2020 International Conference on the Nile and Grand Ethiopian Renaissance Dam: Science, Conflict Resolution and Cooperation Confirmation

August 20 - 21, 2020

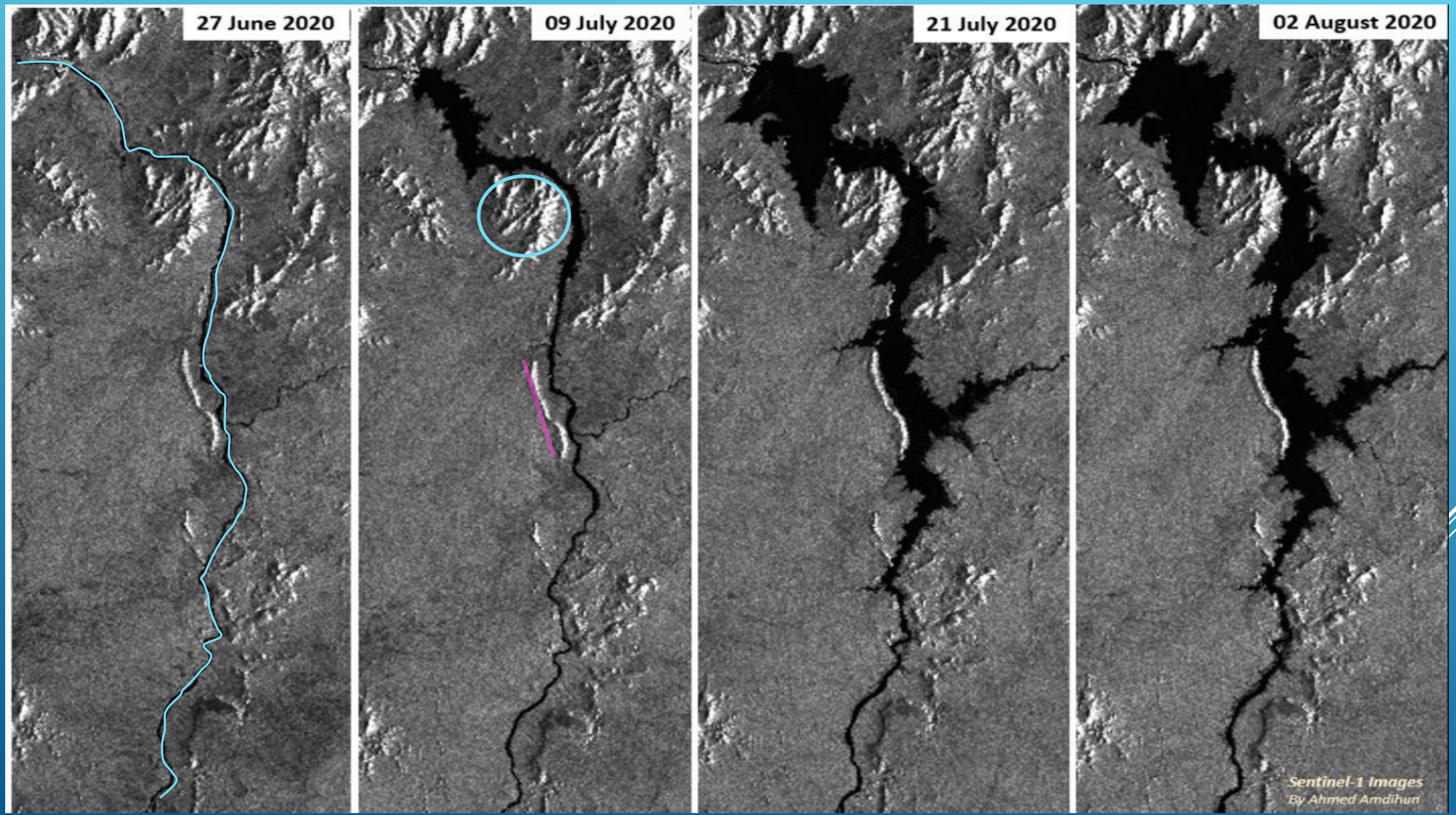
Alemayehu (Alem) Gebriel, PhD, PE

BEYOND THE GERD FIRST STAGE FILLING

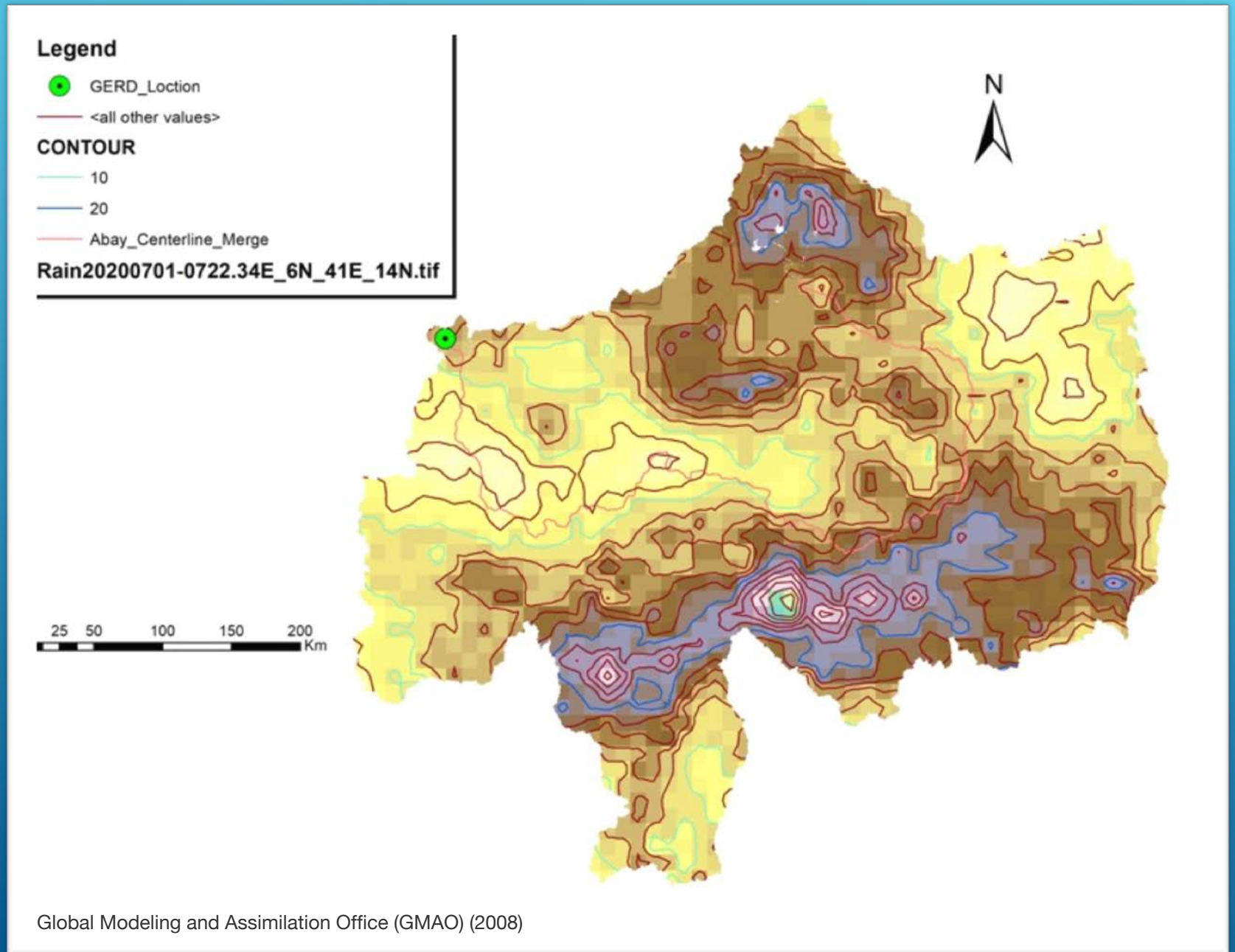
FIRST STAGE FILLING OF GERD

- **First stage filling was accomplished on July 21, 2020 with 4.9 BMC of stored water**
- **No agreement is signed between the three countries, yet**
- **AU sponsored talk is still in progress**

TIME-LAPSE IMAGE OF GERD FILLING

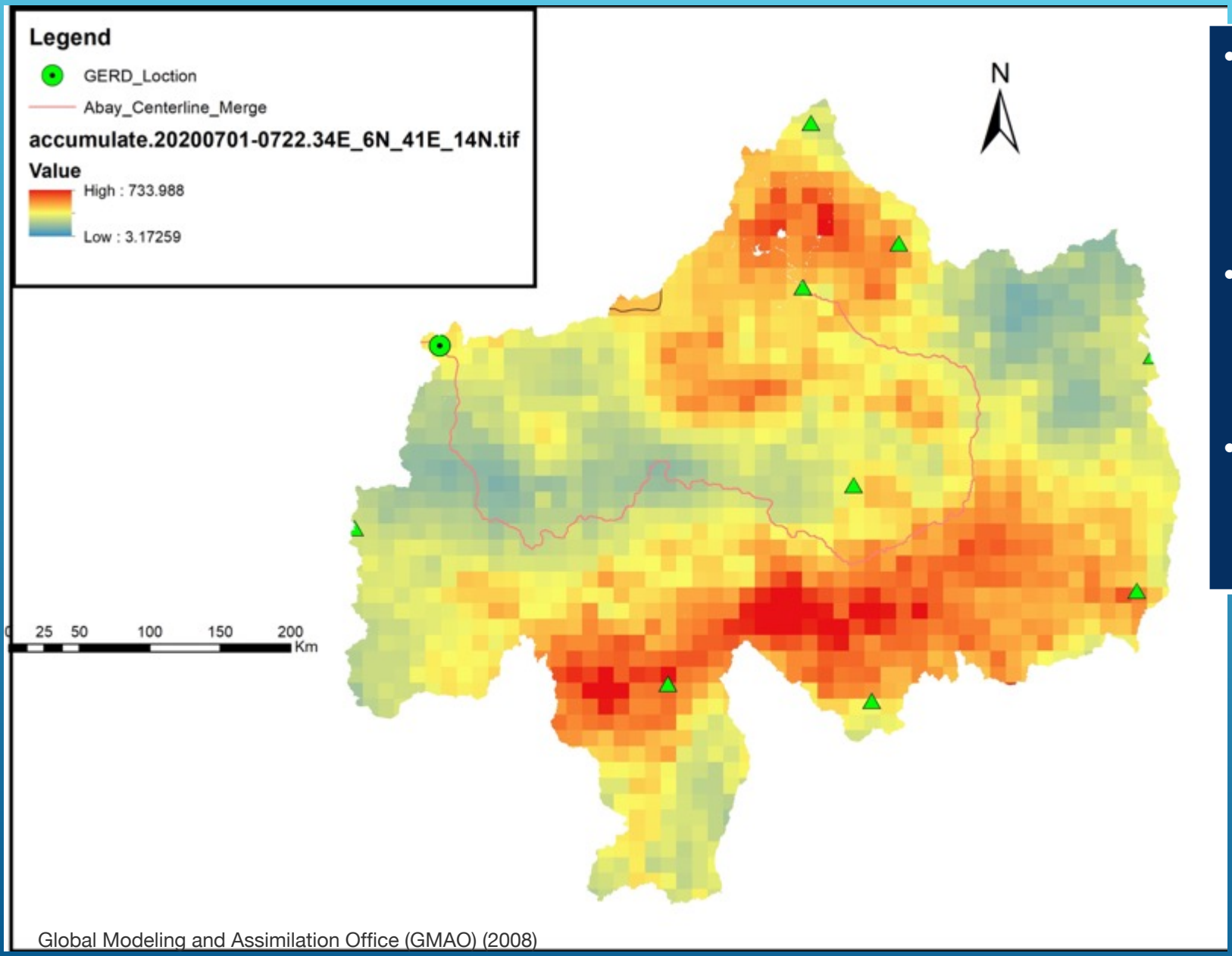


AVERAGE DAILY RAINFALL JULY 1 TO JULY 22, 2020, MM



Global Modeling and Assimilation Office (GMAO) (2008)

