

The impact of climate change as a criterion for forest degradation in a forest dominated tropical watershed

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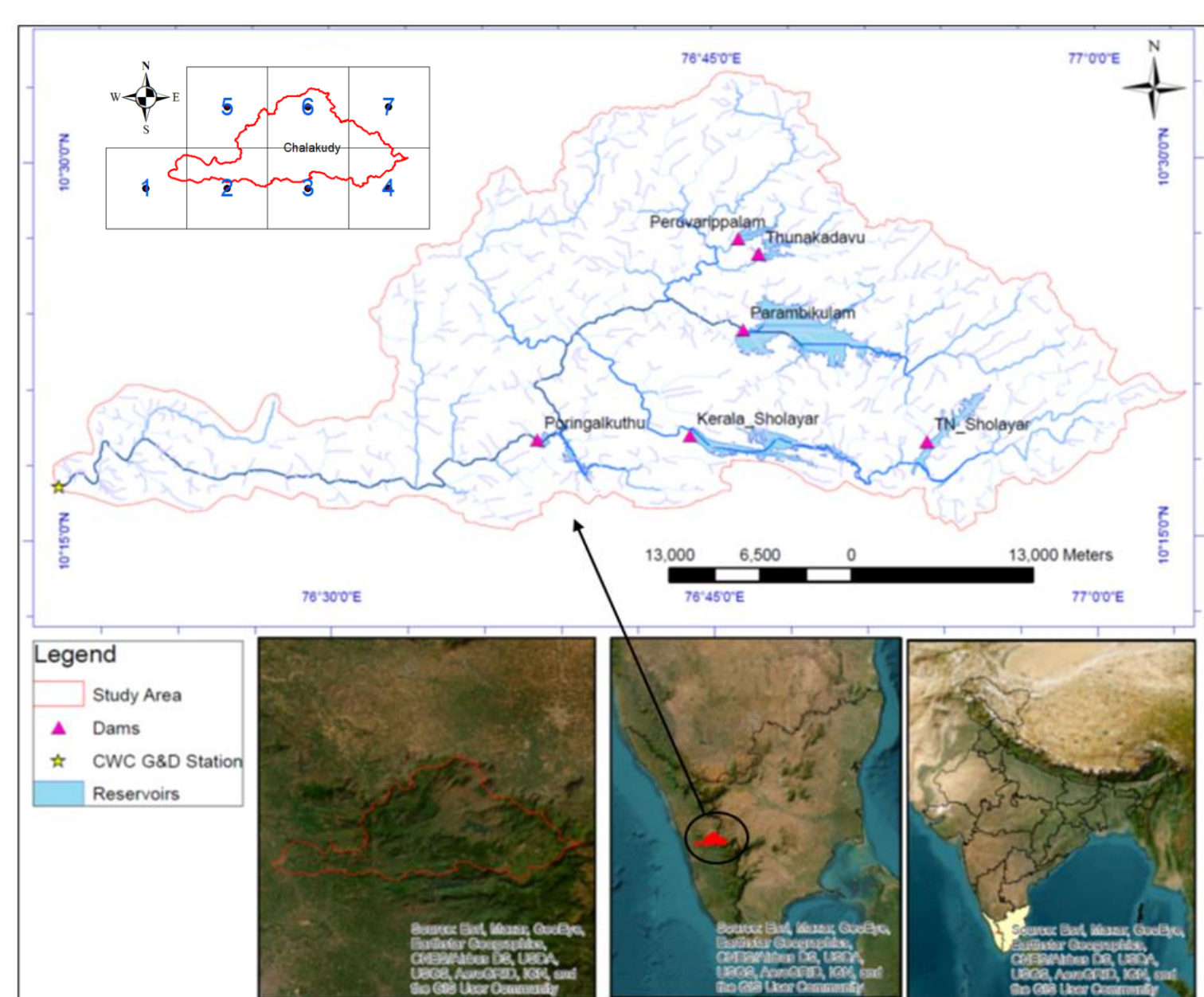
INTRODUCTION & AIM

- One of the main causes of the degradation of forest systems and the ecosystem services that they provide is climate change.
- Forest degradation is analyzed with the help of criteria and their representative indicators.
- While many criteria exist for forest degradation analysis none of them address the impact of climate change specifically.
- The need to have climate change impact assessment as a standalone forest degradation assessment criterion is highlighted with the help of bioclimatic predictors introduced by United States Geological Survey (USGS, 2012) as indicators of forest degradation.

