Understanding of Soil Erosion Based on Wadies Morphometric Parameter Inconsistencies

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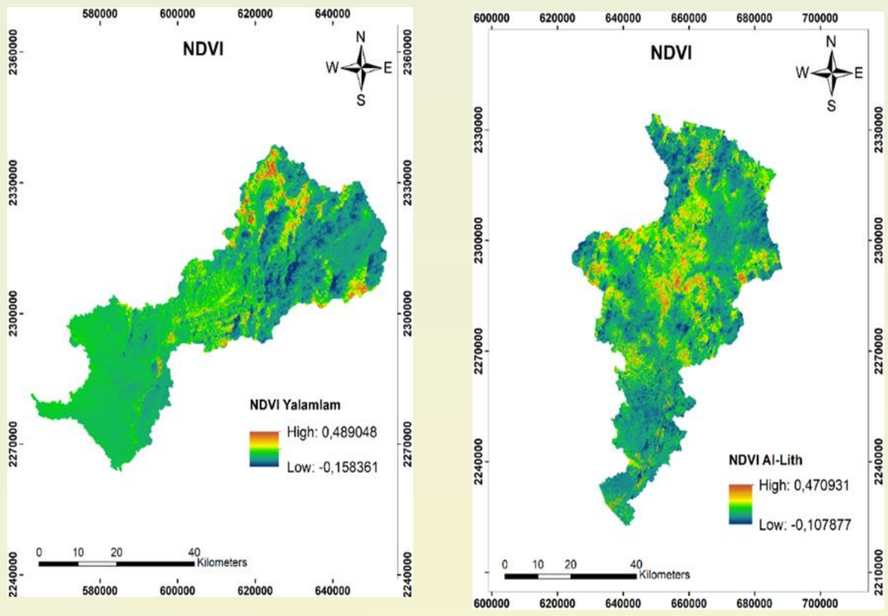
Abstract

Morphometric parameters are parameter that can used to investigate watershed delineation and other geomorphological studies such as understand the of soil erosion problem. Extract basin parameters was done to evaluate the inconsistencies of morphometric parameters from 2 basins which adjacents to each other, Yalamlam basin and Al-Lith basin in the southeastern part of KSA. Basin delineation with 30 m spatial resolution processed by ArcGIS, NDVI value obtain from remote sensing technique using Landsat-8, and the soil eroison estimation using RUSLE method from natural factor such as errosivity factor, erodibility factor, also C, LS and P factor. The morphometric parameters comparation result shows that Al-Lith basin have high drainage densities, high elongation ratio, more circular basin, and low relief than Yalamlam basin. As landuse and landcover references, the landcover for Al-Lith basin have 2% of alluvium, 73% of Rock, and the 25% vegetation while for the landcover of Yalamlam basin is 41% of alluvium, 54% of rock, and 4% of vegetation. Based on these data, it indicates that Al-Lith basin has a high susceptibility to erosion than Yalamlam. Understanding the soil erosion based on analysis of morhometric parameter inconsistensies can provide useful knowledge about geomorphological studies and hydrologycal behaviour.

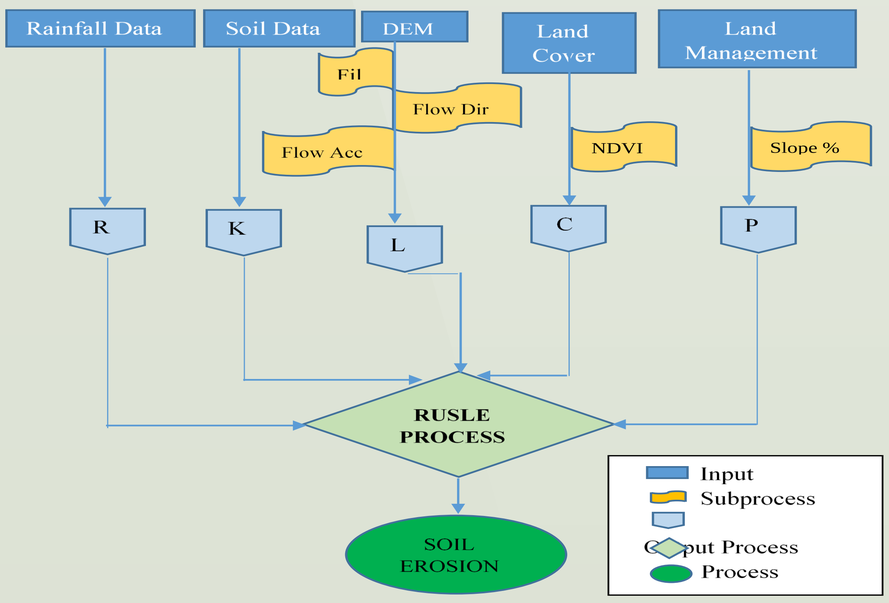


NDVI map of Yalamlam basin and Al-Lith basin

Objectives

The aim of this study is to understand the role of basin morphology on soil erosion, support by remote sensing and GIS techniques. The obtained results will be comparable and useful to understand the relation between morphometric parameter inconsistencies and effect on the soil erosion.