TOTAL RAINFALL FROM JULY 1 TO JULY 22, 2020, MM

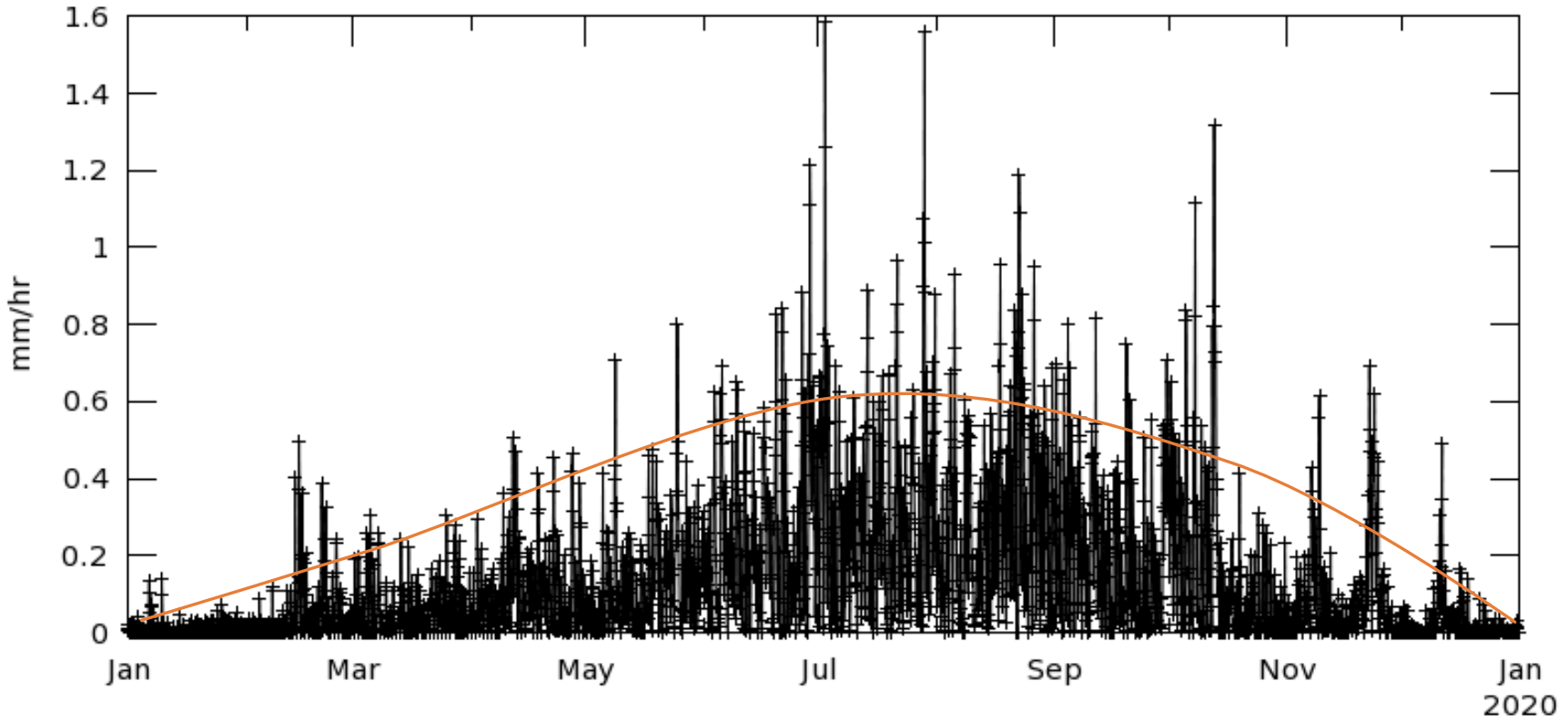


Global Modeling and Assimilation Office (GMAO) (2008)

- Most of the rain fell in wet belt region from west of Nekemet to Deber Berhane and highlands of Gonder
- The cumulative amount range from 200 mm to 700 mm in the region - Nekemet to Deber Berhane.
- In the other areas the amount range as low as 3 mm

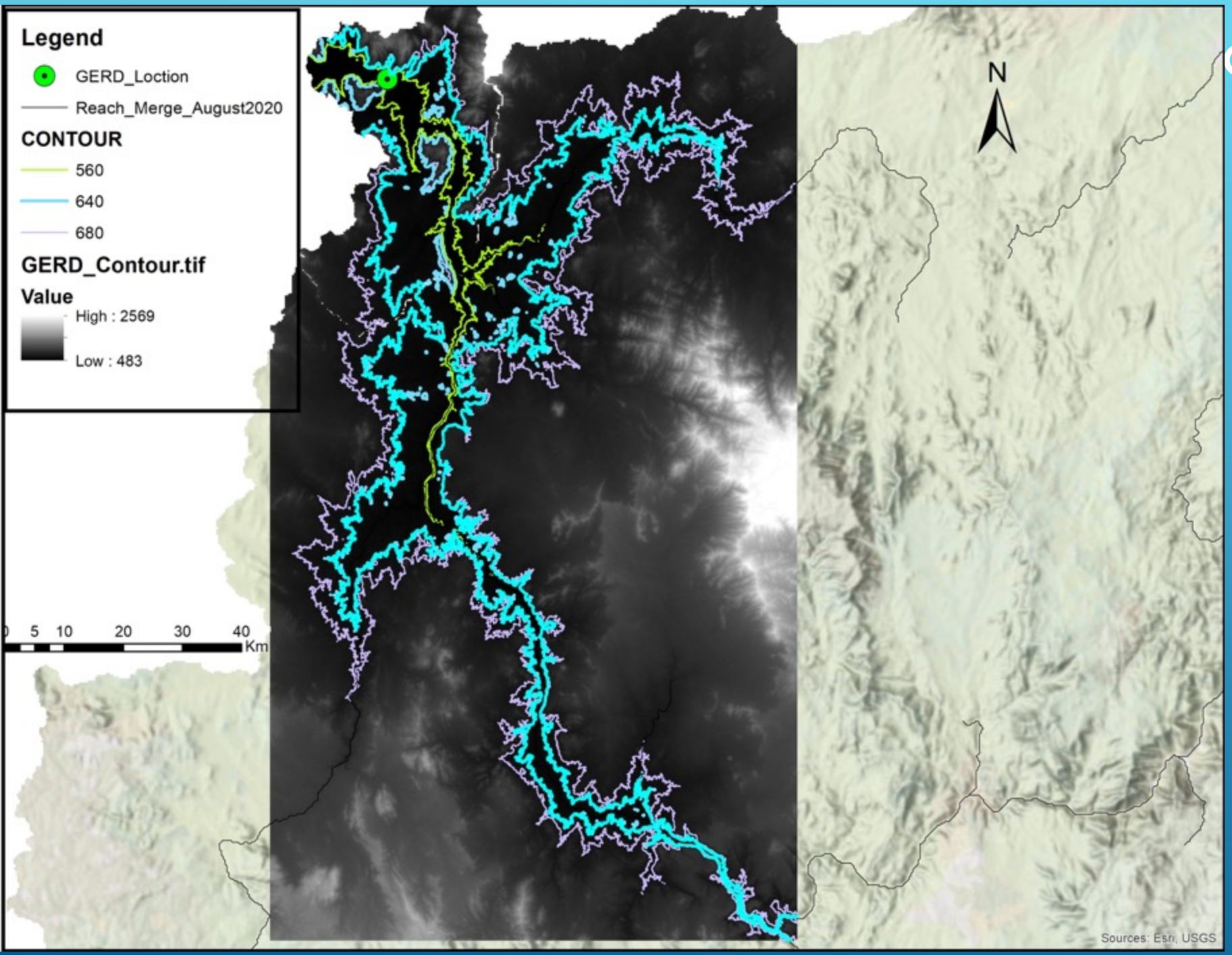
RAINFALL AVERAGE INTENSITY

Time Series, Area-Averaged of Near-Real-Time Precipitation Rate 3-hourly 0.25 deg. [TRMM TRMM_3B42RT v7] mm/hr over 2018-12-31 22:30Z - 2020-01-01 01:30:00Z, Region 33.7939E, 6.4657N, 40.2979E, 13.8924N



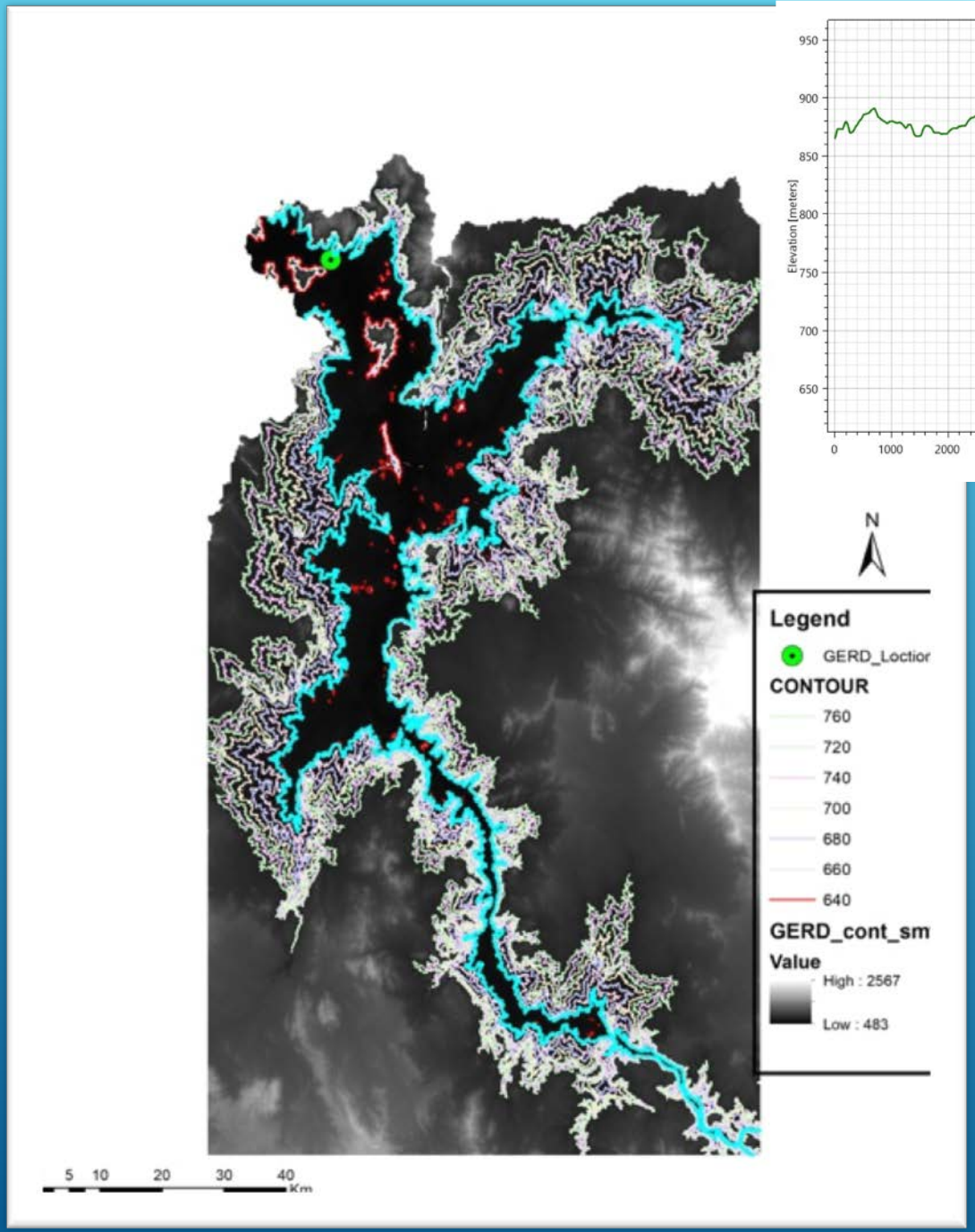
- The user-selected region was defined by 33.7939E, 6.4657N, 40.2979E, 13.8924N. The data grid also limits the analyzable region to the following bounding points: 33.875E, 6.625N, 40.125E, 13.875N. This analyzable region indicates the spatial limits of the subsetted granules that went into making this visualization result.

