

COMBINED USE OF ALOS-AVNIR 2 AND ENVISAT ASAR IMAGES IN MAPPING THE STARCH-RICH SAGO PALMS IN VISAYAS AND MINDANAO, PHILIPPINES

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ABSTRACT: The sago palm (*Metroxylon sagu*) has a trunk which contains starch. Sago palm is reported to be the highest starch producer at 25 tons per hectare per year. It is now grown commercially in Malaysia, Indonesia and Papua New Guinea for production of sago starch and/or conversion to animal food or fuel ethanol. Because of the sago palm's significant economic benefits, there has been fervent interest by the Philippine government for its mass propagation in order to develop and sustain a large-scale sago starch industry. For this to be realized, mapping the location of existing sago palms is necessary in order to determine its habitat characteristics. Once these characteristics have been identified, it is then possible to locate other areas that have the same habitat characteristics for sago palms to grow. We present in this paper the results of our study that aims to map the distribution of the sago palm in Visayas and Mindanao, Philippines through combined use of ALOS-AVNIR 2 and Envisat ASAR images. The analysis consisted of two stages. Stage 1 is differentiating all kinds of palms from other land-cover classes in the ALOS AVNIR2 images through Maximum Likelihood classification. After detecting all kinds of palms, the next stage is to differentiate sago palms from other palms using Maximum Likelihood with parameters (class mean vectors and covariance matrices) derived from image regions of interest of confirmed sago palms and other palm vegetation. In this stage, layer-stacked ALOS AVNIR and terrain-corrected Envisat ASAR (acquired in image mode with HH polarization) images were used. Before implementing Stage 2, the performance of the procedure was first verified using a test image dataset of a municipality in Mindanao where sago palms and other palms are abundant. The test image dataset consisted of an ALOS AVNIR2 image acquired on 4 October 2010 and Envisat ASAR IM acquired on 15 November 2010. Regions of interest of sago palms and other palms (non-sago) were collected to derive mean vector and covariance matrices necessary for Maximum Likelihood classification. Another set were collected for accuracy assessment. Results of the procedure testing indicates that using the ALOS AVNIR2 image alone as input, the overall palm classification accuracy is 90.51%, and the Producer's and User's Accuracies for sago palm are 86.96% and 89.29%, respectively. On the other hand, overall palm classification accuracy increased to 92.09% when Envisat ASAR image is combined with the ALOS AVNIR 2 image. Results also indicate that combination of ALOS AVNIR and Envisat ASAR image bands has higher Producer's and User's

Accuracies in sago palm detection (90.43% and 92.86%, respectively). With this significant increase in accuracy, the combined use of ALOS AVNIR 2 and Envisat ASAR images were then used to differentiate sago palms from other palm vegetation in Visayas and Mindanao. A total of 1,249.77 hectares of sago palms were mapped using the procedure. Presently, field surveys are conducted to verify the accuracy of the classification.

KEY WORDS: Sago Palm, ALOS-AVNIR2, ASTER AVNIR, Envisat ASAR, Remote Sensing, Philippines.