

UAVs for Land Regularization

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SUMMARY

United Nations projections indicate that all regions of the world will be urbanized by 2050 with Africa and Asia having the highest rates of 56 and 64 percent respectively. This implies that the intensive urbanization experienced by now industrialized nations in the past is currently under way in developing countries including Ghana, though with minimal economic growth. The unparalleled economic growth relative to the rate of urbanization has resulted in sanitation challenges, congested transportation system, environmental pollution, encroachment of open spaces etc.

The burgeoning issue of urban land encroachment is palpably evident across many developing nations, with Ghana emerging as a prominent case in point. Rapid urbanization, fueled by a swelling population, has catalyzed the rise of unauthorized land occupations. These lands, though occupied cannot be registered or used as collateral for capital. While in some cases, these lands are reclaimed from illegal occupiers, others are subjected to processes of land regularization which aims at bringing these informal and unauthorized settlements into the official, legal and administrative systems of land management through land use planning, land registration, surveying, service improvement and finally granting titles.

A major drawback to land regularization efforts in most developing countries however is the convoluted process involved which has been exacerbated by the rapid rate of urbanization. Recent developments in new approaches of data collection to support systematic regularization of such lands have shown promising results.

The main objective of this project was to explore the potential of UAV derived Cadastral data in reducing the amount of field work required in the conventional approach of cadastral surveying and thereby expedite the process of regularization of encroached

lands.

Results of the project revealed acceptable accuracies based on existing cadastral mapping requirements in Ghana. Comparison between coordinates of selected checkpoints observed with GNSS equipment and extracted from the Orthophoto showed Root Mean Errors of 0.102m and 0.100m in Northings and Eastings respectively.

Furthermore, field verification of digitized parcels was completed using an open source mobile app that linked spatial and non-spatial attributes of each parcel. Cadastral plans were thereafter prepared for all verified parcels in a systematic approach to facilitate the regularization of these lands. Moreover, the UAV approach showed a substantial 70.83% gain in time efficiency and a significant 75% cost reduction over the conventional approach, underscoring their economic and operational advantages.

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