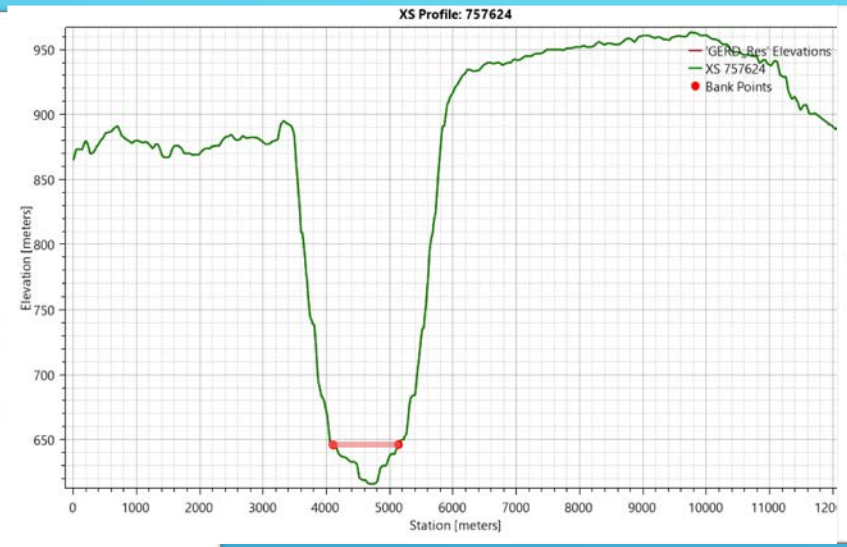
Global Modeling and Assimilation Office (GMAO) (2008)

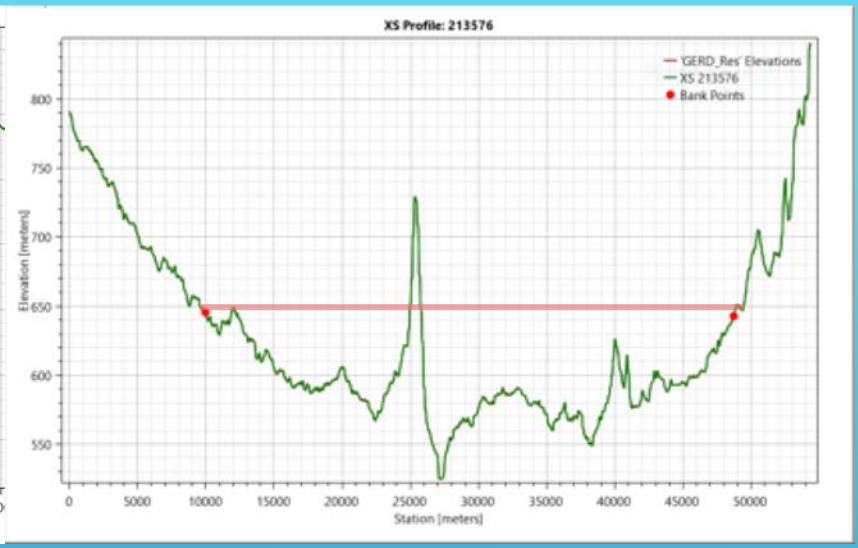


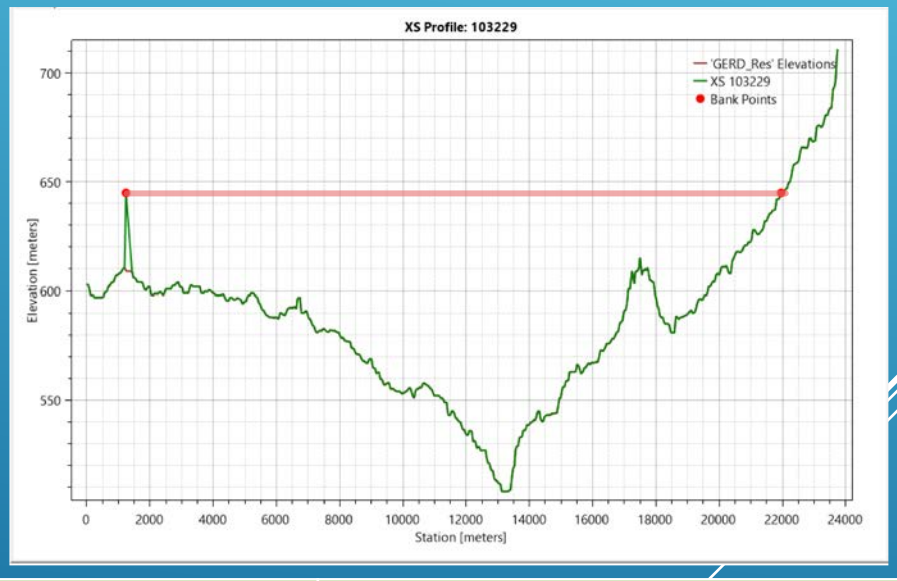
GERD RESERVOIR AREA

1. Elevation 560 m is shown in bright Green; approximate surface area 250 sq. km
2. Elevation 640 m when the reservoir is full; shown in Sky Blue; approximate surface area >1800 sq. km
3. Elevation 680 m is shown for contrast





