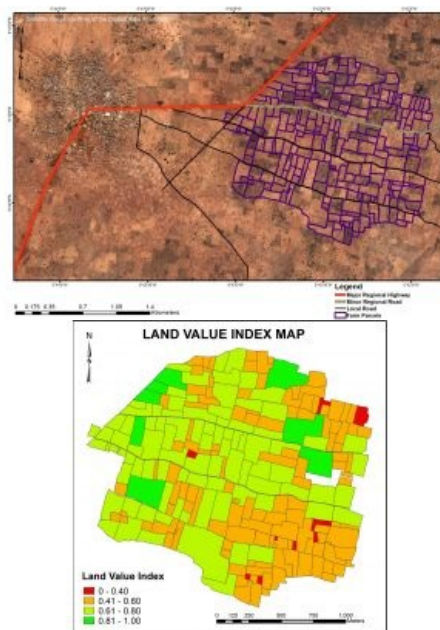## FITTING WITH LOCAL NEEDS

Customary Cadastres, Land Valuation and Rural Agricultural Lands

An approach for valuing rural customary farmlands has been assessed in a case study in Ghana with a view to supporting land consolidation for food security.

Customary lands account for 80% of Ghana's estimated 30 million land parcels. Due to local social, cultural, and spiritual bonds with land, mobility is very low. Land markets are impeded and as are land management activities including land consolidation. Compensation is sometimes unfair, and cases of compulsory land acquisition by government are needed. Here, the authors describe an approach for valuing rural customary farmlands with a view to supporting a specific land management activity, land consolidation, through the development of Land Value Indices (LVI) as quid pro quo values on rural unregistered agricultural farmlands that have no land markets.

A knowledge-based approach, using local and expert judgement is developed using value functions. The approach measures how Land Value Factors (LVFs) deviate for the most suitable local situation. Using local and expert knowledge, the LVFs relevant to the local land values are identified and weighted. The scores of the factors were standardized using direct value rating to allow for comparison. The direct value rating is described in five steps by Beinat (1997). The attributes are first described and then the value range is selected; in this case corresponding to 0 (worst) and 1 (best) respectively. The qualitative characteristics of the value function were then defined (monotonicity, concavity/convexity, *etc.*). The third step was to specify the values for the selected attribute scores. In this approach, this is done via the bisection technique *i.e.* assigning values to selected scores at equal intervals between the maximum and minimum scores. The fourth step was to fit a mathematical equation and/or a curve through the identified points. In the last step, the function was checked for consistency. The standardised scores (S) were then input into the Land Value Indices Table (Table 1), where each row represented a land parcel (p), and each column represented an LVF (F).

Table 1: Land Value Indices Table for Farmland Parcels.

The elements of the Table represent the Land Value Score (S) of a farmland parcel (p) and the factor (f). The Land Value Index (LVI) for each parcel is calculated by multiplying the score of each factor (S_{pf}) by the corresponding weight of the factor (w_f), and summing for each

farmland parcel (each row on the Table).

The process is summarized the figure below.

Figure 1: Flowchart of the Farmland Parcel Valuation Framework.

The Case Study

The approach was applied to a farming village, Nanton, in Northern Ghana, where there is a real need for land consolidation for food security. A customary cadastre developed by Asiama et al., (2017) provided the base map for assessment of values.

The land value factors that influence the customary land values in the area were identified through focus group discussions and interviews with the local farmers, traditional authorities, agricultural extension officers, as well as an agricultural research institute in the area. This resulted in 13 LVFs relevant to the area.

With regards to the internal factors, the size of the parcel was assessed using the Parcel Shape Index from Demetriou et al., (2013) which integrates the perimeter, the acute and reflex angles, boundary points, compactness, and regularity as geometric parameters independent of the size of the parcel. The local people expressed a preference for regularly shaped parcels. The slope of the parcels was also derived from the customary cadastre's information, with the local people showing a preference for the flatter areas that reduce the costs of erosion mitigation. In terms of land tenure, four land tenure situations were found in the area, allodial title, customary law freehold, tenancy, and customary license (in descending order of preference of the local people and most legally tenure secure). The crops farmed on the land also gave an indication of the fertility of the land, with land farmed with non-leguminous crops, land farmed with leguminous crops, and bare lands, in descending order of fertility.

Figure 2: The Area of Interest (with farm boundaries denoted by purple lines) and the Nanton Village.

In terms of the external factors, the locational characteristics of the land were considered the most important, with the access to roads being the most important LVF here. Three types of roads were identified in the area in descending order of preference - the major regional highway, minor regional highway, and the feeder roads (Figure 2). The proximity to the town centre was considered important with regards to the sale of the farm produce. The planning scheme also affected the future use of the farm parcel especially if the parcel was designated farmland.

The final map of the Land Value Indices of the area is show in Figure 4.

Figure 3: Summary of Land Value Factors.

Results Analysis and Community Reaction

In a scenario analysis, it was found that the LVIs changed significantly when the weights were manipulated in three scenarios. In the first scenario LVIs are assigned equal weights, in the second scenario, the weights assigned with priority to the internal land value factors which are assigned higher weights, and in the third scenario, the weights assigned in an inverse order. Scenario 0 was the LVI from the developed approach with an average LVI of 0.68 and for scenarios 1, 2, and 3, the average LVI was 0.70, 0.74, and 0.75.

Figure 4: Land Value Indices of the Farmland Parcels.

The community involvement is paramount to assessing the land values on customary lands. In this approach, it was found in previous studies that farmland sizes were used to determine farmland values. However, this approach incorporated more factors than just the size of the farmland parcel. It was found in interviews with the farmers that they found it difficult to understand the approach to the farmland values presented to them. Though they did find the comparative values to be more representative to their views than the conventional farmland size approach currently being used.

Looking Ahead

The approach developed shows a lot of promise as an initial step towards the valuation of rural customary lands using customary cadastres. The use of local and expert knowledge provides a mix of the judgement that allows for a holistic view of the area. This approach however falls short when it is assessed along with Automatic Valuation Models (AVMs); though it can be further developed with studies and automated to make it faster. The approach also needs to be tested for its efficacy in the valuation for other purposes such as compensation from expropriation, and sale.

Figure 5: The comparison of the four scenarios.

Acknowledgement

that this is an updated and abstracted form of an article published as "Asiama, K. O., Bennett, R., Zevenbergen, J., & Asiama, S. O. (2018). Land valuation in support of Responsible Land Consolidation on Ghana's Rural Customary Lands. *Survey Review*, 1–13. https://doi.org/10.1080/00396265.2018.1467672"

References

Asiama, K. O., Bennett, R. M., & Zevenbergen, J. A. (2017, February). Customary Cadastres and Smartphone Surveys: Fitting with Local Needs. *GIM International*, 41–43. Retrieved from https://www.gim-international.com/content/article/customary-cadastres-and-smartphone-surveys

Beinat, E. (1997). *Value Functions for Environmental Management*. Dordrecht: Springer Netherlands. https://doi.org/10.1007/978-94-015-8885-0

Demetriou, D., See, L., & Stillwell, J. (2013). A Parcel Shape Index for Use in Land Consolidation Planning. *Transactions in GIS*, *17*(6), 861–882. https://doi.org/10.1111/j.1467-9671.2012.01371.x