METHOD

- Understanding the impact of climate change on forest systems requires analysis over a considerable period of time and evaluation at specific intervals in comparison with a base system of forest.
- A forest dominated watershed in the southern Western Ghats of India was selected as the study area. The year 2000-01 was considered as base period for forest degradation assessment considering the history of forest systems in the region and the climate change point analysis conducted using Mann-Kendall-Sneyers (MKS) Test.
- The assessment was conducted on 5-year periods of 2000, 2005, 2010, 2015 and 2020.
- Since the bioclimatic predictors are estimated for long term, 30 year periods of 1970-2000, 1975-2005, 1980-2010, 1985-2015 and 1990-2020 were used.
- The analysis was conducted on grids of size $0.25^0 \times 0.25^0$ based on climate data availability as shown in Figure 1.

Figure 1: Study area and grids



RESULTS & DISCUSSION

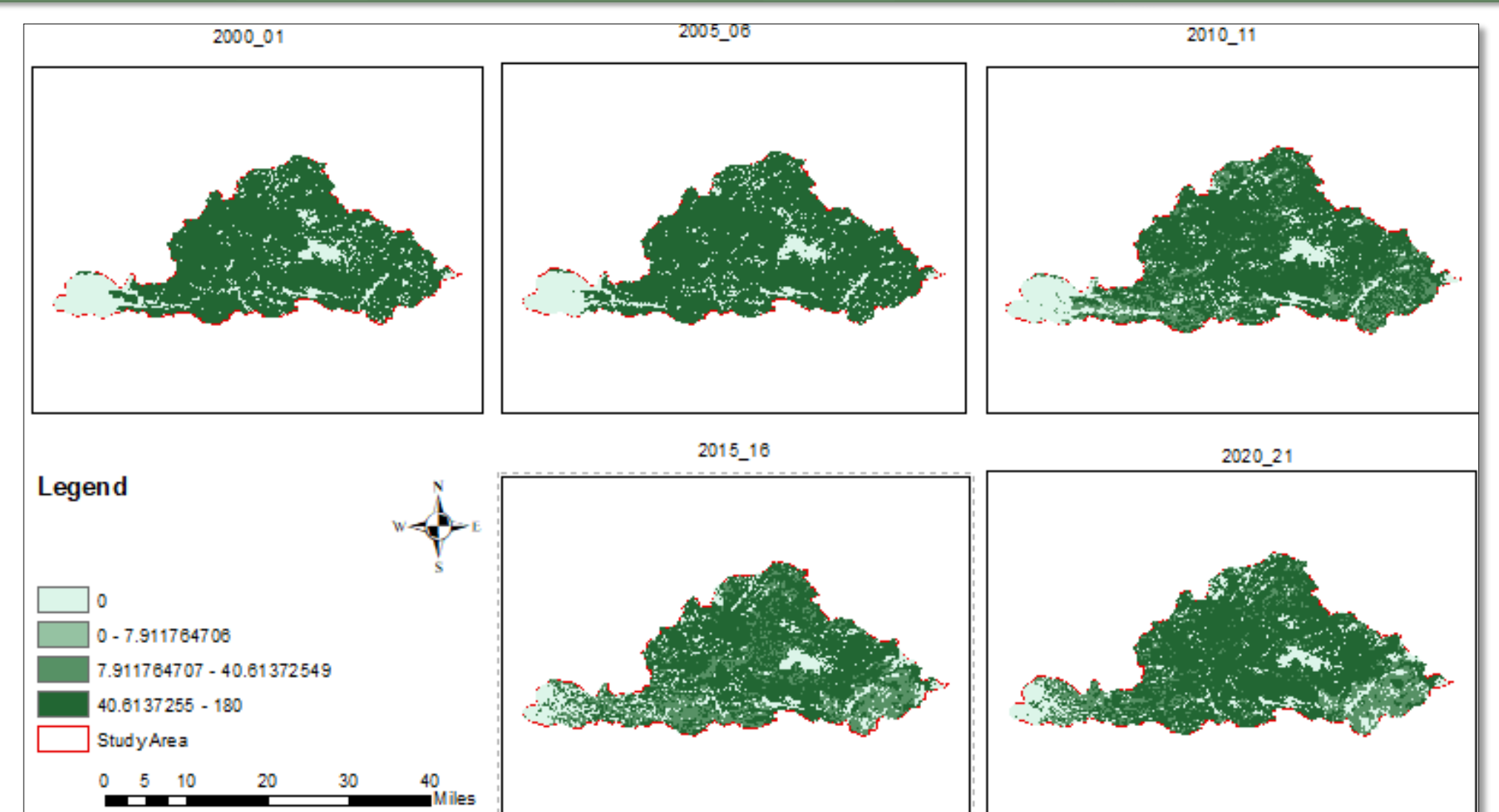


Figure 2: Above Ground Biomass estimated for the study area in 5 year periods

The above ground biomass (AGB) was calculated for the study area (see Figure 2) using forest cover data and the relationship developed by the Forest Survey of India (FSI, 2021) for the forests of India. AGB variation was analysed for correlation with bioclimatic predictors (BcP) in a 5 year periods. Out of the 19 BcPs, 07 BcPs were showing robust correlation in all the grids of the study area as shown in Figure 3.