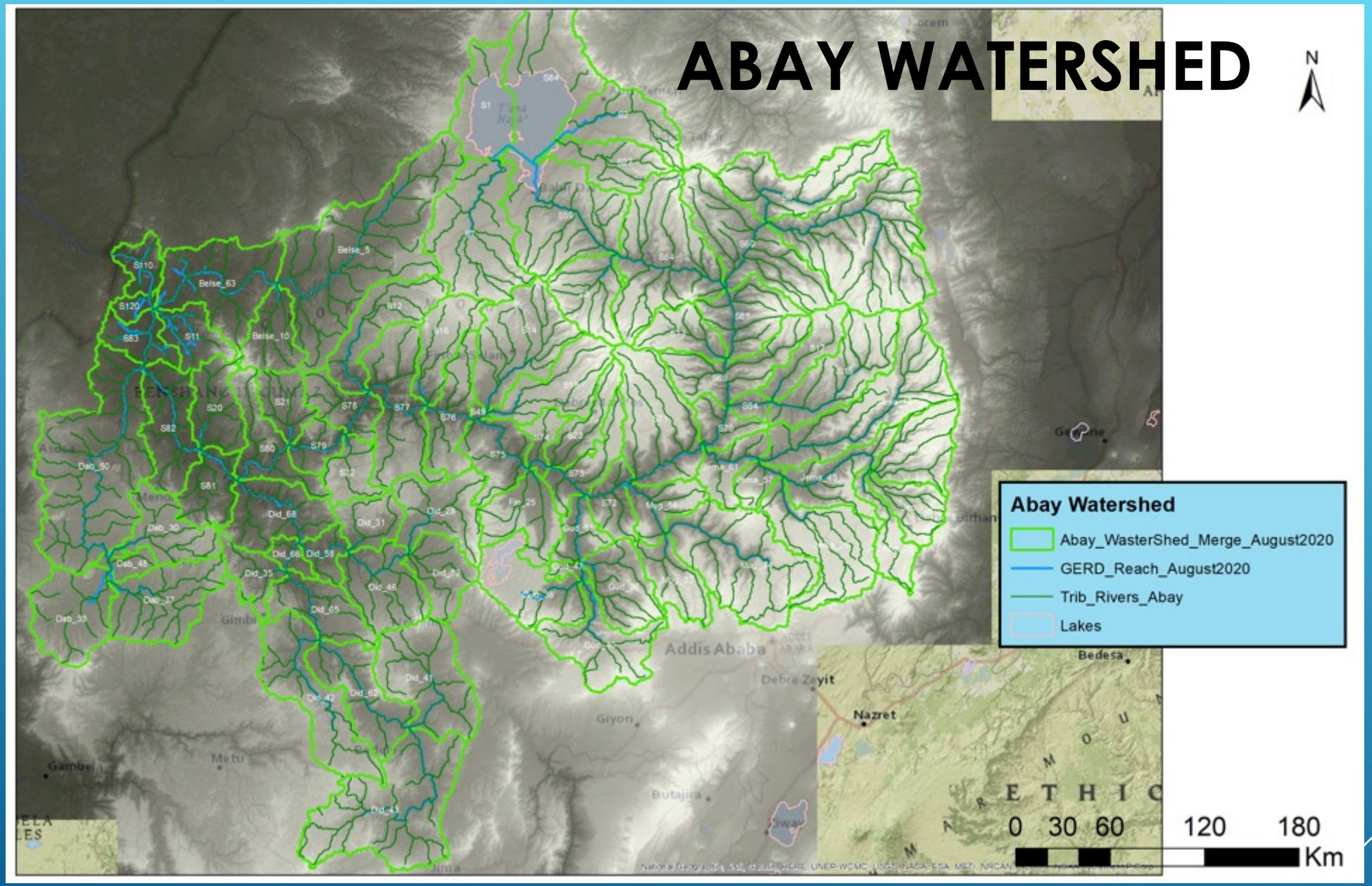


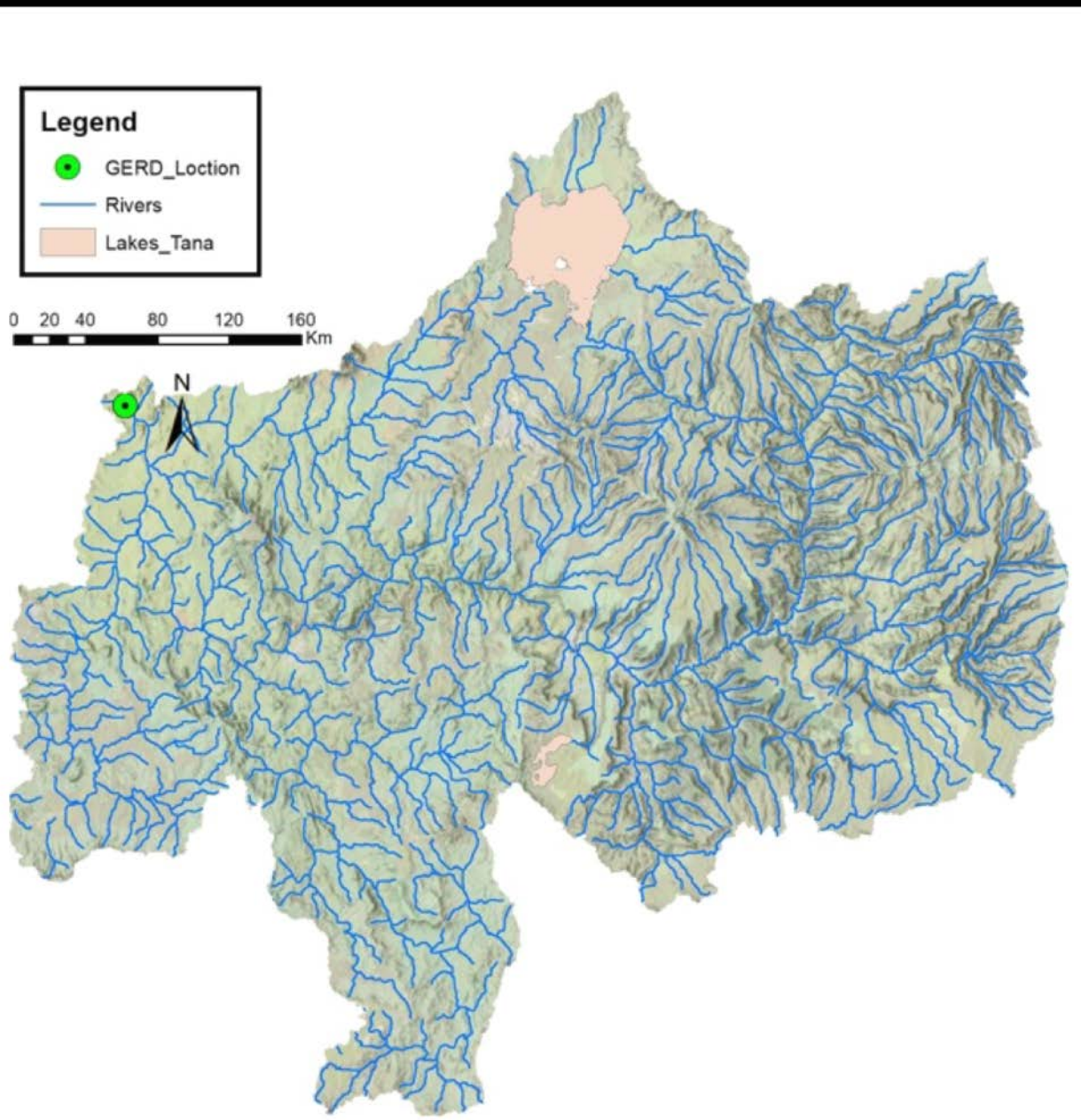


Narrow Section	1,000 m wide
Wide Section	20,700 m
Widest Section	38,700 m

GENERAL FACTS

ABAY WATERSHED



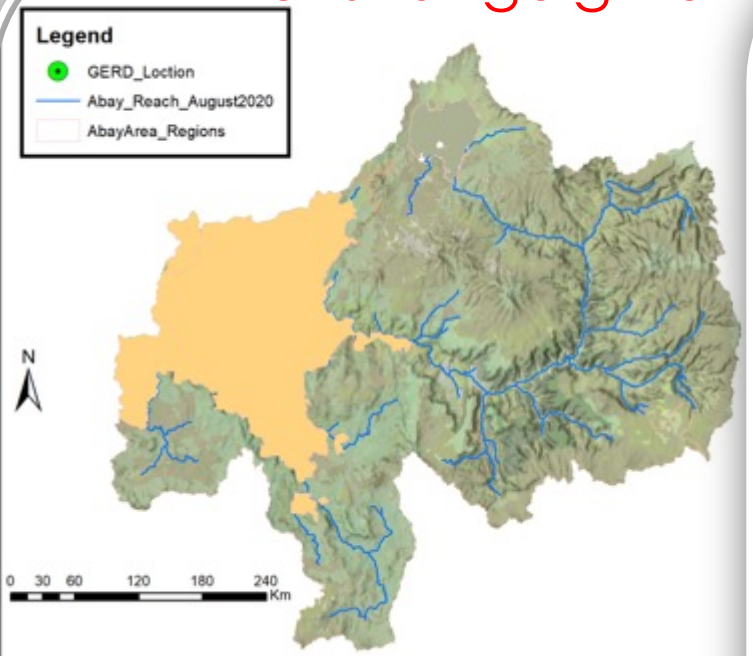


Total Drainage Area	174,436 Sq. Km
Total Stream km	18,540 Km
Percentage of stream in the basin	20%
Length of Abay main river	922 km
Average stream bed slope	14%
Regions	3
Main land use	Agriculture
Contribution to surface water	47%

ABAY WATERSHED AREA BY REGION

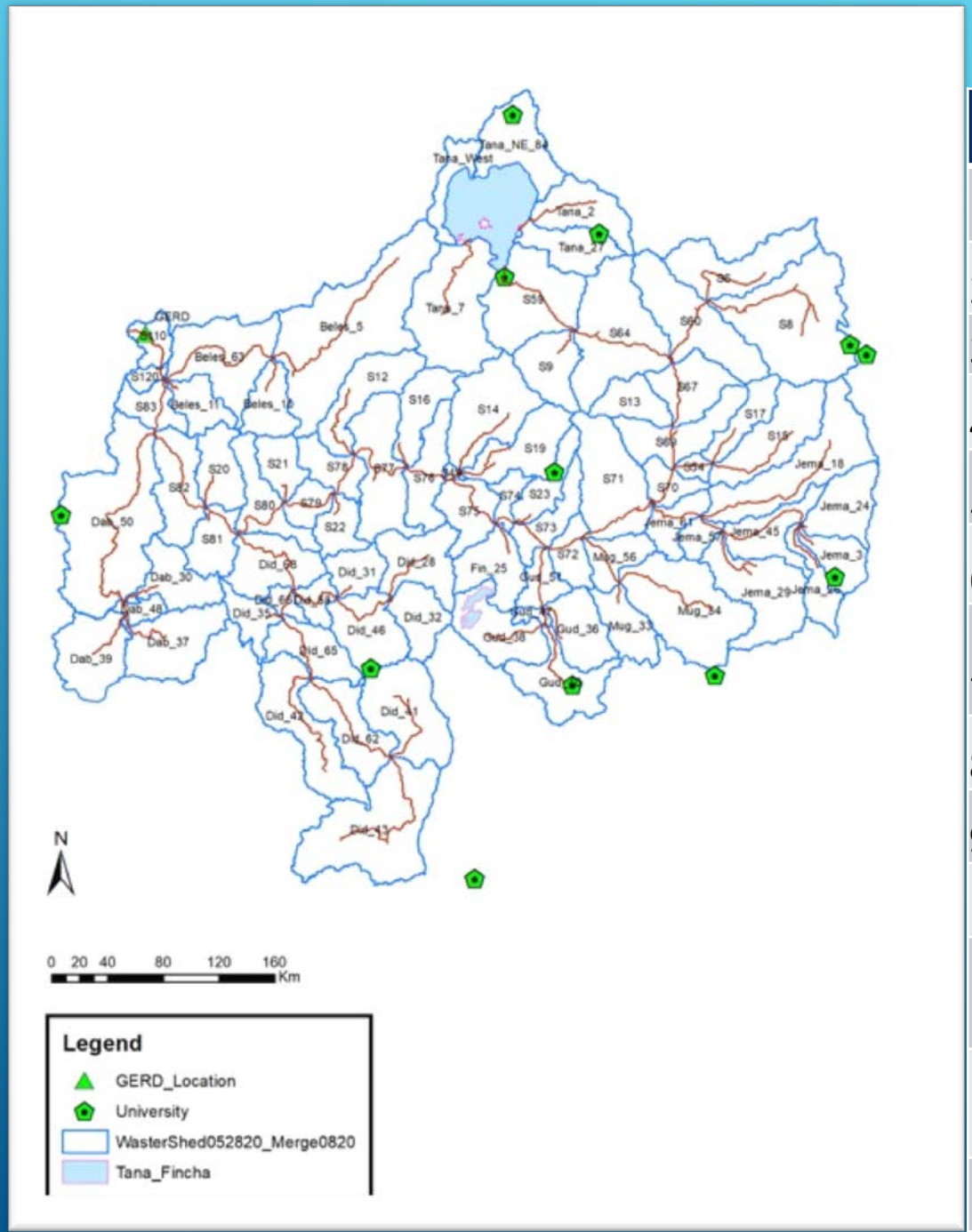
Amhara

Benshangulgmuz



Oromia

Region	Drainage Area, Sq. Km	Percentage
Amhara	78,506	44.2%
Oromia	64,016	36.0%
Benshangulgmuz	35,184	19.8%



UNIVERSITIES IN THE BASIN

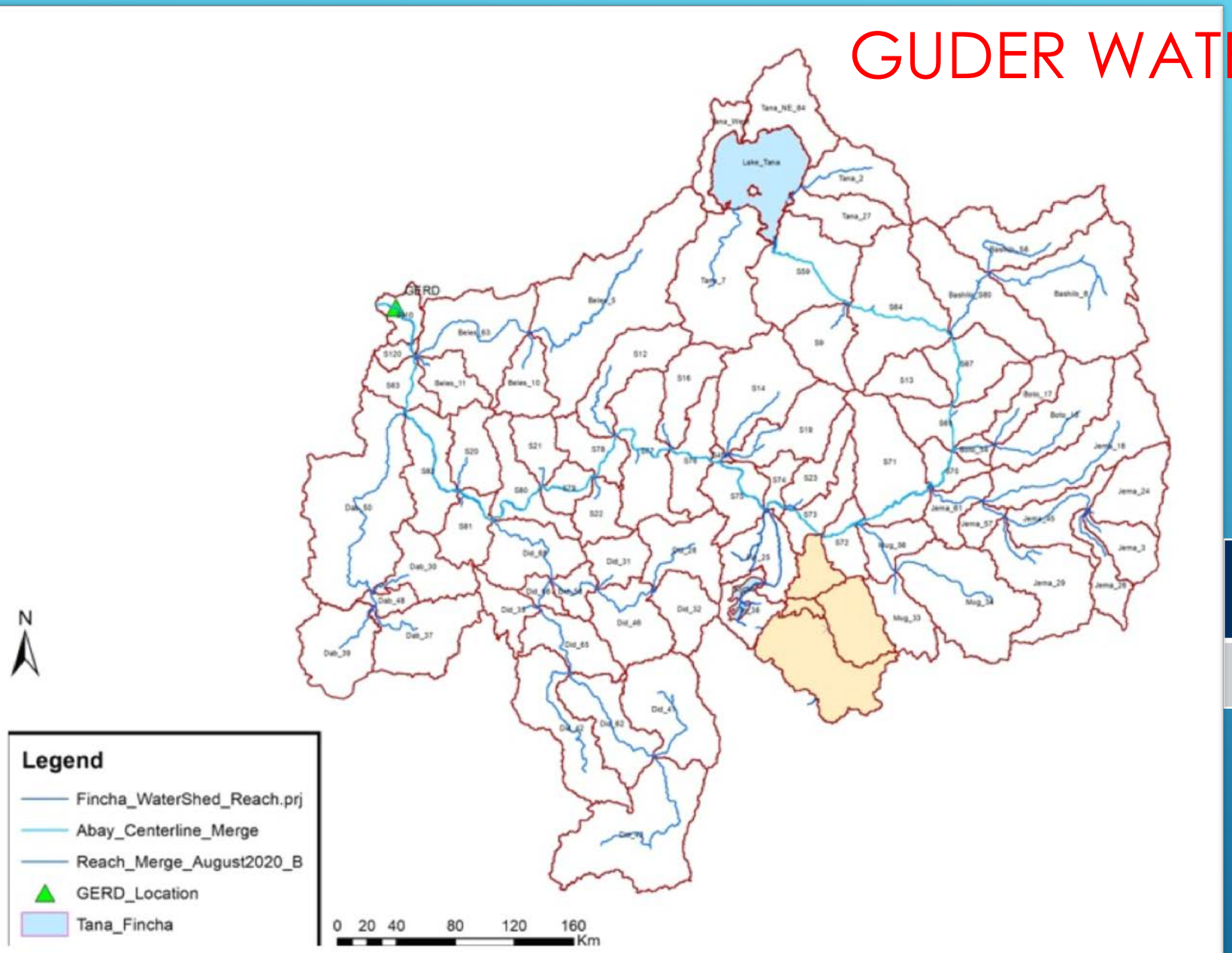
	Name	City	Region
1	Gonder University	Gonder	Amhara
2	Bahir Dar University	Bahir Dar	Amhara
3	Debre Tabor University	Debre Tabor	Amhara
4	Debre Markos University	Debre Markos	Amhara
5	Wolo University	Dese	Amhara
6	Welega University	Nekemte	Oromia
7	Assosa University	Asosa	Benishangul Gumuz
8	Ambo University	Ambo	Oromia
9	AAU University	Addis	Ababa Ababa
10	Jimma University	Jimma	Oromia
11	Debre Berhan University	Debre Berhan	Amhara
12	Kombolcha Institute of Technology	Kombolcha	Amhara
13	Woldia University	Woldia	Amhara

ESTIMATES OF SEDIMENT DEPOSITION IN GERD

- Study done by Ebabu, Kindiye et al. 2018 **Analyzing the variability of sediment yield: A case study from paired watersheds in the Upper Blue Nile basin, Ethiopia**
- **Reported sediment yield (wash off) of with a range 7.6 ton/ha to 71.2 ton/ha for the 2014 and 2015 year. The study was done in the Guder Watershed**

