Tobias Landmann et al., Expert Opin Environ Biol 2014, 3:2
http://dx.doi.org/10.4172/2325-9655.C1.006

OMICS International
conferenceseries.com SciTechnol

3rd International Conference on
Earth Science & Climate Change
July 28-30, 2014 DoubleTree by Hilton Hotel San Francisco Airport, USA

Contribution of earth observation to emerging environmental challenges in Africa

Tobias Landmann and **Tino Johansson**
Tobias Landmann and Tino Johansson

A large part of the populace in Africa depends on the integrity of the agro-ecological systems for their livelihoods. The agro-ecological system provides an array of important ecosystem services to populations in Africa, such as fresh water, pollination, biological control and medicinal plants. However, increasing demand for natural resources and agricultural products often leads to unsustainable land use intensifications and conversions of natural areas to croplands through mostly deforestation. Land degradation, recently defined as a decline in ecosystem services of a landscape, often occurs as a consequence of human induced land cover change. Moreover, the effects of climate change, such as shifts in rainfall patterns or flooding, often exacerbate the human induced change. However the distinction between human and climate induced changes still poses a challenge to scientists and decision makers alike. Earth observation (EO), defined as an amalgamation of remote sensing observations, in situ measurements and modeling or Geographical Information Systems (GIS) data sets, has the ability to quantitatively measure global change effects over larger areas effectively. The key research challenge in EO science is to render integrated and seamless continuum of observation products that can be utilized in mitigation and adaptation efforts, including early warning systems. This paper illustrates examples, possibilities and future perspectives from current EO research to address emerging environmental issues. Two EO examples from eastern Africa are showcased; (1) a multi-sensor approach to map vegetation productivity decline over eastern Africa (regional scale), and (2) a "work in progress" integrative approach to map the spatial distribution and the floral cycle of melliferous plants (local scale study). In example 1, vegetation productivity, mapped at a moderate resolution and regional scale, is related to very high resolution data in Google Earth. This cross verification was found to be useful in that productivity declines could be effectively linked to land transformation processes (i.e. "Deforestation"). Moreover, the climate induced changes could be disentangled from the human induced change. The results of the second example are instigated for the quantification of pollination effects and to sustain healthy honey bee colonies. Multi sensor monitoring of flowering plants is possible given that also ground data on the floral cycle is integrated. We conclude that intelligent data integration techniques are paramount in seamless and use case orientated monitoring of emerging environmental issues in Africa. The use of innovative, effective and fast field based data collection methods such as "crowdsourcing" is of special relevance to data scarce environments. Likewise existing in situ observations can contribute immensely to integrative EO systems.

tlandmann@icipe.org