The variation in BcPs such as Mean Temperature of driest quarter (Bio-9) and Precipitation seasonality (Bio-15) can aid in understanding degradation of forests in the study area in AGB aspect.

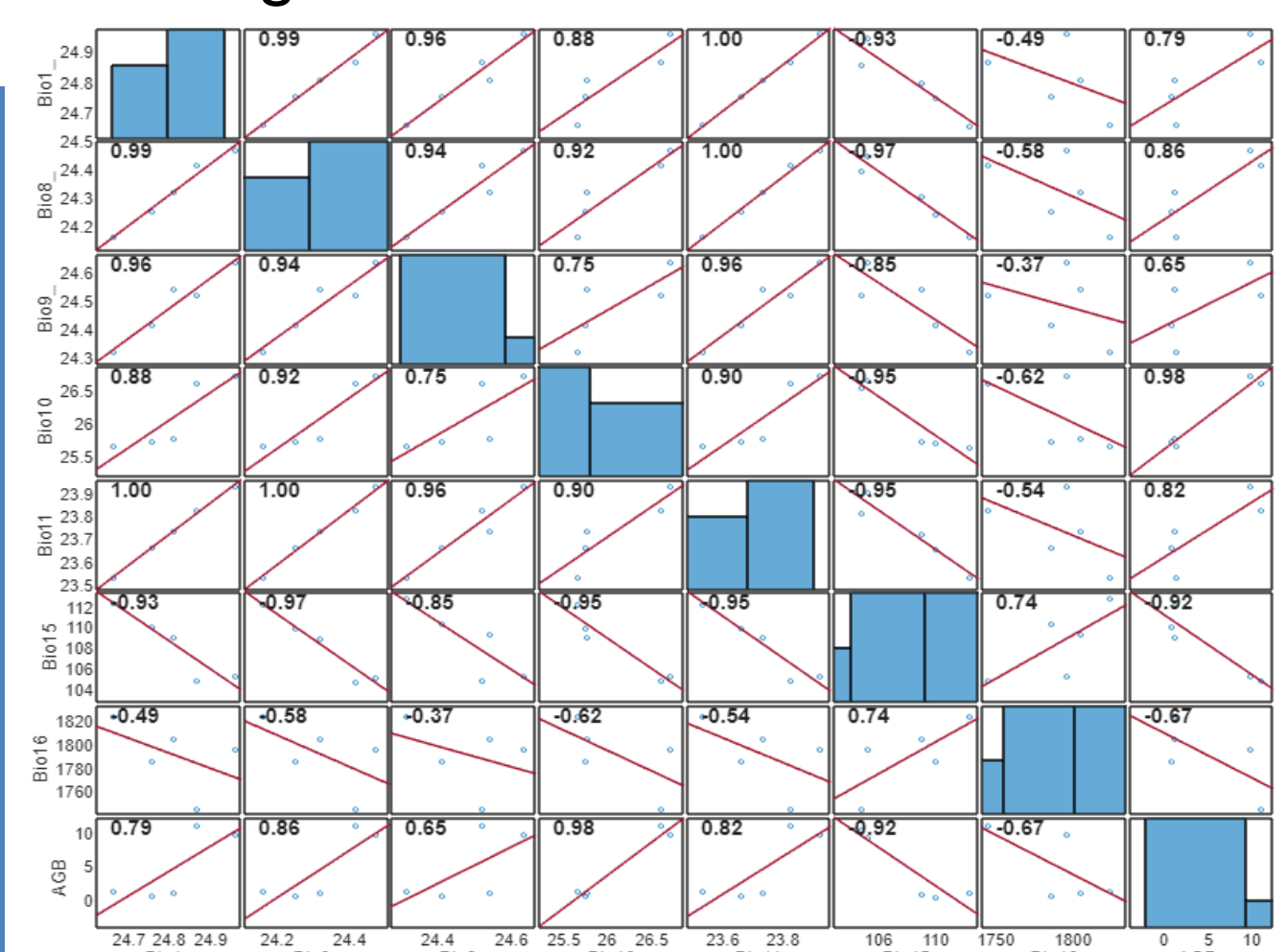


Figure 3: Correlation matrix

CONCLUSION

Similarly forest degradation using other criteria such as carbon loss, forest structural degradation etc., can be assessed for correlation with the BcPs as the indicators of forest degradation and their negative variations in BcPs can be considered as degradation.

FUTURE WORK / REFERENCES

The concept needs to be tested for many criteria and indicators of forest degradation.

References:

- USGS (2012). Michael S. O'Donnell and Drew A. Ignizio. Bioclimatic Predictors for Supporting Ecological Applications in the Conterminous United States. Data Series 691.
- FSI (2021). Above ground biomass estimation using SAR data. India State of Forest Report 2021.