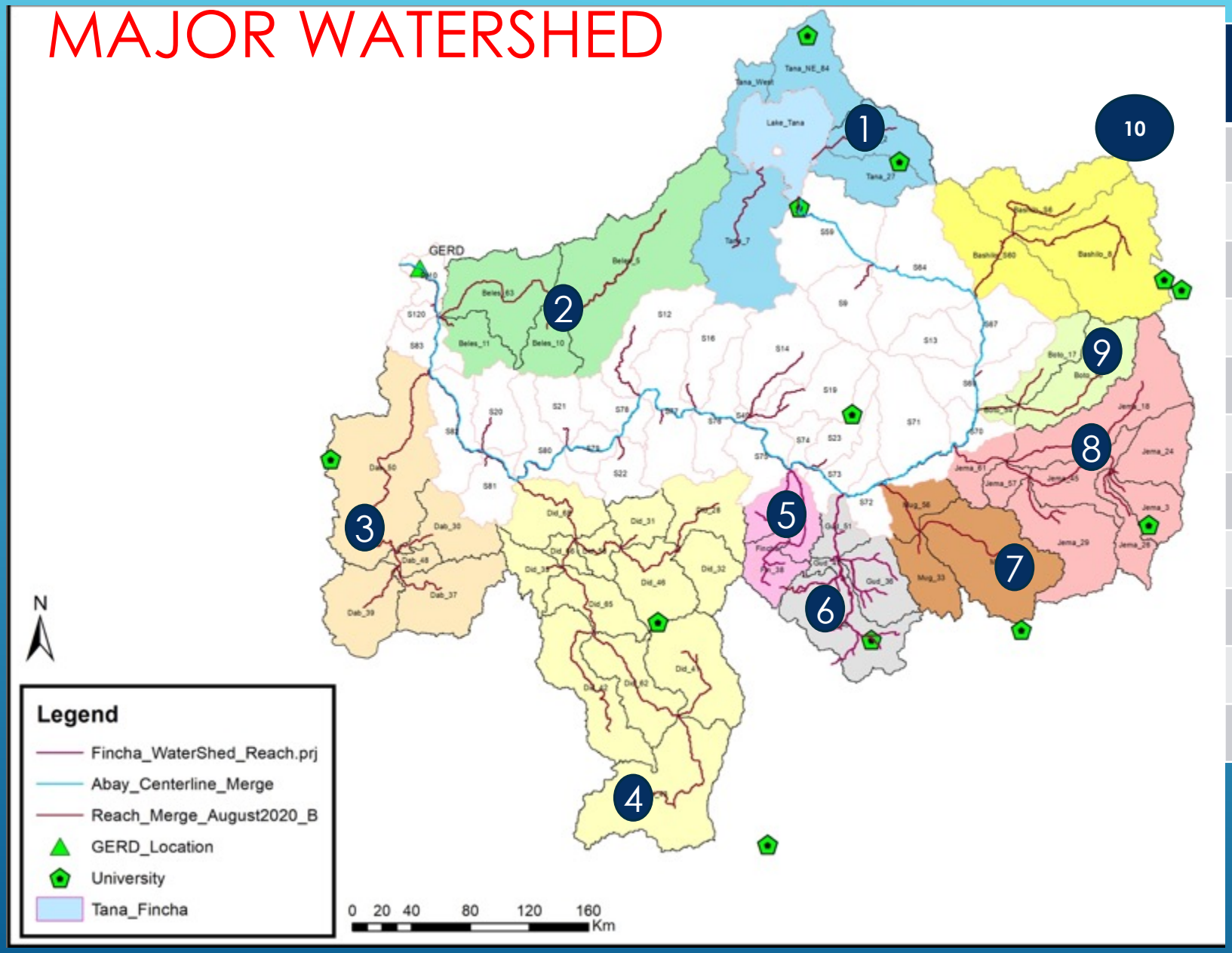
Volume of GERD lost to Sediment deposition			With Target ton/ha
	71.2 ton/ha	7.6 ton/ha	5 ton/ha
100-year	57%	6%	4%
50-year	29%	3%	2%
20-year	11%	1%	0.4%

GUDER WATERSHED



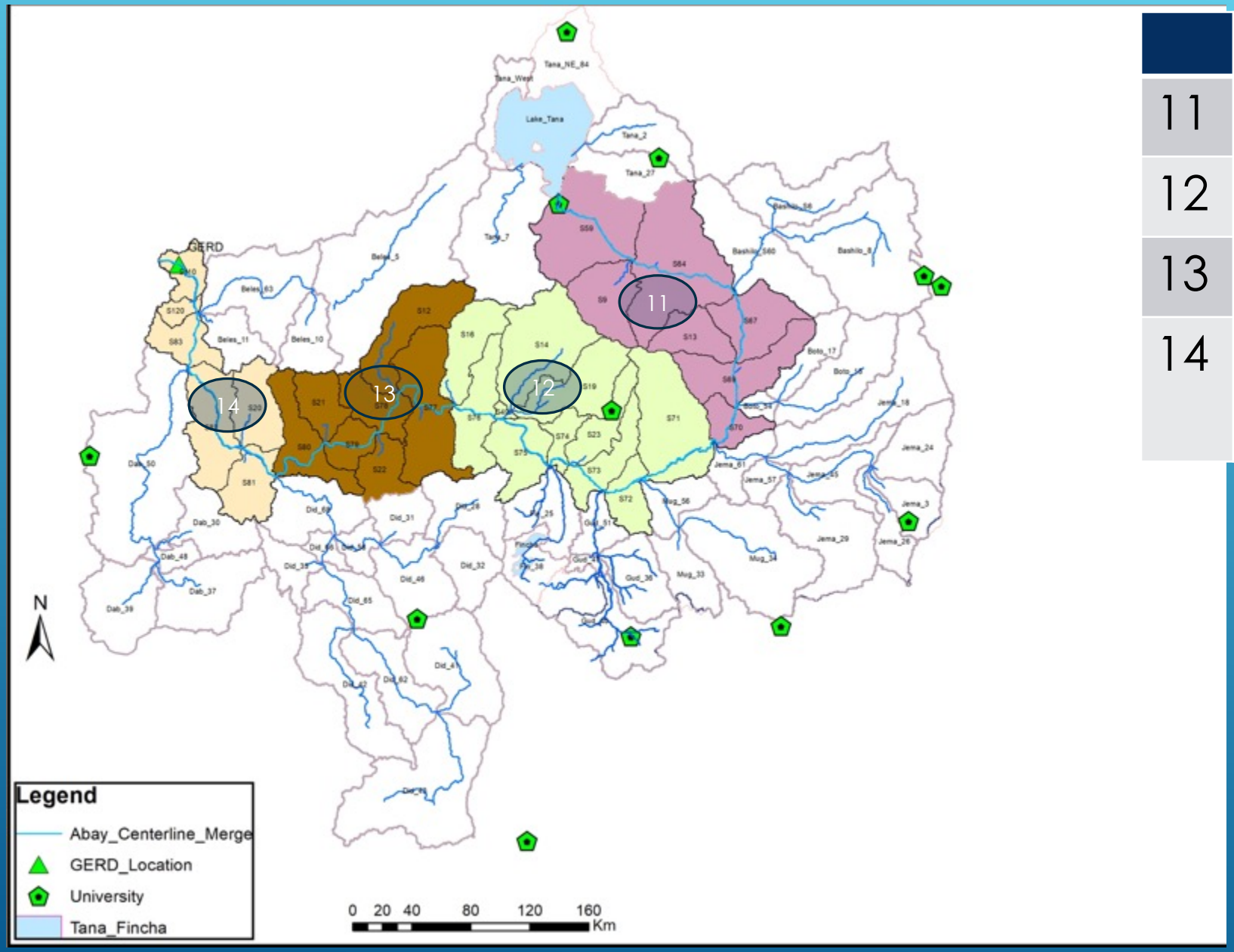
Guder	Drainage Area, Sq. Km
	5,467

MAJOR WATERSHED



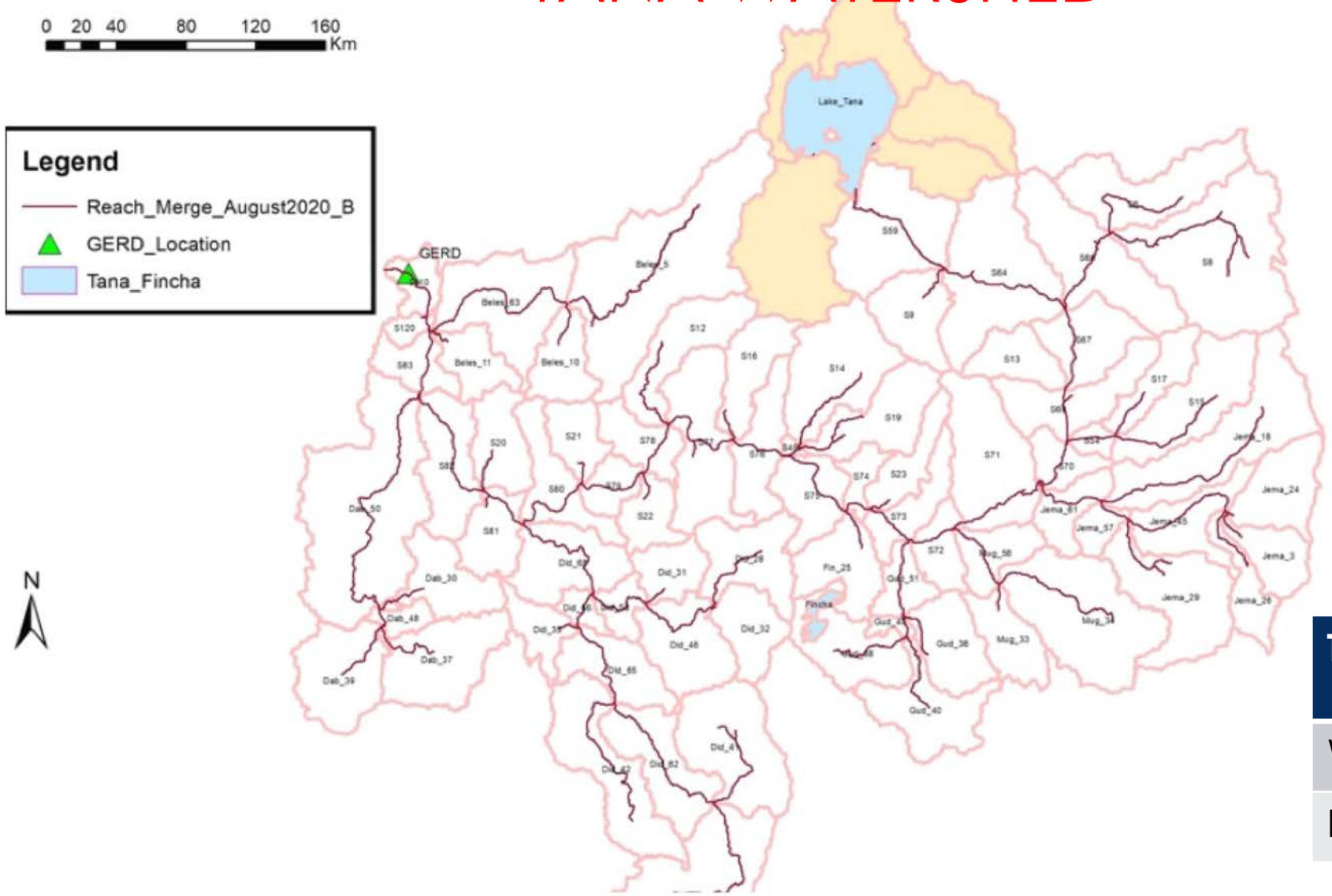
		Area, Sq.. Km
1	Tana	**11,519**
	Lake Tana	**3,045**
2	Belse	**13,605**
3	Dabus	**14,774**
4	Didessa	**28,163**
5	Fincha	**3,198**
6	Guder	**6,539**
7	Muger	**7,324**
8	Jema	**15,338**
9	Boto (Sotola)	**4,470**
10	Bashilo	**12,204**

MAJOR WATERSHED CONT.



