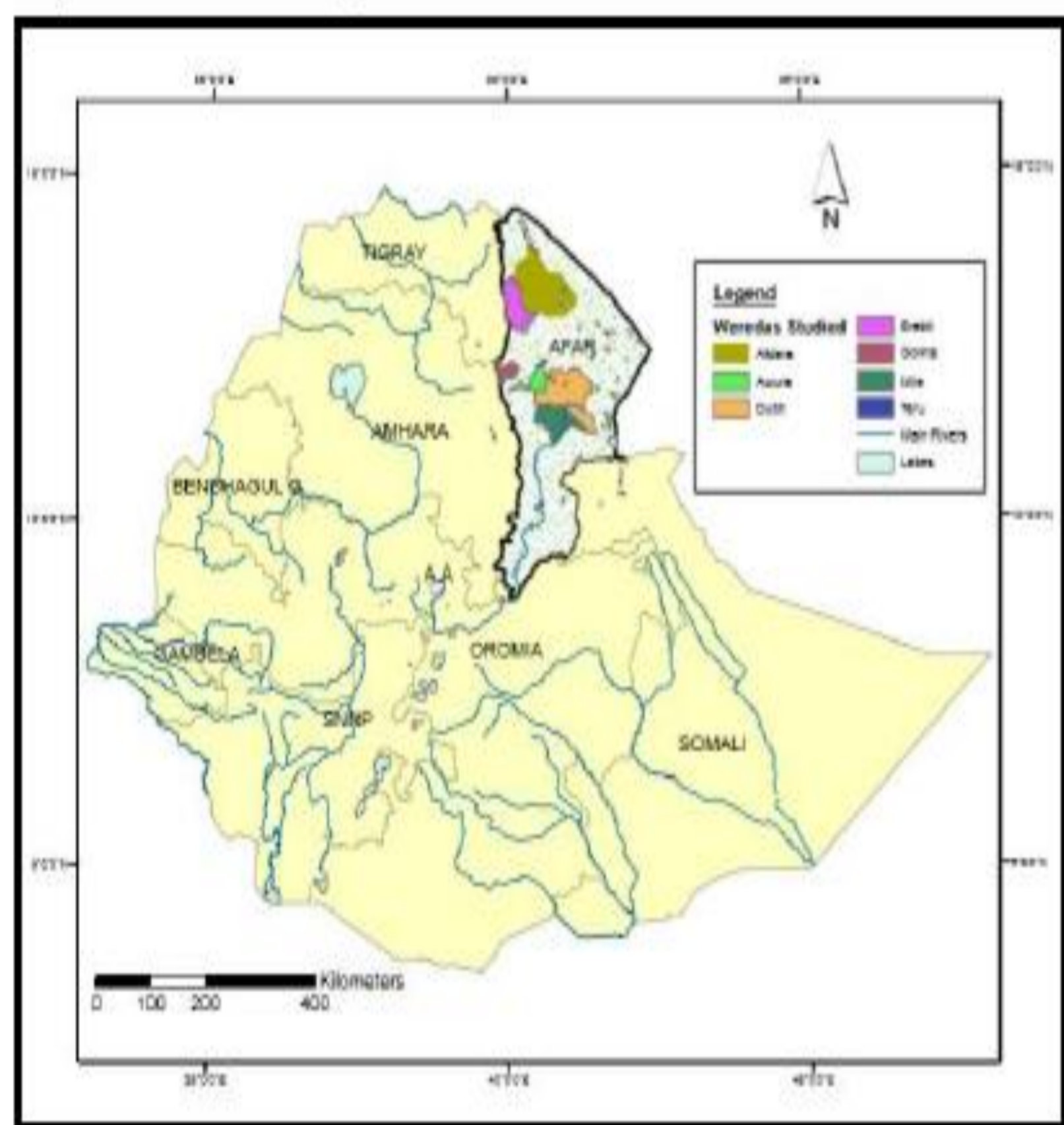


Figure 1 Map of Afar National Regional State, Ethiopia

- The Afar region is one of the driest areas in Ethiopia located in the North Easter part of Ethiopia.
- The dominant part of the region is characterized by low rainfall of less than 300 mm (53% of the region) and average temperature exceeding 27.5 0C.
- Most of the people of Afar practice pastoral and Agro-pastoral modes of life. Crop production is practiced through irrigation and river water abstraction.

## Objectives

- To understand the overall potential and identify potential target locations covered by a flood over time using high-resolution satellite images and hydrological tools.
- To estimate the amount of water that is available for productive purposes using a volume balance approach, and
- To develop a land suitability map for main crops in the major agriculturally potential flood areas of the Afar region.

## Methodology and Data

- The flood area maps that were done by ICRISAT using higher-resolution satellite images were used for the identification of selected districts.
  - Laboratory analysis of the collected Composite soil samples was done used to compare to the results identified using high-resolution satellite images.
- Hydrologic Analysis
- Applied the simplest approach using the surface runoff coefficient method to determine peak runoff for the watersheds contributing to floods that are potential to be used for spate irrigation.
  - Isohytal method was applied to get the areal average rainfall over the selected sites with reference to nearby stations.

