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LE BASSIN DES EAUX USÉES TRAITÉES





TRAVAUX DES OUVRAGES DE POST-TRAITEMENT EN COURS





CHOIX DES CULTURES À BORJ TOUIL : COTONNIER





INSTALLATION DU SYSTÈME D'IRRIGATION ET DE FILTRATION





LA QUALITÉ DE L'EAU D'IRRIGATION





AVANT ET APRÈS QUELQUES JOURS – SEMAINES





LA QUESTION DE LA QUALITÉ DE L'EAU





QUEL SYSTÈME D'IRRIGATION





IRRIGATION DE SURFACE AVEC LES EUT





RAVAGEURS ET TRAITEMENTS PHYTOSANITAIRES !





QUELS TRAITEMENTS PHYTOSANITAIRES ?





STAGE D'ÉTÉ

LA QUESTION DE L'OCCUPATION DU SOL ET DE L'IRRIGATION



Land Use Land Cover Mapping of Borj Touil (Northern Tunisia) Irrigated District with Redaimed Water Using Landsat-8 and Sentinel-2 Satellite Images

Aenna Bellaloui, Mahram Arane, and Karim Erguel

Keywords

Remote sensing • Supervised classification • Decision tree • Water requirement • Landsat-8 • Sentinel-2

1 Introduction

Remote sensing is a reliable technique to quantify and qualify the detected objects and thus to inform on the extension and the heterogeneity of the agricultural areas. The main objectives of this study were (a) to map the land use/land cover (LULC) of 2015/2016 agricultural campaign of Borj Touil's irrigated district with reclaimed water, using Landsat-8 and Sentinel-2 images and (b) to evaluate and map the potential annual water requirement of the irrigated perimeter using the CROPWAT 8.0 model.

2 Materials and Methods

To determine the LULC of the agricultural area, twelve Landsat-8 images and nine Sentinel-2 images were freely downloaded and then corrected atmospherically using 6Sv2 method. A fieldwork was conducted during August 2016 and the LULC of randomly selected samples representing 5% of the total study area were identified. Two LULC maps were obtained: a winter map and a summer map. To obtain

the LULC of the winter period more than 50 bands combinations were set up, varying images type, date and number and including NDVI in some of them. For each combination, a supervised classification was performed applying the Maximum Likelihood Algorithm, which is the most common method used in remote sensing for image data analysis (Richard 1995). The results were then evaluated using kappa index. For the summer land use a decision tree method based on a set of NDVI thresholds was applied in order to delineate the irrigated land. The used NDVI threshold (0.5) was obtained from the generated NDVI profiles analysis of the Landsat images of June, July and August. Then 23 supervised classifications using the Maximum Likelihood were performed. The best resulting LULC map considered was the one that has the highest kappa index and maintains all the land classes observed in the sampled area. On the base of the best LULC map, the potential annual water requirement map was obtained. The potential annual water requirement for each crop was calculated using CROPWAT 8.0 model using the meteorological parameters (RAI, W_{PEN}). The parameter cropcoefficient (K_c) was calculated by FAO Penman-Monteith method then multiplied by an empirical crop coefficient (K_e) to produce an estimate of crop evapotranspiration (ETc).

3 Results and Discussion

3.1 Classification

The best classification selected to map the winter LULC has Kappa index of 0.91 (Fig. 1). Six images were used (October 5, March 20, June 17, February 6, April 26 and

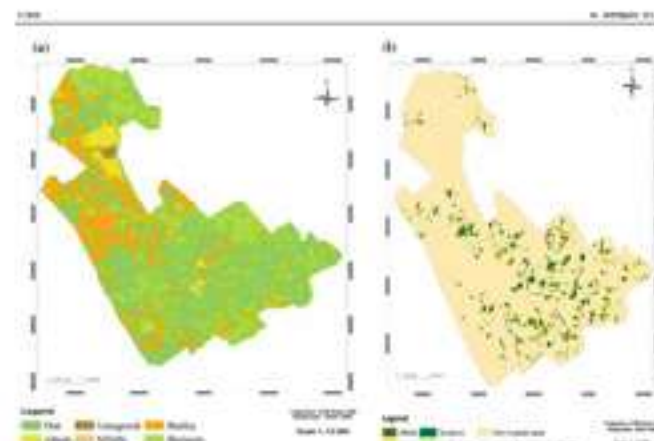


Fig. 1 Land use/land cover of Borj Touil irrigated district: winter and summer crops