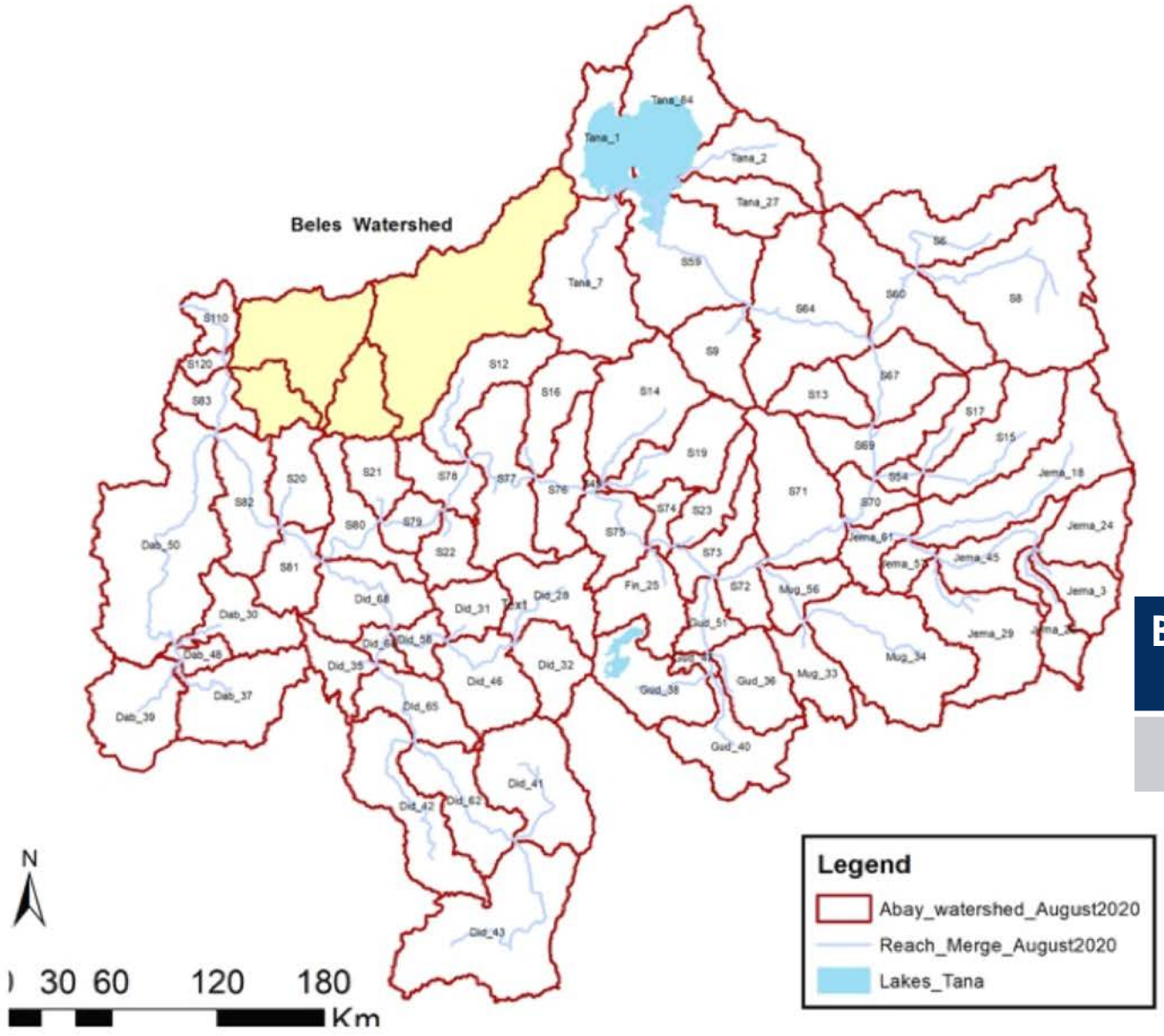
11	Upper Abay
12	Middle I Abay
13	Middle II Abay
14	Lower Abay (Reservoir Area)

TANA WATERSHED



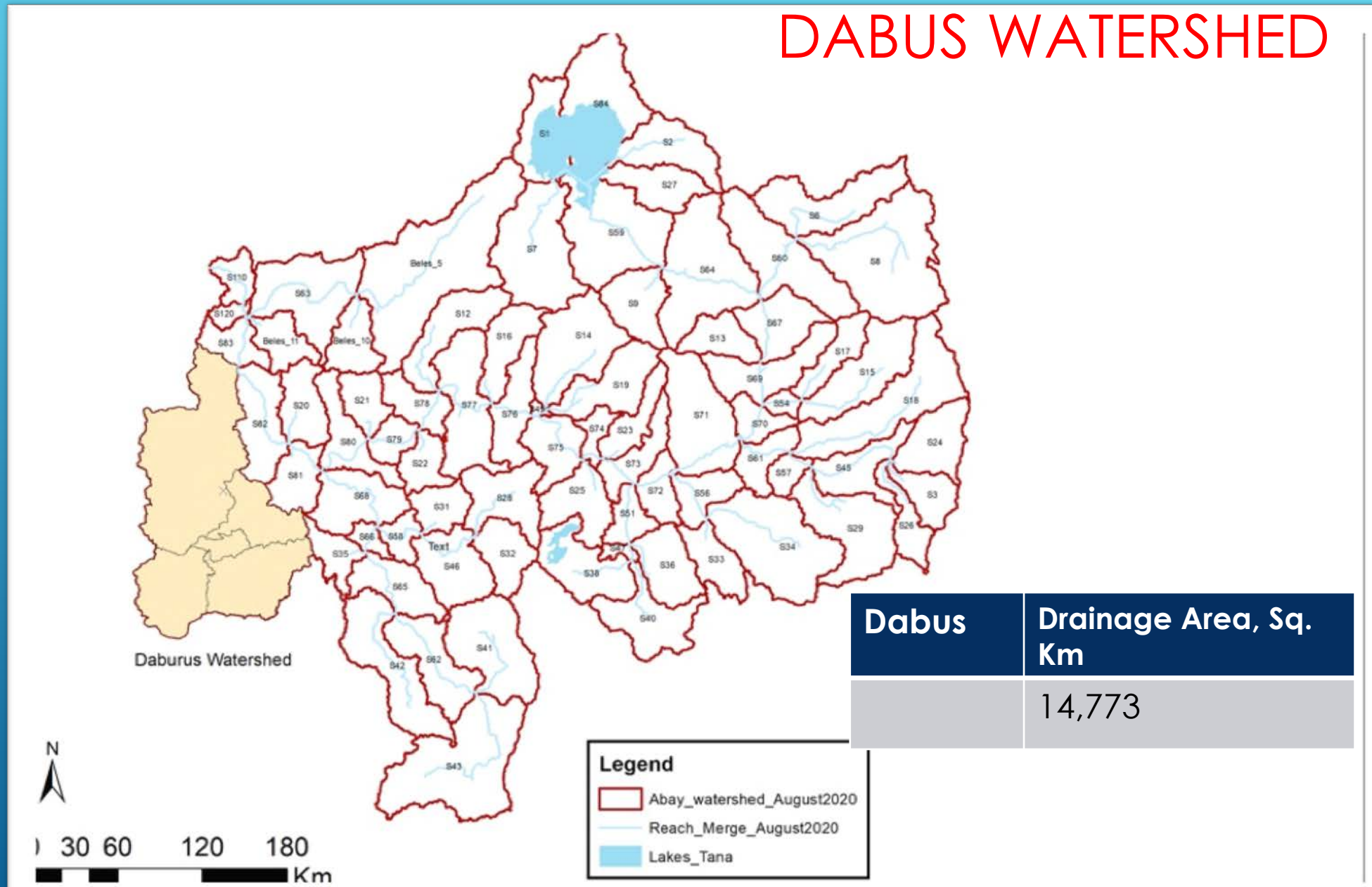
Tana	Drainage Area, Sq. Km
Watershed	11,518
Lake Tana	3,046