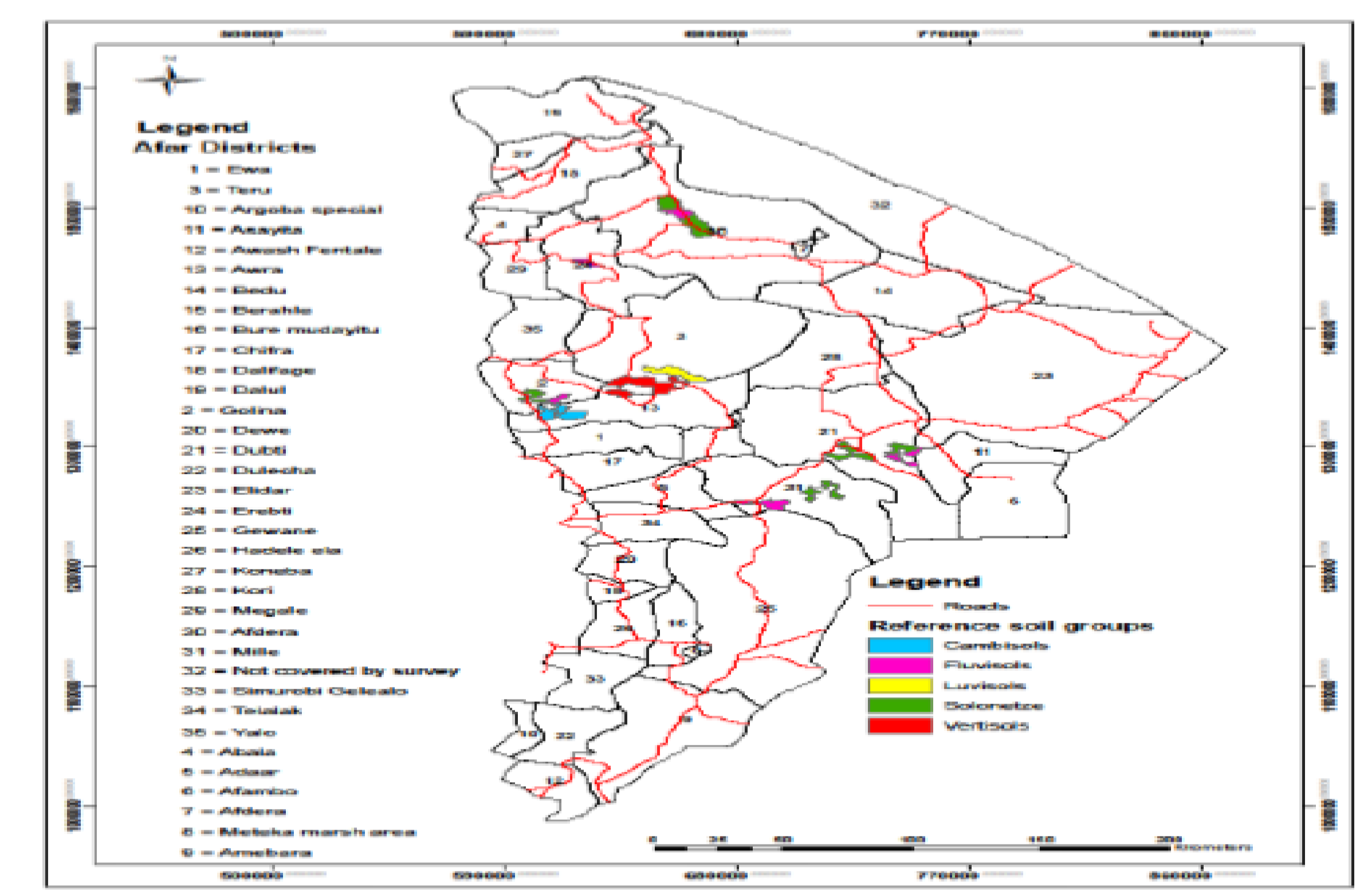


Figure 2 Description of Reference soil groups of the Study Area FAO 2006.

## Reference

- Belay K, Beyene F and Manig W (2005) Coping with drought among pastoral and agro-pastoral communities in eastern Ethiopia. Journal of Rural Development 28, 185–210.
- FAO 2006. FAO - WRB (Food and Agricultural Organization of the United Nations – World Reference Base for Soil Resources), World Reference Base for Soil Resources Report. No. 103. Rome, Italy.
- Getnet M, Amede T, Tilahun G, Legesse G, Gumma MK, Abebe H, Gashaw T, Ketter C, Akker EV (2020). Water spreading weirs altering flood, nutrient distribution and crop productivity in upstream–downstream settings in dry lowlands of Afar, Ethiopia. Renewable Agriculture and Food Systems 1–11. <https://doi.org/10.1017/S1742170519000474>