Methodology



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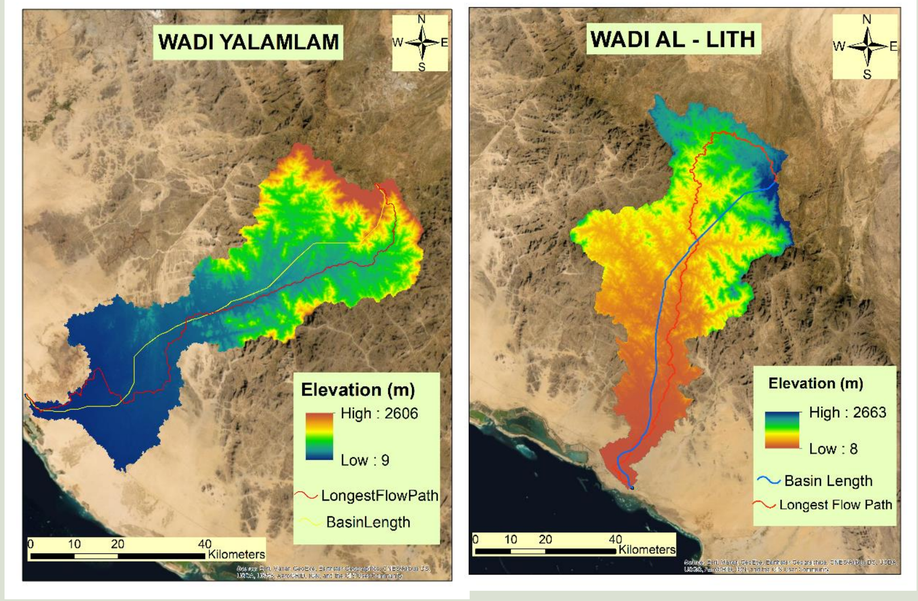
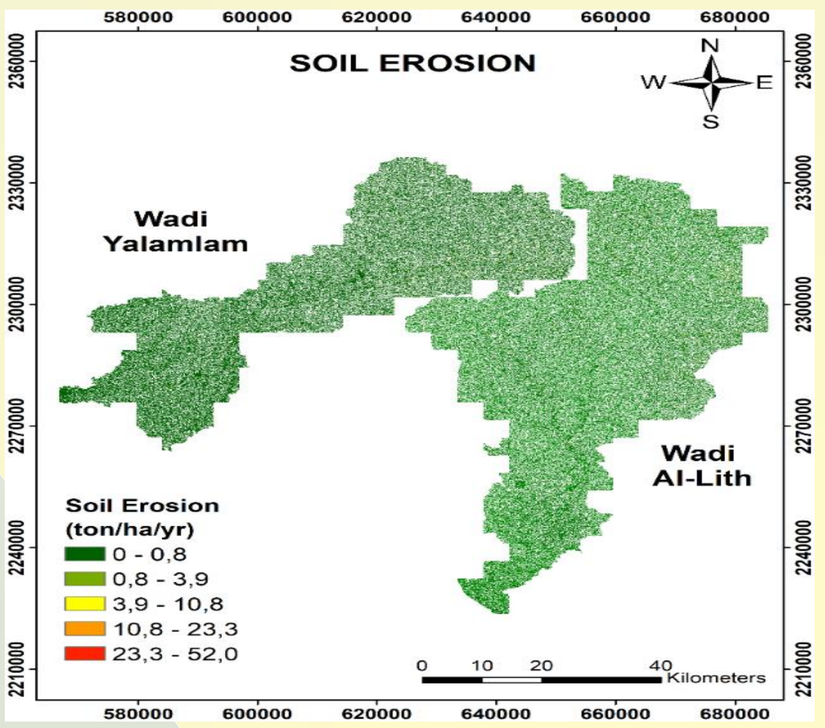


Morphometric parameter includes elevation, basin length, and longest flow path of Yalamlam basin and Al-Lith basin



Soil erosion scale of Yalamlam basin vs Al-Lith basin

Conclusions

Delineation and estimate soil erosion using GIS and RS techniques are good and precise tools to understand the role of basin morphology. The RUSLE method has proven that have better accuracy for estimate soil erosion. The result from the comparison of morphometric parameters shows that Al-Lith basin has high drainage densities, high elongation ratio, more circular basin, and low relief than Yalamlam basin. It indicates that Al-Lith basin is has a high susceptibility to erosion than Yalamlam. From the soil erosion calculation, both basins have soil erosion dominantly on a low value with less than 4 ton/ha/year. The maximum soil erosion is range between 23 to 52 ton/ha/year. As land use and landcover references, the landcover for Al-Lith basin has 2% of alluvium, 73% of Rock, and 25% of vegetation while the landcover of Yalamlam basin is 41% of alluvium, 54% of rock, and 4% of vegetation. Based on these data, Yalamlam basin is more eroded than Al-Lith basin. Yalamlam basin also have high relief which implies has a high susceptibility to erosion. This study regarding soil erosion estimation through the morphometric parameters analysis can provides useful information about geomorphological studies and hydrologycal behaviour. It also can help land decision makers for sustainable water resource management and evaluate risk assessment of the basin.