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Integrating Geospatial Data and Analysis into Land Tenure Impact Evaluations

Overview

Although land rights are spatial in nature, the effects of securing land rights are seldom analyzed spatially. E3/Land is working to change that by leveraging the power of geospatial data and analysis to gain new insights into the most effective land tenure programs and policies. Central to this effort is using geospatial data and analysis to expand opportunities to learn from and inform USAID's portfolio of land tenure impact evaluations. This offers important opportunities for evaluators to augment the more traditional household survey methods that most impact evaluations employ with geospatial data and analysis. While useful in many contexts, geospatial data and methodologies have important limitations that evaluators should to keep in mind. This document shows some of the ways that E3/Land is integrating geospatial data and analysis into impact evaluations and what we are learning from these efforts.

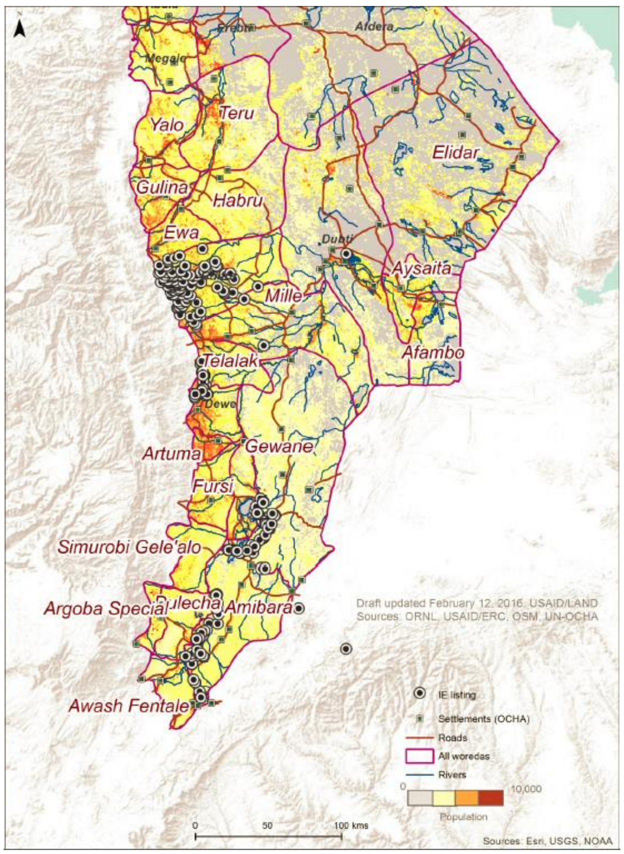

Figure 1. Map of population density, major towns, roads, and rivers in Afar, Ethiopia

Better Evaluation Design

Rigorous impact evaluation methods, such as quasi-experimental and experimental designs, require the identification of suitable comparison groups that have the same measurable (observable) characteristics as the areas identified for the intervention. Incorporating secondary geospatial data on geographic and biophysical characteristics helps identify comparison areas that are as similar as possible to the intervention areas. For example, in the context of a quasi-experimental impact evaluation of a pastoral community land rights recognition pilot in Ethiopia, we incorporated secondary data on land cover, including proximity to major roads, towns, and water sources; the incidence of an invasive plant species toxic to livestock; and population density to test the balance (comparability) between the identified treatment sites and potential comparison sites (Figure 1).

Geospatial data also help the evaluation control for possible drivers of key outcomes of interest, including land tenure security and land cover change, other than the project itself over time.

Improved Baseline Context Analysis

Baseline data can be used to test program assumptions and theories of change and inform our programming in real time. In the context of an evaluation of a community forest management program in Zambia, E3/Land is using secondary data, including remotely sensed forest cover data, to assess historical forest cover change in the study area. This analysis can highlight significant areas of change in forest cover and their proximity to selected sites, which the program can use to target activities. Spatial analysis can also be used to test the model design and the degree of spatial autocorrelation between variables. Furthermore, spatially-derived variables like forest cover can be incorporated in the model for sensitivity analysis, to test assumptions and to generate new findings.

In the Zambia case, we encountered some important challenges through this research, especially related to forest definitions, the lack of spatially-referenced forest or village boundaries, and the limited variability of some secondary data, such as mean annual rainfall, across the study area. In the absence of verified boundaries, we approximated forest access by creating buffers around village center points. While this methodology presents interesting opportunities to test the effect of biophysical variables, it also has potential drawbacks, as it depends on the availability of baseline spatial data across the study area.

