SPECTRAL SIGNATURE LIBRARY FOR VEGETATION AROUND SETTLEMENT AREAS IN LOW LYING ISLANDS IN THE PACIFIC

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ABSTRACT:

Maintaining long-term food security has emerged as a major issue in the Pacific region, and climate change, with its associated extreme weather events, is likely to adversely impact food production especially in the low lying islands in the coming decades. This study is based on the application of remote sensing to the identification of vegetation types and dissemination on the ground and to evaluate its changes over a period of time.

Unlike coconut palm cover, pandanus, breadfruit and other trees are not always easy to visualise on satellite image data. Collectively, this vegetation has always been classed as village vegetation or vegetation surrounding settlement areas. The main aim is to develop a spectral signature library, to further sub-stratify and to give a clear indication as to which bands the above mentioned vegetation can be separated and mapped. This will result in better monitoring and management and allow for easy adaptation to food security strategy in place made available in case rice which is the main food supply stops.

This study is based on the application of remote sensing to the identification of vegetation types and dissemination on the ground and to evaluate its changes over a period of time by utilization of very high resolution optical image data. Since 2009 vegetation mapping have been an on-going task for Kiribati at 1:10, 000 scale. Only sub-metre data allows separation of coconut from shrub, mangrove and other vegetation types. The need for mapping at this scale was addressed by the two important stakeholders, the Agriculture and Environment Department, where both stated that food security is the most important reason for the mapping.

Since then, only the coconut cover has been properly stratified into different densities. Pandanus, breadfruits, and other trees still cannot be separated with the current image data available however they have been jointly delineated as human influenced vegetation through buffer zones around the villages. Now as more awareness for building resilience to climate change arises, strategic adaptation for food security is a prime concern for the Agriculture Department in Kiribati. Pandanus and breadfruits have been identified as substitute for rice which is currently the main source of staple food in Kiribati.

The main aim is to develop a spectral signature library, in order to further sub-stratify the village vegetation and to give a clear indication as to which bands the above mentioned vegetation can be separated and mapped. This will result in better monitoring and management and allow for easy adaptation to food security strategy in place made available in case rice supply stops. Nowadays, the uses of remote sensing methods have provided knowledge and proficient ways of acquiring data for the advancement and management of natural resources. The main aim is to develop a spectral signature library, with clear indication as to which bands the above mentioned vegetation can be separated and mapped. This will result in better monitoring and management and allow for easy adaptation to food security strategy in place made available in case rice which is the main food supply stops.

Study will use WorldView-2 8-band which is a very high resolution optical satellite data is owned by DigitalGlobe Corporation. This is the first of its kind to be produced and the potential in extracting spectral signature is beyond any other space-borne remote sensing (DigitalGlobe, 2009). Each of the 8 spectral bands is unique to specific to a feature on the ground and this makes it easy to map the land cover types. For instance, in measuring plant material, a Normalised Vegetation Index (NDVI) is established for calculating vegetation health and to monitor environment changes (DigitalGlobe, 2009).

There have been several studies done regarding spectral signature library establishment for vegetation mapping and land cover change and monitoring. But, this study will be the first of its kind to use high resolution eight band WV-2 sensors to separate and fully sub stratify vegetation surrounding settlement areas. Thus, as further the food production area is stratified, as more precisely it can be used for management and to make available food substitution options in preparation for climate change events.