May 25). The first three dates correspond to Landsat images and the last three are Sentinel-2. The crops cultivated in the winter are: Citrus, Barberry, Barley, Wheat, Alfalfa and Pomegranate with area covering respectively, 1819, 1308, 1022, 100 and 15 ha. The best classification selected to map the summer LULC has Kappa index of 0.86 (Fig. 2). The images used are June 5, July 19 and August 20. The crops cultivated in the summer are: Alfalfa, Maize, Sorghum and Sudan grass with an area covering respectively, 234, 66, 39 and 35 ha. The irrigated area occupies 8.0% of the total agricultural area.

3.2 Water Requirement Assessment

The values of the potential annual water requirement provided by the CROPWAT 8.0 model based on the FAO56 approach shows that the total required amount of water to meet the needs of all the winter crops during 2015/2016 is 5.36 mm² and of all the summer crops is 2.22 mm². The alfalfa has the highest water requirements whereas the barley has the lowest. Figure 2 presents the potential annual water requirement map of the study area of the winter crops and the summer crops.

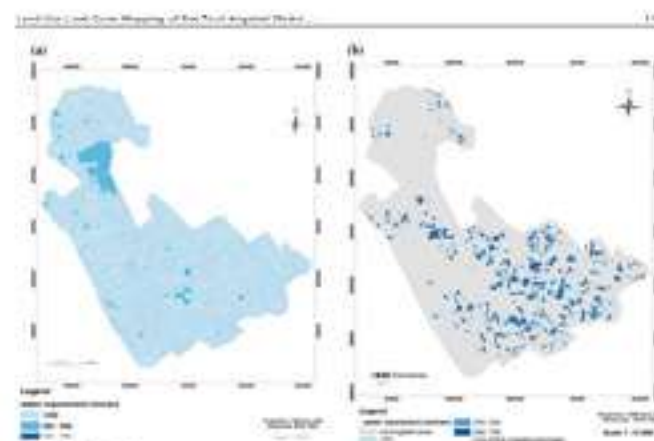


Fig. 2 The potential annual water requirement map of winter crops and summer crops

4 Conclusion

The maximum Likelihood classification using Landsat-8 and Sentinel-2 images supply us accurate map of LULC of the Borj Touil's irrigated area with reclaimed water. The best winter LULC map was obtained using its multi-temporal images and the best summer LULC map using three images. Based on the LULC maps and CROPWAT model, during 2015/2016 the total required amount of water to meet the needs of all the winter crops in Borj Touil irrigated area is 5.36 mm² and it is

2.22 mm² for all the summer crops. The alfalfa has the highest water requirements and the barley the lowest.

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FAO. CropsWat 8.0 for windows user guide. from <http://2008.wpsnet.org/>.
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La Lettre

Wallonie-Bruxelles en Tunisie



Nouvelle programmation de coopération bilatérale 2016-2018

Programme de coopération bilatérale de la Région wallonne
avec la Tunisie
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PREMIER PRIX D'INNOVATION 22 MARS 2017,
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**YOUTH INNOVATING WITH WASTEWATER FOR A SUSTAINABLE
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PLATEFORME D'ÉCHANGE ET D'INSPIRATION POUR LES JEUNES





AMÉNAGEMENT DE PARCELLES DE ROSIER ET DE GÉRANIUM





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Le 14 mai 2017, de 9h à 17h, à l'occasion de la Journée Scientifique de la Ville de l'Ariana, une manifestation sera organisée à l'occasion de la Journée Scientifique de la Ville de l'Ariana.

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LA ROSE DE L'ARIANA DE LA VILLE DE L'ARIANA

Journée Scientifique

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