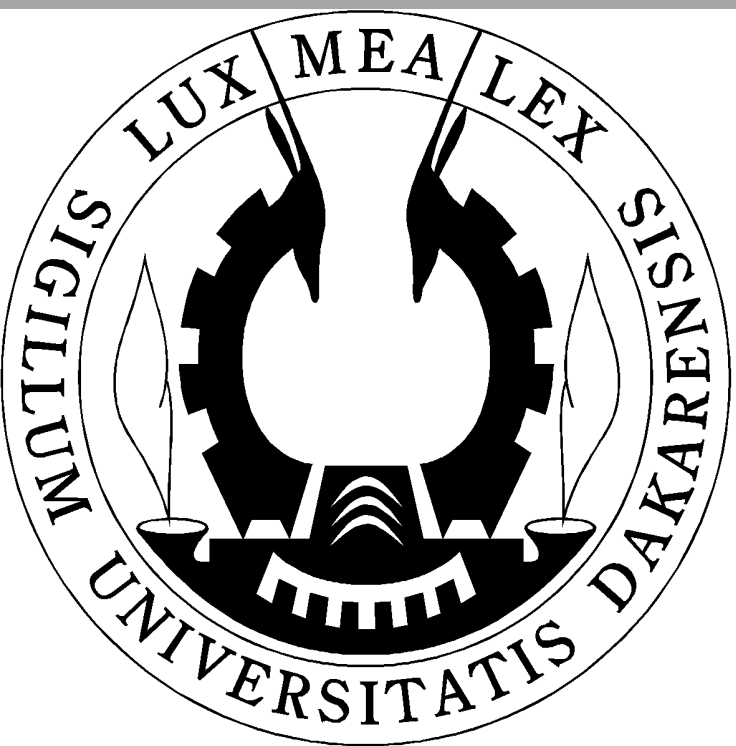




Vulnerability of water resources to climate change in the Saloum River Delta, Senegal (West Africa)



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1. Introduction

West Africa is among the most vulnerable regions to climate change. This the case of the Saloum region (Senegal), characterized by a very salty 'reverse' estuary and limited fresh water resources for the supply of its 618, 674 residents living in 23 rural districts. The salinity of the river gradually increases from upstream to downstream with a maximum of 110‰ in Kaolack (upstream). Groundwater supplies the population through boreholes and wells. 95% of water consumption is based on the water table of the Continental Terminal (CT). The area of salt land is very large, about 3.089 Km².

2. Objectives

The main objective of this paper is to analyze the vulnerability of water resources to climate change in the Saloum River Delta area.

1. Identify the potential future impacts of climate change on water resources in the horizon 2050 ;
2. Identify adaptation options that can make water resources and the sectors/users that depend on them more resilient to the impacts of projected climate change.

3. Methods

To this end, multi model ensemble mean based on 24 bias-corrected global climate models participating in the CMIP5 has been used following the RCP4.5 and RCP8.5 scenario pathways by mid-century (2021-2050) compared to the 1976-2005 reference period, were used to estimate the potential evapotranspiration, the effective rain, the water balance and the effective water recharge. In order to characterize the sensitivity of water resources to climate change, statistical trend analyses and Geographic Information System (SIG) were used to assess the following indicators: renewal water reserve, water demand dynamics and water quality evolution.

