Utilizing UAV Techniques to Investigate the Dynamics of Encroachment on The Right-Of-Way for The N8 Highway in Peri-Urban Ghana

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SUMMARY

Encroachment on highway reserves is a major problem in Ghana as it hampers the efforts to develop and expand highways in Ghana. This article draws on Asef Bayat's theory of "quiet encroachment" to analyze the dynamics of informal settlement on the N8 highway reserves in Ghana. As widespread encroachment is costly to remove or mitigate, it would be useful to have a swift means of identifying trespassers before encroachment gets out of hand.

Due to the fact that the conventional means of carrying out right-of-way surveys, though providing a more appropriate solution, has been found to be expensive, time-consuming, and laborious, there is a need to seek alternative means for carrying out right-of-way surveys. Unmanned Aerial Vehicles (UAVs) provide a convenient solution to this problem because of their resourcefulness in producing maps over large areas at a fast rate.

Aerial images of the corridor by means of a drone (UAV) were acquired and processed using Agisoft Metashape software. The buildings and road features were extracted using a computer vision algorithm add-on in QGIS; Orfeo Toolbox (OTB). A GIS buffering operation was performed on the Right of Way (ROW) using 35m and 45m distances according to the standards of the Ghana Highway Authority and the physical planning committee. It was identified that a thousand and eighty-six (1,086) buildings were identified in the buffered region. Using google earth historic data, these structures within the buffer were tracked (object detection) to determine the trend of encroachment within the reservation. A structured questionnaire was designed and administered to the affected people in the encroachment zone.

Empirical analysis shows that 755 buildings (70%) were constructed in recent times due to the increasing population and economic activities in the area. Also, the majority of the residents see it

as an opportunity to make business and money and hence prefer lands on the roadside. They occupy these lands without legal documents to them. The study sought to identify the key drivers of the problem and come up with policy recommendations for resolving the encroachment of road reserves using the DPSIR framework. The major factor contributing to the problem of encroachment were; Population/ Peri – Urbanization, Accelerated Economic & Industrial Activities, and Poor Functioning of Government Institutions to protect Highway reserves. Enforcement of environmental laws against encroachment on the reserves and constant monitoring of informal settlements was strongly suggested.