

# **HYPERSENSPECTRAL REMOTE SENSING – A MALAWIAN PERSPECTIVE**

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## **ABSTRACT:**

Any National Mapping agency's need is to have a geo-enabling platform that maximizes the workflow by creating an environment that provides for the power to view, access and analyze data. Imaging spectroscopy is becoming a major Remote Sensing technique for providing more details of the earth surface than the current most popular multispectral remote sensing but a country like Malawi, which is one of the poorest countries, can not embrace such technology. Malawi does not have the capacity to interpret Hyperspectral images and has failed to utilize the multi-spectral data widely available. The main challenge with hyperspectral images is the prior knowledge of the properties of interest on the ground, which a country like Malawi cannot manage to identify on a larger scale since such assignments require spectral libraries and capacity for spectral mixing.

## **1. INTRODUCTION**

Malawi can utilize hyperspectral imagery in the following areas of application such as agriculture (the country is an agro based economy), environmental management since there is a large out cry for proper management of the environment and forest reserves, geology as the country would like to have a geological map covering the country and mining due to the discovery of uranium and platinum in the country.

This paper provides an insight on how least developed countries can benefit from hyperspectral imagery and the donor and project driven approach to dictating acceptance to technology and solutions to least developed countries. This paper was written based on a personal understanding of spectroscopy and a belief that hyperspectral imagery requires distinguishing targets from similar background and identifying unknown material.

## **2. THE CURRENT HYPERSENSPECTRAL SCENARIO IN MALAWI**

Image spectroscopy has been sold as to Malawi as a potential for more accurate and detailed information extraction than the multispectral imagery and possible elimination of the former. Donor dictat has led to non commitment to the leveraging of technologies with donors and international agencies dictating the type of technology least developed countries should use and adopt. It is every government's wish to have new technologies but least developed countries are failing to cope with technological trends since such countries can not decide on their requirements due to limitations in finances and capacity.

Lack of resources and finances alone are not the only hindering factor but also the lack of belief and confidence amongst technical experts since the trend has been to wait for an external source to provide solutions to least developed countries. In Malawi most remote sensing activities are single project oriented and such projects are abandoned after their time lapse. Most international agencies are promoting image spectroscopy to least developed countries although such imagery is not readily available as there are a few hyperspectral sensors and

that Malawi can not afford such technology since inception and implementation of new technology comes at higher cost. After winding of donor projects most projects begin to falter and a country like Malawi can not sustain in Hyperspectral remote sensing technology if they can not manage spectral libraries, laboratories and spectra for reflectance of man made and natural phenomena which are of great importance to scientific applications.

The economic status of a country like Malawi leads to a latency that is facilitated by international institutions deciding on the type of image processing techniques and the type of remote sensing methodology in fulfilling activities. An example is when working with an American agency that can not let a beneficiary access European datasets.

Hyperspectral remote sensing is a very welcome technology but countries like Malawi are still concerned with advanced image processing, complex mosaicking, image enhancement and access to remotely sensed datasets.

Developed countries have access to remote sensing data both in hyperspectral and multispectral formats but least developed countries do not have a remarkable presence in international space science activities. It is best practice for countries like Malawi to base their remote sensing decisions to their own best interest. Countries like Malawi have been convinced about the value of remote sensing applications but the pricing of imagery is relatively high. Although it is now claimed that the prices of imagery has gone down, it is still cumbersome to cost and determine hyperspectral image coverage.

## **3. HYPERSENSPECTRAL TECHNOLOGY CAPACITY**

Hyperspectral technology is not an easy to use technology for detailed extraction as its algorithms have not developed to the extent where a country like Malawi can apply in monitoring earth resources and their sustainability.

There are a lot of spectra that can be downloaded but such spectra can not be easily accessed and does not cover least developed countries like Malawi. A country like Malawi require remotely sensed data that can support resources management, economic activities and inventorying of natural resources, topographic and thematic mapping. There is great need to have access to remotely sensed data that can aid in man made and natural disaster management. The main challenge facing Malawi is the use of remotely sensed data in various applications and the capacity to function the remote sensing technological requirements. For a small country like Malawi whose mapping and remote sensing activities are limited to a few experts and under the mandate of government, there is a great need to help such countries have a paradigm for management, processing and access to satellite imagery.

There is need for enhancing capacities of least developed countries like Malawi regardless of technological applications so as to reduce gaps in coping with trends in this information age.

#### **4. MAXIMIZING HYPERSPECTRAL REMOTE SENSING APPLICATION**

Although research into remote sensing technologies is vital, means of image access and distribution should be promoted for data modelling, value adding and integration. It can be appreciated if geo-enabling and customized solutions are included to the unique economic status of a country as this will enhance levels of ability in the space science discipline.

The remote sensing community has failed to align its activities with the central government's priorities by failing to provide solutions to the country's problems. Small, medium and large scale mapping are derived needs of most government agencies and such institutions would like to successfully retrieve valuable information contained in imagery. The United States Geological Survey (USGS) has made Terralook data available on the web to countries like Malawi. The process of acquiring such data on [glovis.usgs.gov](http://glovis.usgs.gov) or [earthexplorer.usgs.gov](http://earthexplorer.usgs.gov) is very convincing but the levels and capacity of downloading such data is complex due to slow internet connections and speed.

There is a need for remote sensing data collectors and distributors to maximize and promote remotely sensed data availability to least developed countries like Malawi with regards to their specific Space Laws and the United Nations General Assembly Resolution 41/65 of December, 1986.

Satellite based technology should not be a technological barrier but a tool for all political landscapes regardless of national affiliations. All nations should formulate policies that have a common international thought that will aid in data processing, acquisition and distribution around the world. According to Satyaprakash, 2007, every country and organization responsible for the launch of the satellites, archive their data, but still there is lack of a global metadata availability of which could help the users in locating the desired data and procuring them. The above statement is true as there is failure to meet the requirements of this information age where access to information is paramount.

#### **5. CONCLUSION**

It is unfortunate that it will take time for countries like Malawi to fully utilize and access hyperspectral imagery since there are large gaps in the utility of such technology. Technology should not only maximize workflow but provide technology based solutions that will provide information to decision makers.

Country profiles are likely to be enhanced if there are geo-portals with an outline of country requirements and areas of application. Developed countries should express diverse opinions and reach a consensus on how to respond to the challenges developing countries are facing in coping with the technological trends in the field of remote sensing and aid developing countries in the realization of the global development agenda.

#### **REFERENCE**

United Nations General Assembly Resolution 41/65 of December 1986

Satyaprakash, 2007 "Remote Sensing Satellites: Present and Future" GIS Development, page 34

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