## Result

No	Site name	Water shade area(km2)	Average annual rainfall(mm)	Runoff coefficient	Annual Flood volume(10 <sup>6</sup> m <sup>3</sup> )	Basin Name
1.	Ereti	524	300	0.02	3.14	Dankil
2.	Kesudad	260	120	0.01	0.31	Dankil
3.	Yalebahe	584	150	0.01	0.88	Dankil
4.	Aetura	1560	250	0.02	7.8	Dankil
5.	Giraro	1071	450	0.06	28.92	Awash
6.	Mokole	133	450	0.06	3.59	Dankil
7.	Adumdello	1175	700	0.15	123.38	Dankil
8.	Gremille	4300	400	0.05	86.0	Dankil

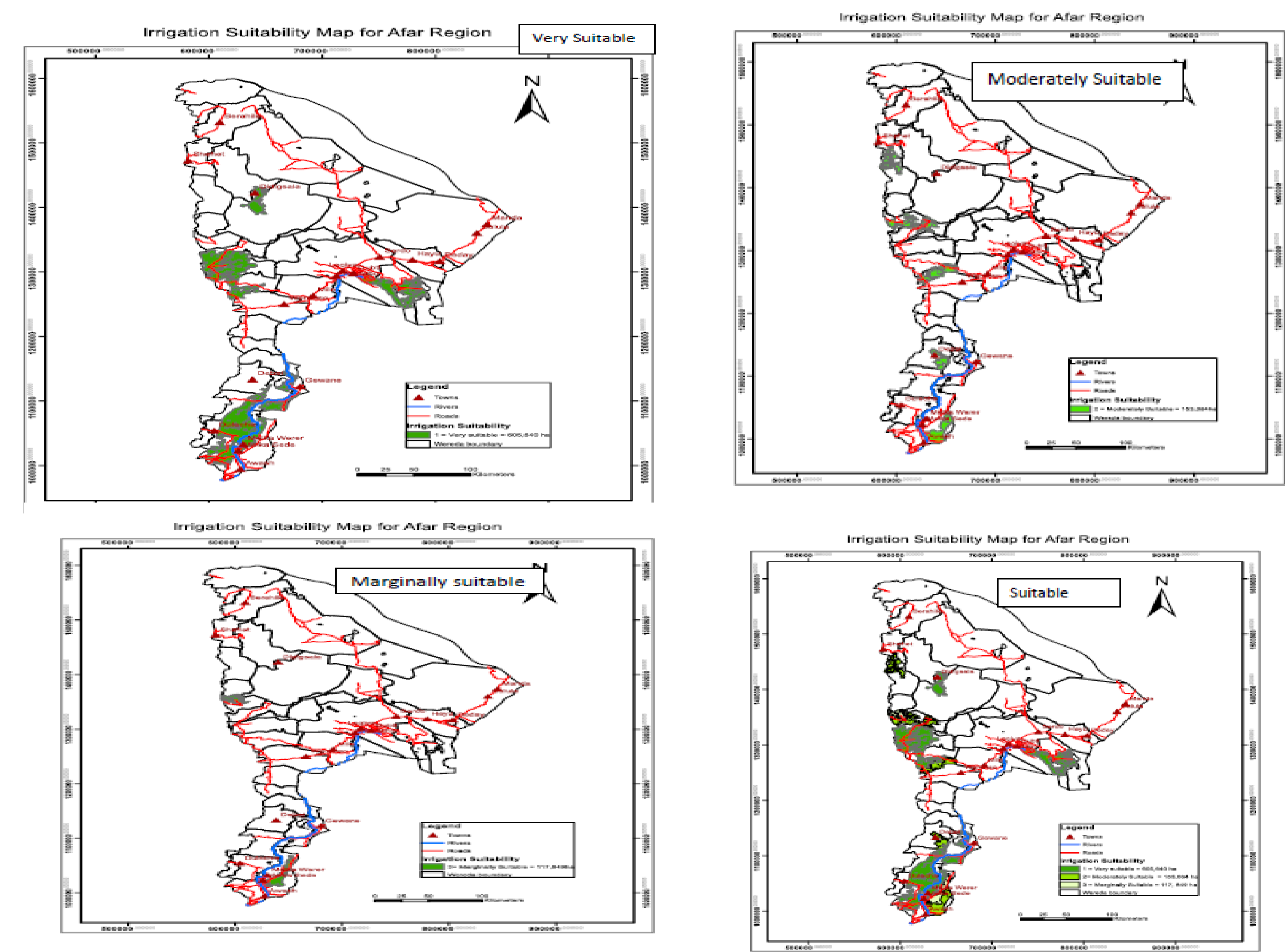


Figure 3 Land suitability Map of the Study Area

## Conclusion

- The result of this study based on samples for site-level validation has proved the presence of potentials both in terms of floods and water. From the soil and land suitability points of view, five reference soils have been identified, which include Luvisols, Cambisols, Fluvisols, Solonetz, and Vertisols.
- The land suitability analysis using four factors, i.e., slope, soil texture, soil depth, and salinity resulted in a total estimated area of 877,000 ha which close to what the study by ICRISAT reported as 900,000 ha. This is a validation of their work.