More Nuanced Impact Analysis

Secondary geographic and biophysical data can also be used to improve our ability to study differential program effects. For example, in Ethiopia, we have just completed a [quasi-experimental impact evaluation of two programs that certified farmland use rights in the highlands](). We compared village group (*kebele*) locations across treatment and control areas to confirm that they were located within close spatial proximity, since location is likely to affect other characteristics of relevance to the study, such as rainfall and soil types (Figure 2). We also tested how the effect of land certification on credit taking changed based on distance to the regional capital and found that the impacts were larger for *kebeles* located farther away from the capital (Figure 3), which has important programming implications.

These results suggest that understanding the spatial context in which our programs operate—and measuring their differential impacts—is important to achieving positive development outcomes.

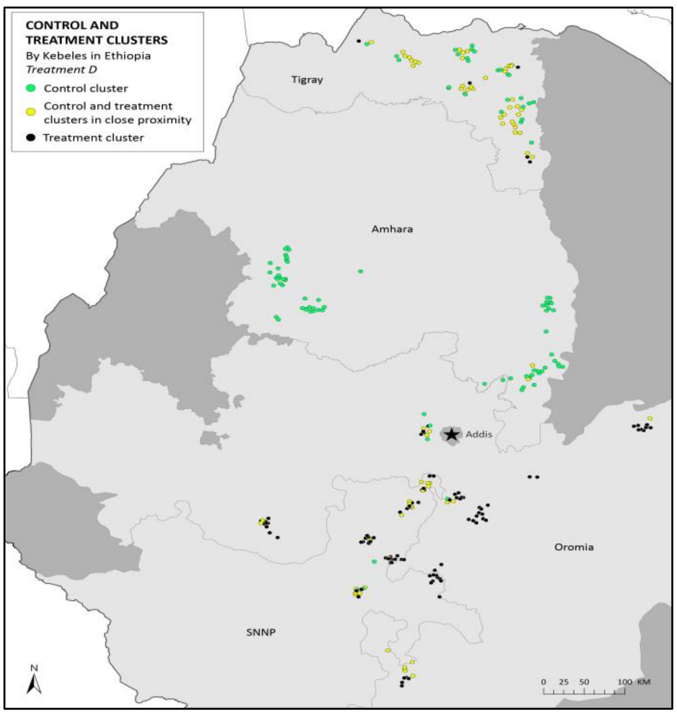

Figure 2. Spatial proximity of treatment and control sites in Ethiopia

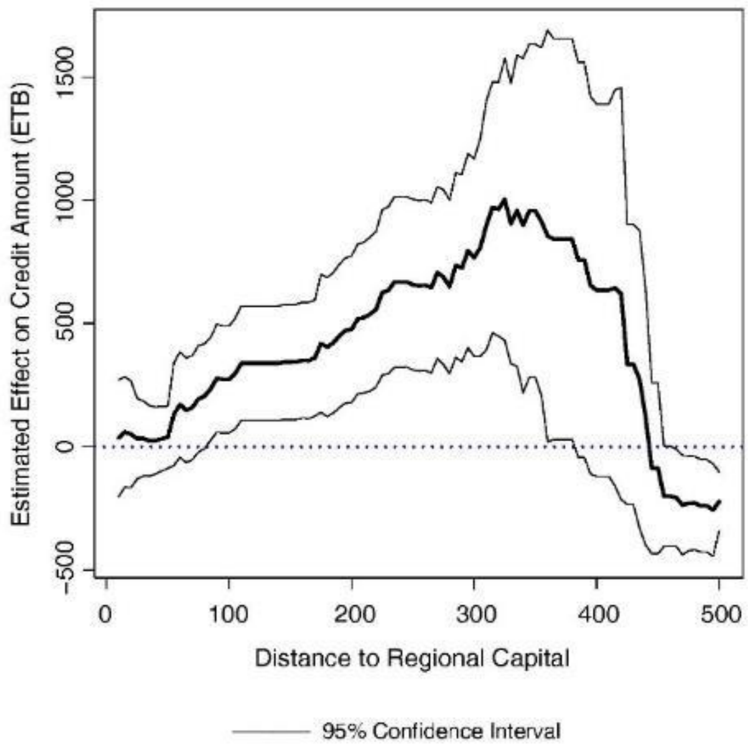

Figure 3. Effect of distance to regional capital on credit amount taken (in Ethiopian birr, ETB) in Ethiopia

What Are We Learning?

Although there are important challenges inherent in integrating geospatial data and analysis into our impact evaluations, there are also clearly a number of exciting opportunities to leverage these kinds of data and analysis to improve the way we identify treatment and control sites; analyze the baseline context; and measure the differential impact of our programs in different geographic areas.

Learn more about USAID's land tenure impact evaluations by contacting E3/Land at [www.usaidlandtenure.net/data]() or emailing us at [landmatters@usaid.gov]().