BELSE WATERSHED



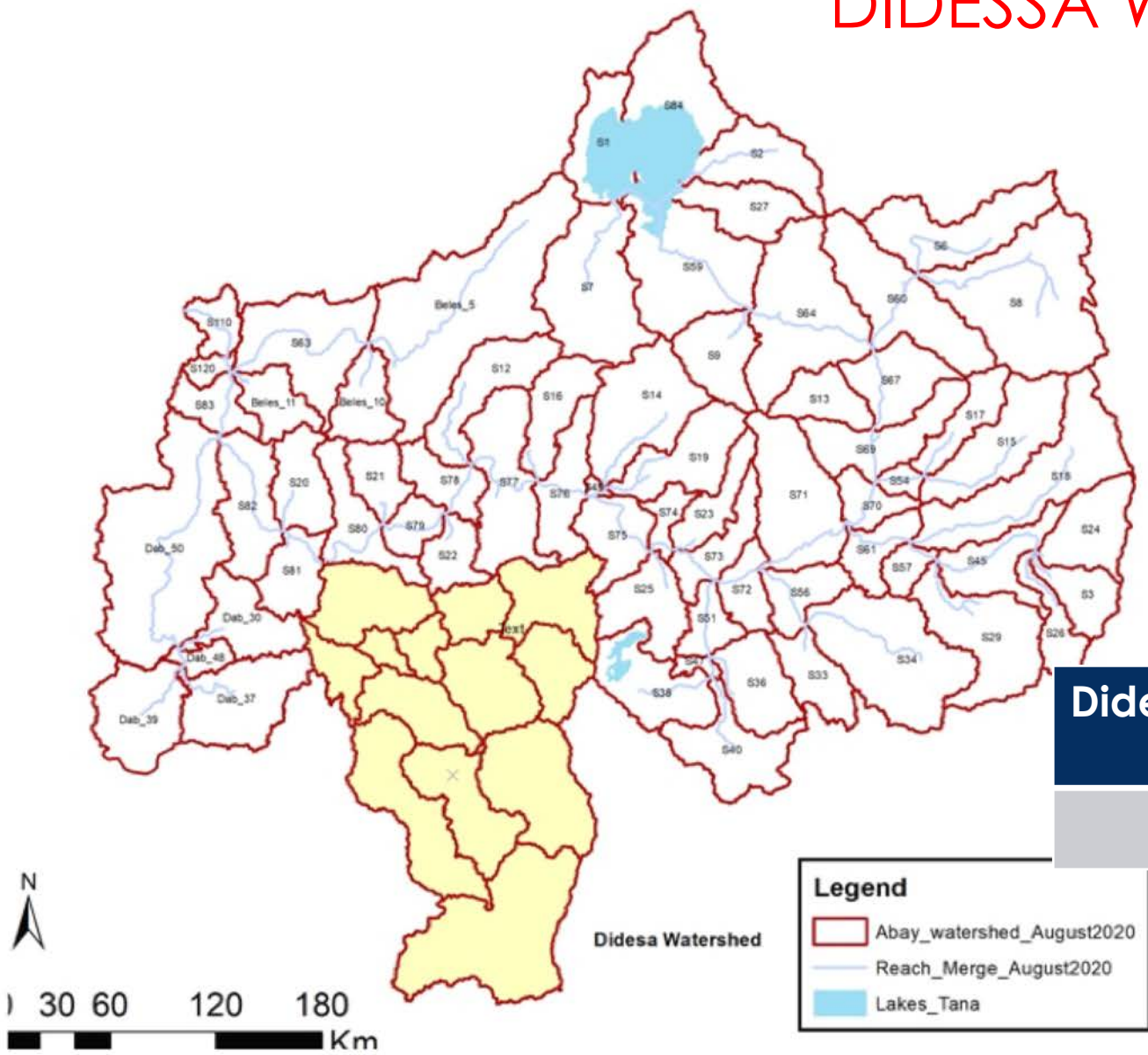
Belse	Drainage Area, Sq. Km
	13,604

DABUS WATERSHED



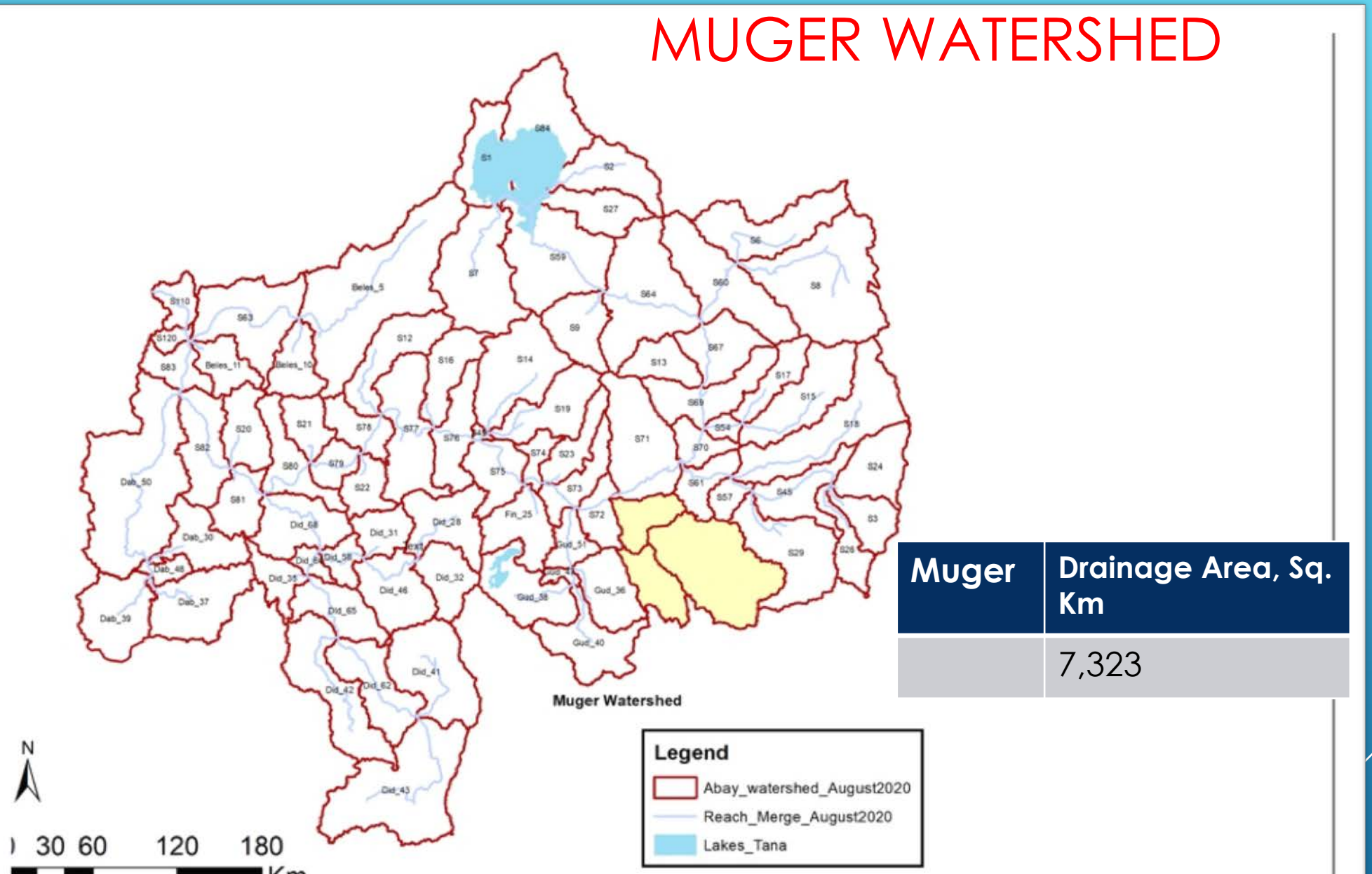
Dabus	Drainage Area, Sq. Km
	14,773

DIDESSA WATERSHED



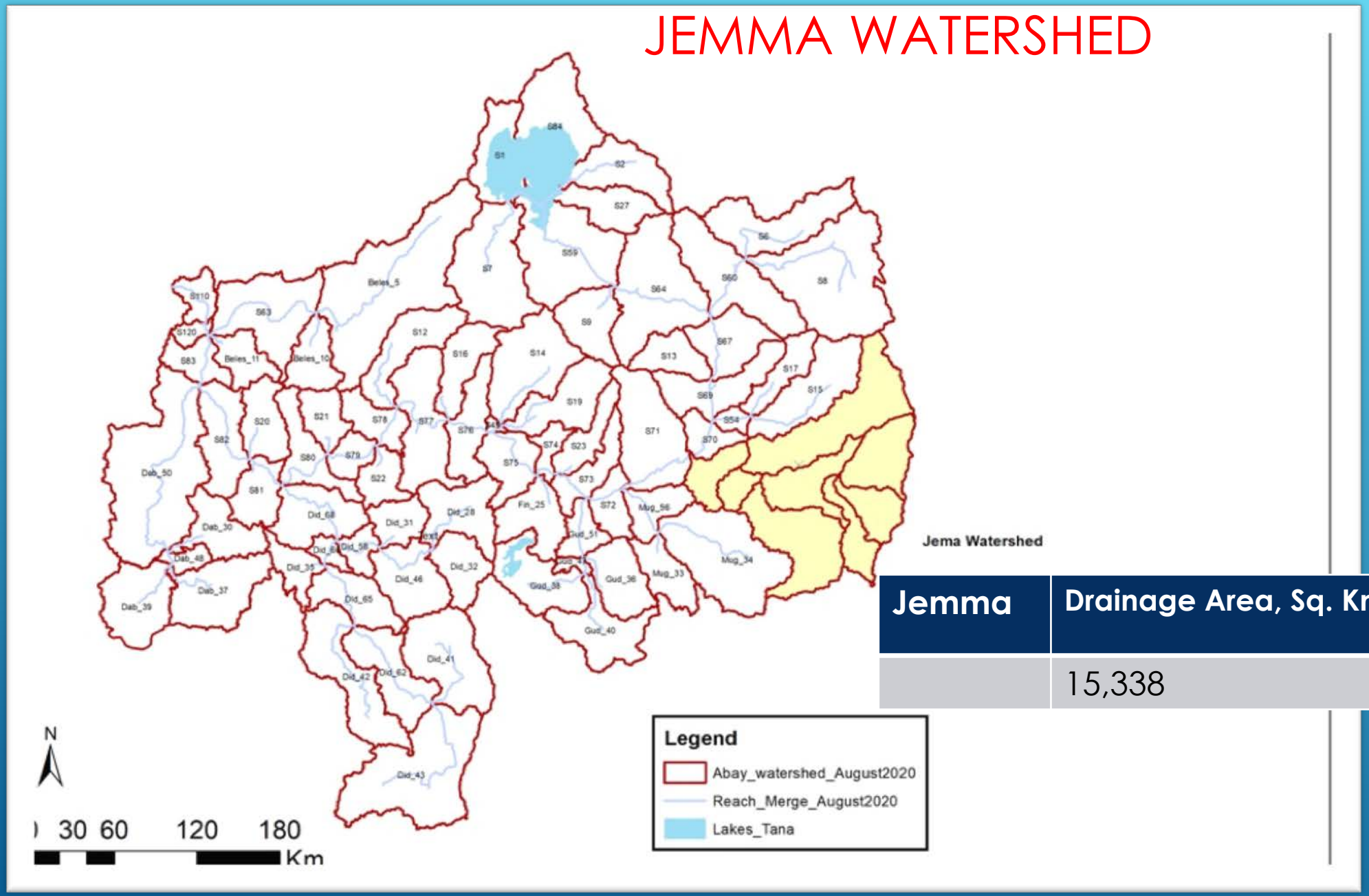
Didessa	Drainage Area, Sq. Km
	28,163

MUGER WATERSHED



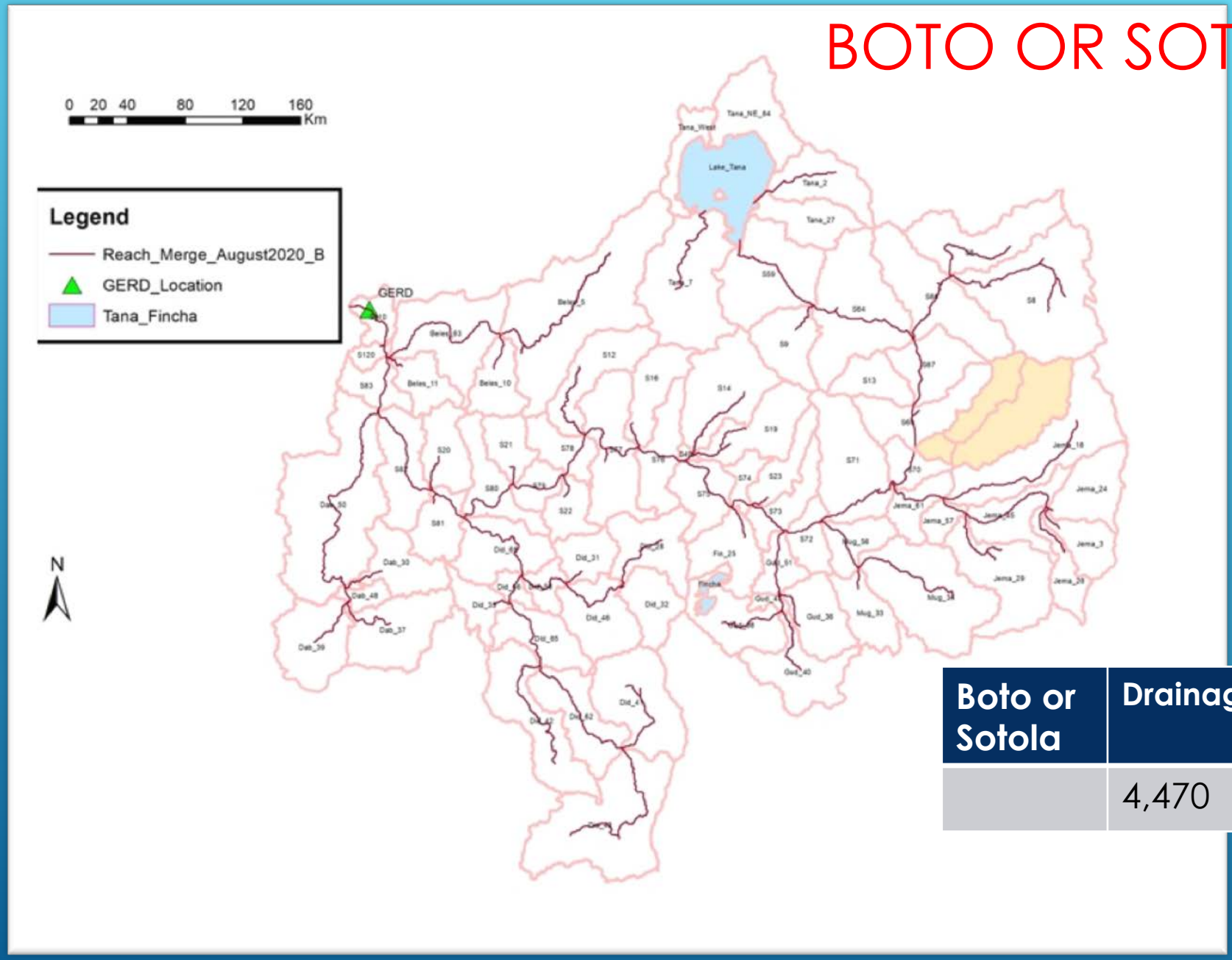
Muger	Drainage Area, Sq. Km
	7,323

JEMMA WATERSHED



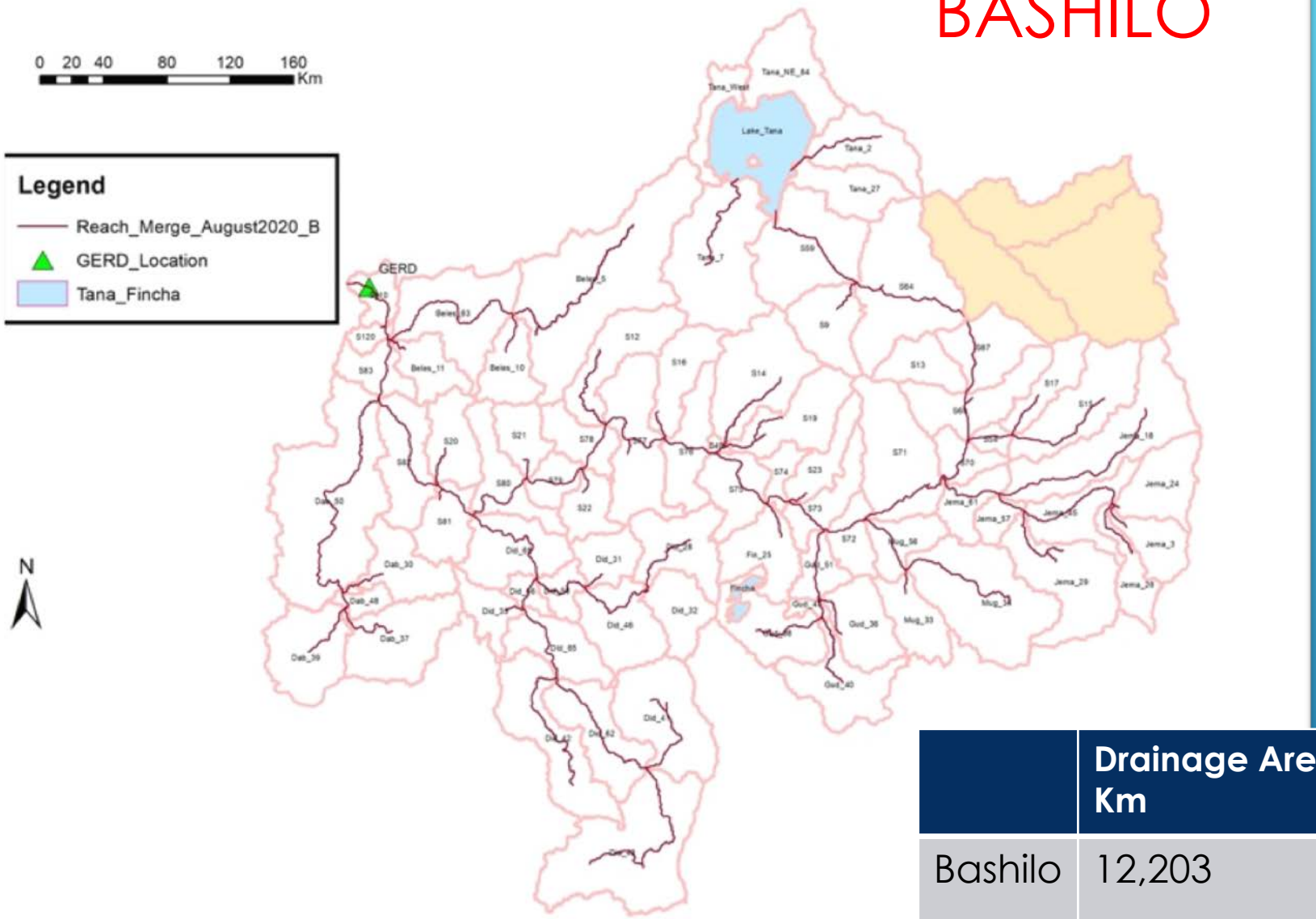
Jemma	Drainage Area, Sq. Km
	15,338

BOTO OR SOTOLA



Boto or Sotola	Drainage Area, Sq. Km
	4,470

BASHILO



	Drainage Area, Sq. Km
Bashilo	12,203

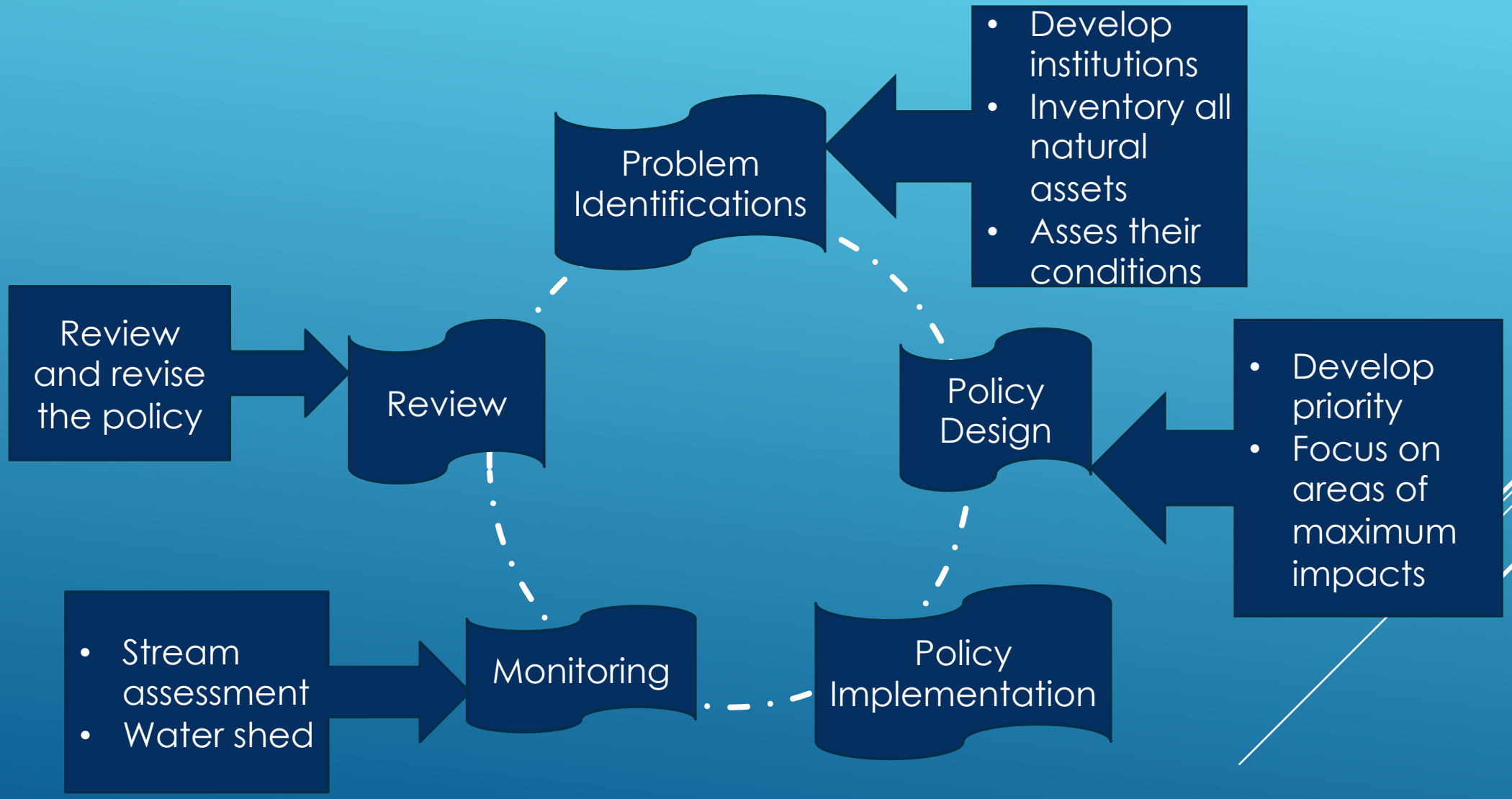
CHALLENGES BEYOND THE FILLING OF THE GERD

- Institutions to coordinate various critical tasks, a few are listed below:
- Inventory of water and other natural assets including the conditions of the assets Responsibility: Regional and Federal
- Develop basin wide soil and water management strategies,
- Responsibility: Federal and Reginal in collaboration with other institutions
- Develop basin wide hydrology and hydraulic models,