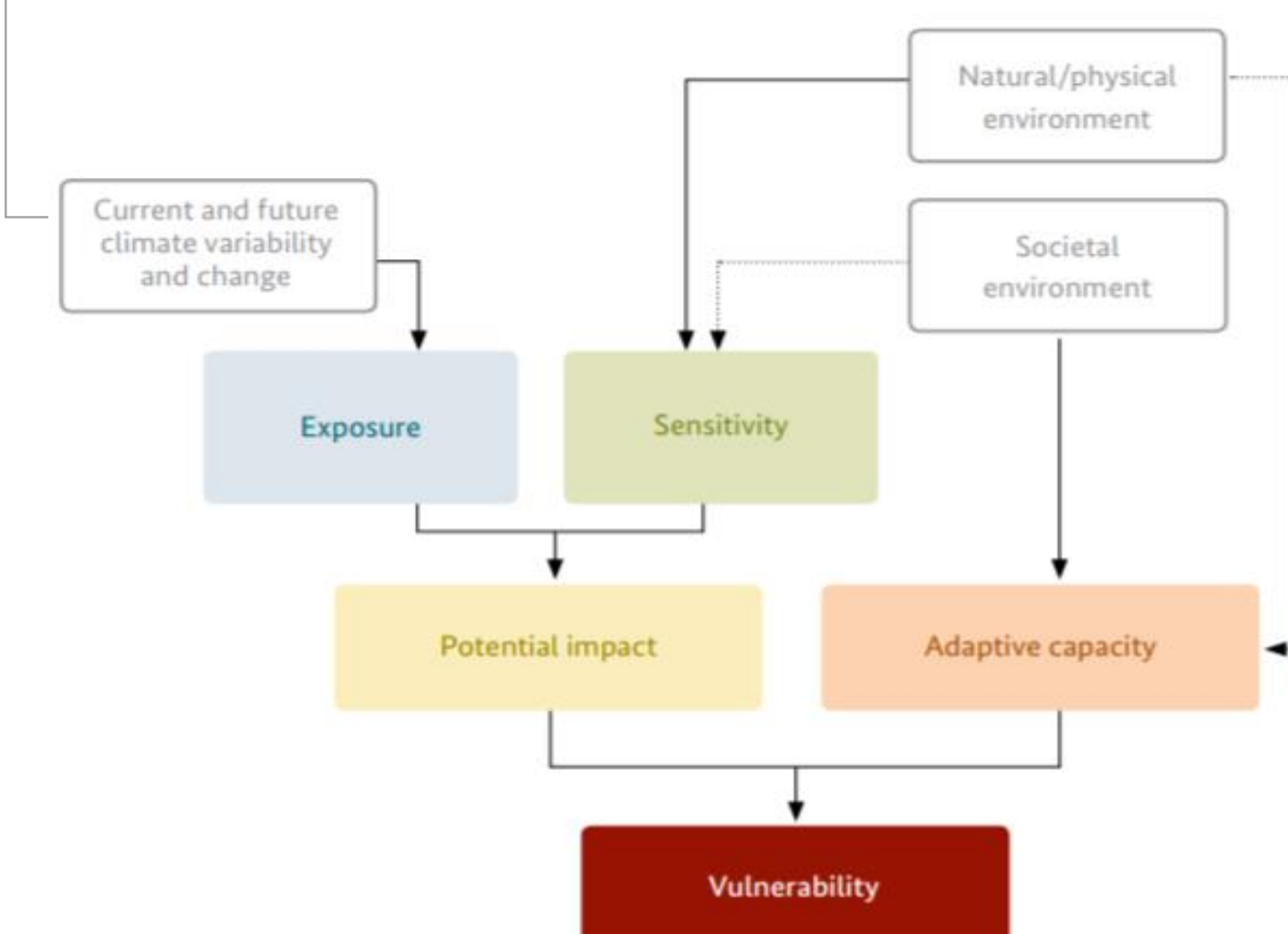


Figure 3: Chain of impacts according to IPCC AR4
Source: adelphi/EURAC 2014

6. Conclusion

The vulnerability of water resources to climate change in the horizon 2050 is **very high** in the Fatick region

