Using MODIS data to improve fire information and lessen fire risk and associated threats to livelihoods in the Albaja region of Sudan

Mohamed Elgamri[1] and Simon Trigg [2]

Abstract

Wildland fires occur over extensive regions of central and southern Sudan yet there is often limited awareness of the many problems of wildland fire. Although fire suppression is the responsibility of the Forests National Corporation (FNC) for Forest Reserves, fires set by farmers or nomads burn unchallenged in most of Sudan's natural rangelands. The unchecked spread of rangeland fire poses several problems: it consumes grasses available for grazing, changes the composition of tree, shrub and grass species to those that are more fire resistant, and destroys trees that livestock rely on for shade and fodder. Fire therefore threatens the livelihoods of nomads who rely on rangelands to maintain their herds of camel, sheep and cattle. To check the spread of rangeland fire, Sudan's Range and Pasture Administration builds a limited number of fire lines. These generally do not control fires effectively however, primarily due to a lack of planning information. Improving the efficacy of fire lines requires two new sources of information: a detailed reconstruction of recent fire history, and timely end-of-wet season information on the spatial configuration and quantity of standing grass fuel. This paper describes how the planning fire line construction is being improved using new information on fire history and end-of-wet season standing biomass, both derived from remotely sensed MODIS data at a spatial resolution of 250m. End-of-wet-season biomass is estimated for 2005 by correlating field measurements of aboveground dry biomass with time-integrated values of vegetation index values derived from MODIS. Of the three indices considered for estimating biomass (NDVI, MSAVI2 and EVI), the NDVI is found to be the best predictor ($r2=0.69$). Burned areas are mapped (2000-2006) using a semi-automated change detection method based on the fall in vegetation index values following burning. The paper concludes by describing how the resulting maps of biomass and burned area history are being incorporated into the planning of fire lines in Sudan, and hence supporting efforts to reduce the vulnerability of livelihoods to fire.

[1] College of Forestry & Range Science at Sudan University of Science, Khartoum, Sudan.
[2] Department of Geography, University of Maryland, College Park, MD, USA.