- Responsibility: Federal and Universities
- Develop reservoir operation and management models,
- Responsibility Federal
- Devise actionable tasks that could be implemented in the Regional, Zonal Administration level,
- Responsibility: Regional
- Explore financing options to undertake focused and targeted watershed management projects in the basin,
- Responsibility: Federal

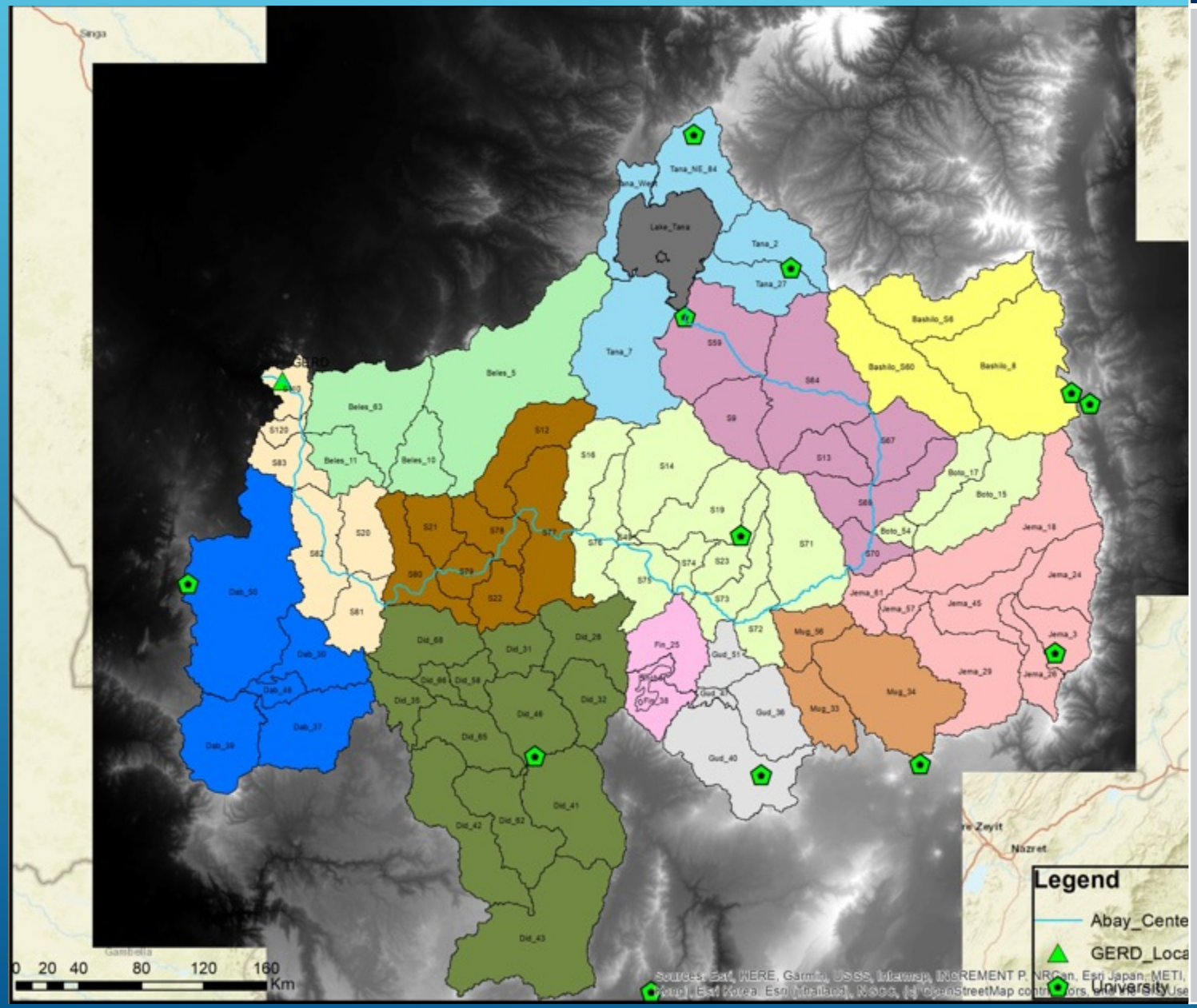
PROCESS

- Develop resource account and identify problems
- Institutional building
- Policy design
- Policy implementations
- Monitoring
- Review

DEVELOP INVENTORY OF ASSETS: PROCESS



SUMMARY



Recommendations

- Develop a systematic stream and watershed designation or naming system
- Inventory of water and other natural assists including the conditions of the assets
- Quantify Stream km
- Asses physical conditions of streams
- Conditions of the biological habitats of the streams
- Existing watershed land use and management
- Develop information clearing house (a site for information exchange)

QUESTIONS?