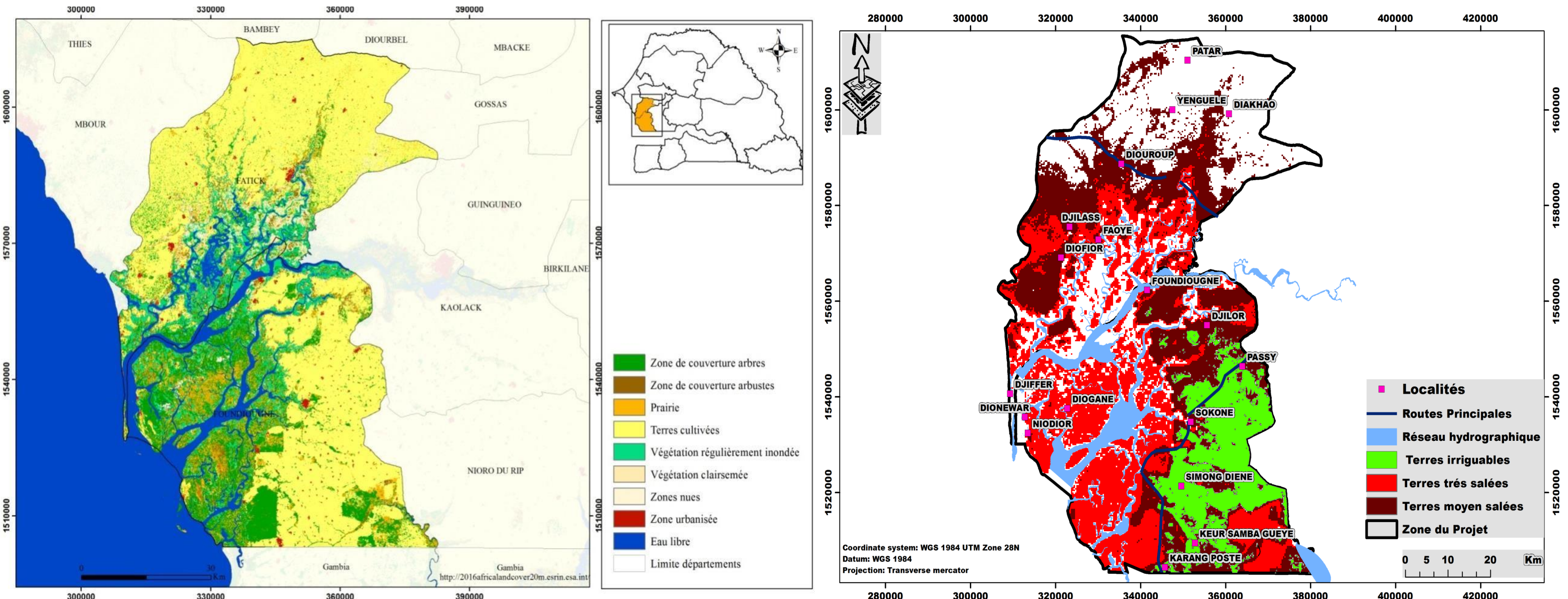


Figure 1 : Land use map (<http://2016africallandcover20m.esrin.esa.int/download>) Figure 2: Distribution of irrigable surfaces in the area (<ftp://ftp.soilgrids.org/data/recent/>)

4. Results

Future Exposure

Reference period (1976-2005)

- Cumulative rainfall: 561 mm
- Start of the rainy season : 03 July
- Raining season length : 92 days
- Maximum temperature : 33.8°C
- Minimum temperature: 23.7°C
- Sea level rise : 3.2 mm/an

