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ABSTRACT

Welala and Shesher wetlands have vital role in providing water-related ecosystem services. But, they are under threat due to multiple anthropogenic factors and thus, shrinking time to time. Thus, the aim of this research is to investigate and quantify these factors by analyzing LULC change and hydrological change trends in Ribb sub-basin; and its consequence on Fogera floodplain wetlands' hydrology and ecology change. Supervised learning based classification, SWAT model and NDVI has been used. According to the result, the Sub-basin had gradually deteriorated for the last 31 years. Consequently, the wetlands' vegetation ecology seems losing its integrity where grasses are changed to invasive weeds and bare lands. The water bodies become so shallow and decrease in coverage because of siltation and mud. Generally, as the watershed LULC and hydrology changes, the wetlands' ecology and hydrology have also changed from time to time.

Key words: Early Warning System; Ecology; Hydrology; Land use /cover change; Wetland Change

OBJECTIVES

- The aims of this study were investigated and quantified;
 - Hydrological and land use/cover change trends in Ribb sub-basin and consequence on Fogera floodplain wetlands hydrology and ecology changes,
 - Recommended a mechanism to improve the sustainability of these wetlands.

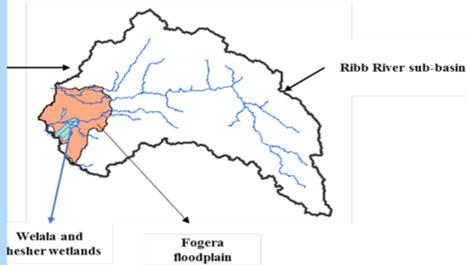


Figure 1. Map of the study area

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INTRODUCTION

- Wetlands have important environmental functions and can be considered as a “kidney” of a watershed,
- Wetlands account nearly 6.4% of the world and 1.14% of the total land area of Ethiopia,
- Fogera floodplain (where Welala and Shesher wetlands are located) covered almost 40% of the Ribb watershed Marshlands,
- Different human and natural factors ,which had been practicing in Ribb sub-basin and local practice around Wetlands expose Welala and Shesher ecosystem under threats,

METHODS

- Land use/cover change Analysis
 - Supervised learning methods - a pixel-based image analysis
- Wetland ecology(Flora) change analysis,
 - Spectral index change analysis(NDVI Value)
- Hydrological modeling (SWAT modeling)
 - Analyzing and predicting spatio-temporal variations of the hydrological characteristics in Ribb river sub-basin and Welala and Shesher wetlands,

RESULTS

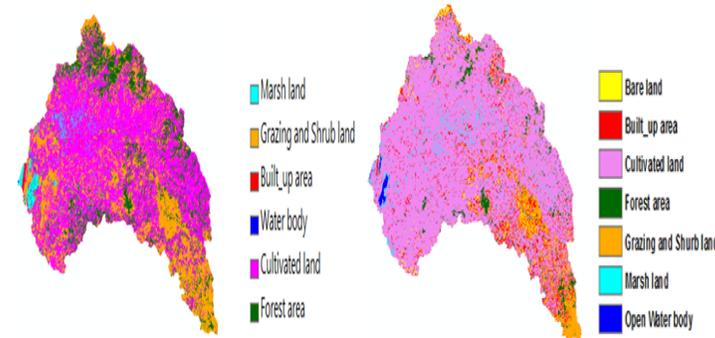


Figure 2. Ribb sub-basin LULC at 1985

Figure 3. Ribb sub-basin LULC at 2015

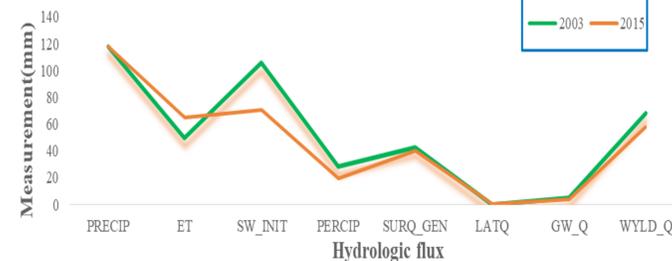


Figure 4. Welala and Shesher wetlands_2003 vs 2015

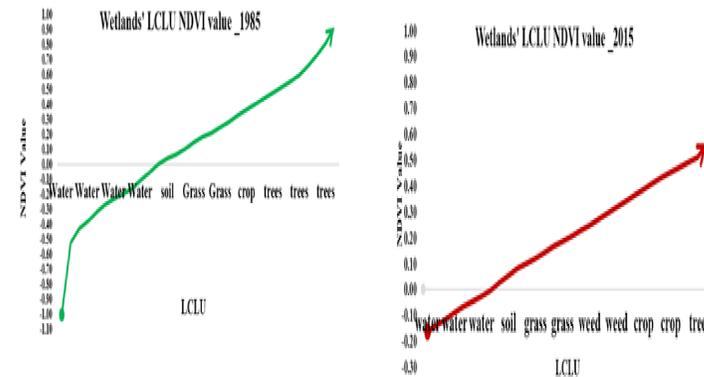


Figure 5. Welala and Shesher wetlands NDVI _1985 vs 2015

DISCUSSION

- The Sub-basin had gradually changed for the last 31 years. Forest area has decreased from 25% to 7%; Marsh land from 6% to 3%, almost decrease by 50% from former coverage and transformed into Built-up area from 3% to 21.4%; Cultivated land from 11% to 47% land and 4% Bare land cover. The main cause of the LULC due to the social development (population growth) and less soil and water conservation practices.
- As the same manner, the sub-basin and Wetlands' hydrology had changed. The Evapotranspiration of the Ribb sub-basin decreased to 4.7%; surface runoff, water yield increased up to 12.06%, and 2.47% respectively during 2015 LULC with compared 2003 LULC. Wetlands' surface water inflow and water yield decreased by 32.3%, 15.85 % respectively.
- Consequently, the wetlands' vegetation ecology seems losing its integrity where grasses are changed to invasive weeds and bare lands. Water bodies of the wetlands become so shallow and decrease in coverage because of siltation and mud area increased.

CONCLUSIONS

Overall, in this research, it has been shown that LULC had changed increasingly in the watershed as well as in floodplain wetlands. As a result, hydrology of the watershed and the wetlands had changed increasingly. Consequently, wetland ecology has also changed in association with the watershed LULC and wetland hydrology changes.

In addition to the upper catchment disturbance, poor wetland policies and local practice (excessive wetland exploitation) has a great role for the severity of these wetlands.

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