

IAF EARTH OBSERVATION SYMPOSIUM (B1)  
Earth Observation Applications, Societal Challenges and Economic Benefits (5)

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EARTH OBSERVATION AND IN-SITU DATA TO INFORM UNDERSTANDING OF WATER  
HYACINTH GROWTH ON LAKE NOKOUE IN BENIN

**Abstract**

The research explores an Earth Observation application with the enterprise Green Keeper Africa (GKA) based in Cotonou, Benin, that addresses the management of an invasive plant species that threatens economic activities such as fishing, transportation and irrigation. GKA pays local community members to harvest the water hyacinth and transform it into a product that absorbs oil-based waste. The EO application is an online observatory and decision support tool that utilizes satellite, aerial and ground data to map the location of the water hyacinth and a fish farming practice known as “acadja” over time, providing valuable information for government, private and public users. This paper is a follow up on the work presented in the 2020 contribution to IAC session B1.5 by the authors. New research in this paper includes (i) extended remote sensing algorithms for monitoring water hyacinth extent in rivers using medium and high-resolution datasets, (ii) the design of an in-situ water quality sensor kit and (iii) combined analysis of water hyacinth extents with water quality data. The technique Normalized Difference Vegetation Index (NDVI), combined with a Change Detection scheme is applied to the Landsat series to identify water hyacinth in the target region of Lake Nokoue from 1999 - Present. Limited by the Landsat resolution, the original algorithm does not perform well on the rivers and tributaries attached to Lake Nokoue, a key concern for GKA. We demonstrate an analysis comparing the use of high-resolution data for this purpose. Forecasting of water hyacinth proliferation is assessed through regression analysis combining extents and in-situ water quality data including conductivity, temperature and dissolved oxygen. These updates demonstrate significant progress towards the goal of building an online observatory and decision support tool with GKA. This work aims to enable data-informed decision making by GKA and local community members, improve sustainable management of the Lake Nokoue ecosystem, and increase accessibility to value-adding EO tools through the design of a new low-cost data stream.