Horizon 2035

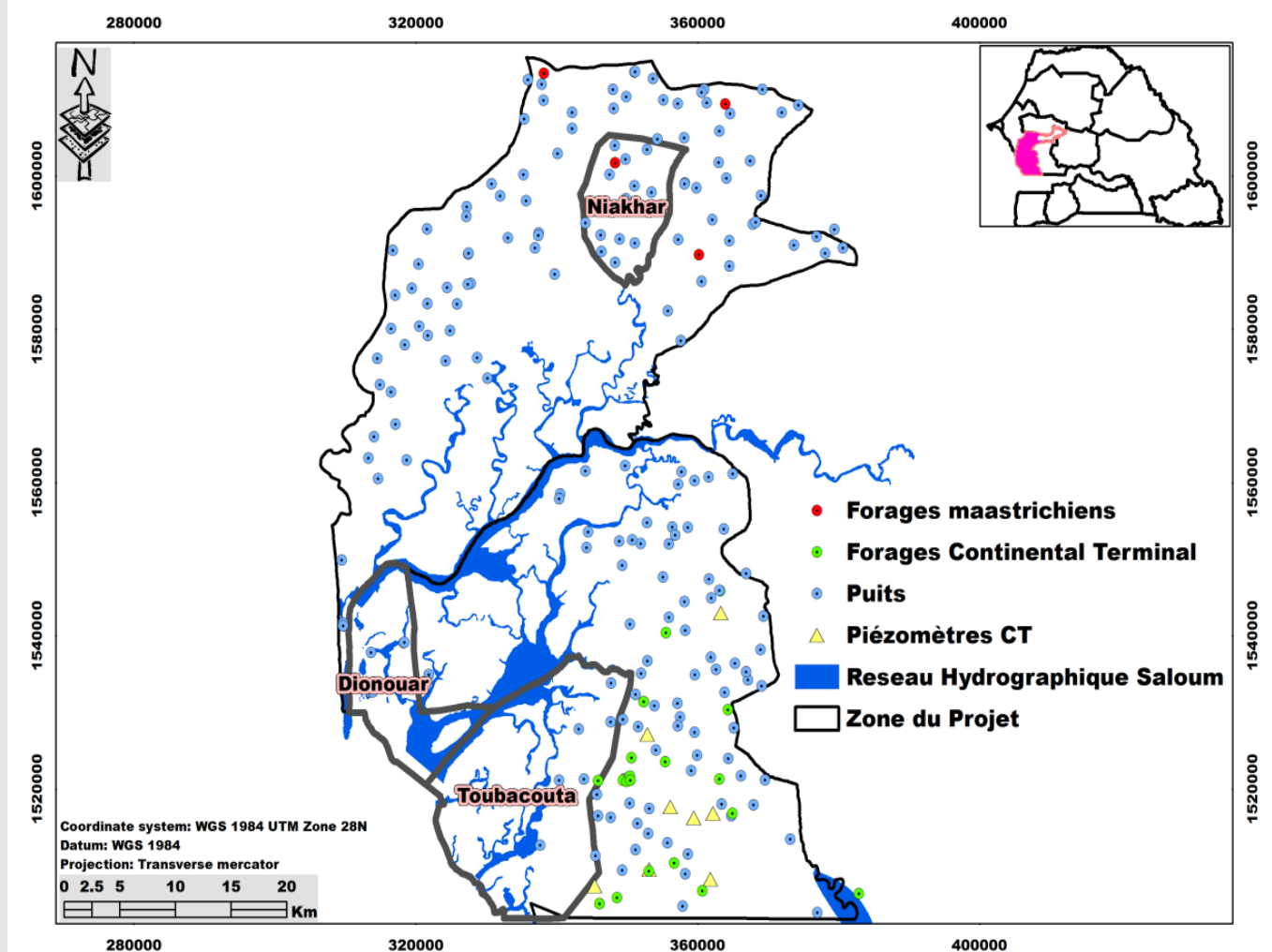
- Decrease cumulative rainfall : -15mm
- Late start of the season : 5 days
- Decrease raining season length : -6 days
- Increase maximum temperature : 0.69°C
- Increase minimum temperature : 0.77°C
- Increase sea level rise : 0.30m

Climate Change

Horizon 2050

- Decrease cumulative rainfall : -24mm
- Late start of the season : 8 jours
- Decrease raining season length : -14 days
- Increase maximum temperature : 1.78°C
- Increase minimum temperature : 1.99°C
- Increase sea level rise : 0.63m

Figure 4: Study area



Sensibility of water resources

- Decrease in surface flows by about 9% in the horizon 2035, which will intensify to around 14% in the horizon 2050 (RCP4.5 scenario)
- At 2050 horizon, renewable water reserves of the water table are likely to decrease up to 60 Mm³/year and 65 Mm³/year for RCP4.5 and RCP8.5 in Fatick respectively. In Toubacouta, the decrease in water reserves is about 156 Mm³/year under RCP4.5 and 179 Mm³/year under RCP8.5 scenario
- Water demand may increase by more than 15 Mm³/year by 2035, which will intensify by more than 40 Mm³/year by 2050
- Furthermore, the decrease in water reserves, the overexploitation of the groundwater table, the decrease of 14% in basin flows, the salinization of the land and the sea level up to 50 cm/year will impact the quality of fresh water table by marine and fluvial salt intrusion in the horizon 2050.

5. Adaptation options proposed

❖ Institutional Level

- To facilitate access to water through transfer
- To build retention basins
- To promote the treatment of non-conforming water

❖ Individual Level

- To undertake water saving measures
- To sensitize on the need for water management
- To promote GIRE and environmental management in school programs

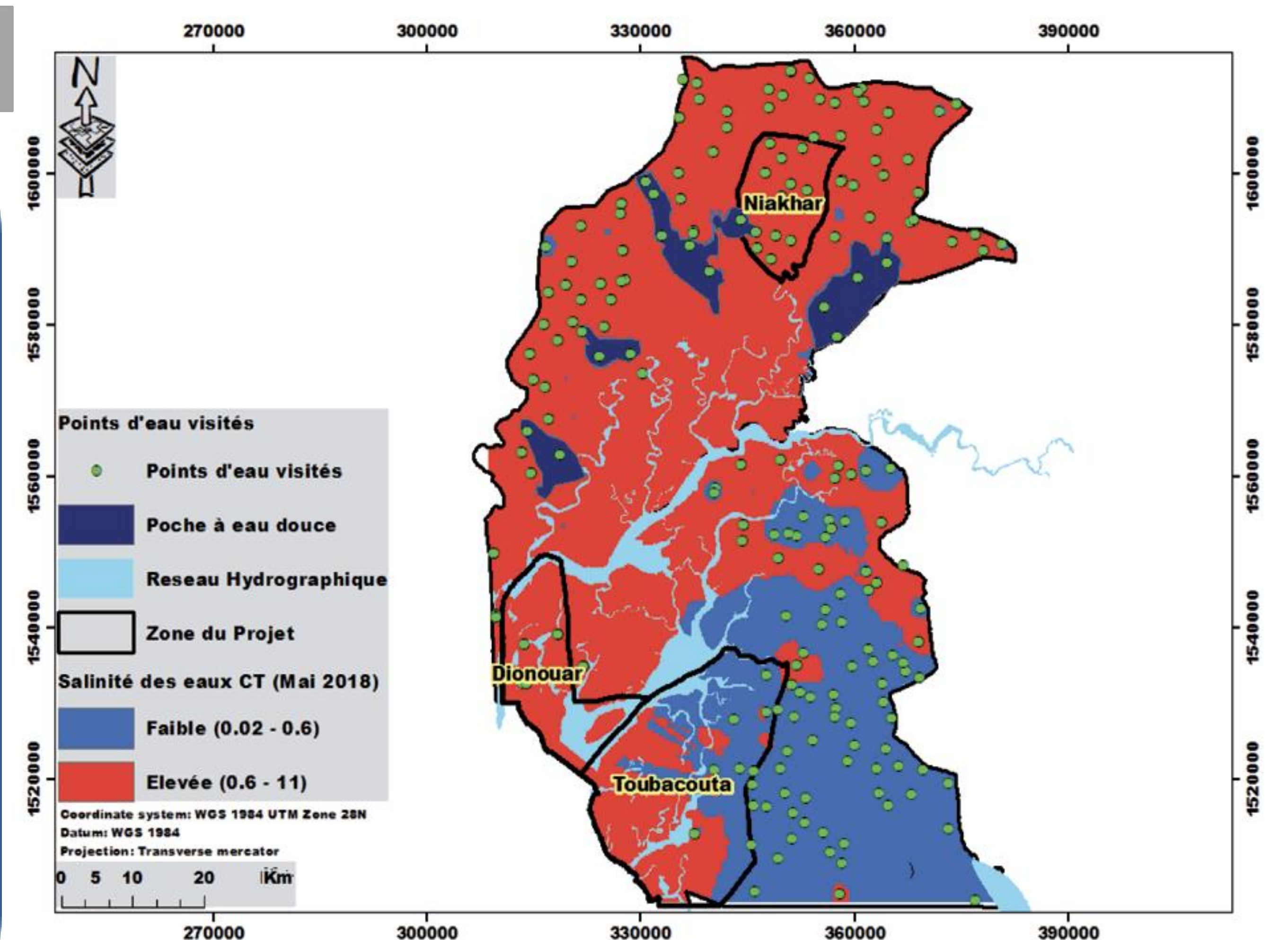


Figure 5: Groundwater salinity in May 2018

Cited Reference

BAH A., CAMARA I., NOBLET M., 2019. Evaluation de la vulnérabilité du secteur ressources en eau à la variabilité et aux changements climatiques dans la région de Fatick. Report produced under the project "Projet d'Appui Scientifique aux processus de Plans Nationaux d'Adaptation dans les pays francophones les moins avancés d'Afrique subsaharienne", Climate Analytics gGmbH, Berlin.

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