Large-Scale Land Transactions as Drivers of Land-Cover Change in Sub-Saharan Africa
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Annual Report

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PI: Daniel G. Brown
                              School of Natural Resources and Environment
                              University of Michigan
                              440 Church St.
                              Ann Arbor, MI 48109-1041

Co-PIs: Arun Agrawal

Program Officer: Garik Gutman, Manager
                              Land Cover Land Use Change Program
                              NASA Headquarters

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Summary and Project Status
The project is structured around two primary research questions. Neither these questions nor the overall scope of the project has changed since its inception. Also, the project is too new to have produced any significant findings to date.

The project design is taking shape to facilitate examination of large-scale changes in land tenure on land cover and on livelihoods in three African countries: Ethiopia, Tanzania, and Liberia. Our work during the first year of the project to develop collaborative relationships with in-country partners, bring on new staff to implement the work of the project, and collect key datasets has set the stage for successful implementation of project objectives.

In this document, we report on the status of the project, relative to the two original research questions. We also list the staff of the project, including those whose training is supported by the funding, and our in-country collaborators.

The status of the project relative to each of the two research questions is as follows:

1. *What are the patterns of large transactions, in terms of number, size, anticipated use, and impacts in the target countries, what is their distribution across environmental, institutional, economic, and social contexts, and what are the sources of investment for large scale land transactions between 2000 and 2012?*

A significant aspect of our progress during the first project year has been collecting available data on land transactions. This required trips to Tanzania and Ethiopia, meeting with our collaborator from Liberia, and a chance meeting on a domestic US flight with the director for concessions and public-private partnerships for Liberia. As a result, we have secured information about all transactions in Liberia, a number of transactions in Ethiopia (including mapped boundaries (Fig. 1), and a commitment from the land commissioner of Tanzania to provide this information. The formats and levels of detail for these data differs across countries. In each case we are pursuing information about the area of transaction, country of origin of investor, data of transaction, and intended use. In some cases (e.g., Liberia), we have access to all the transaction agreements, which allow us to compile this information, but it is somewhat painstaking work.

As we compile this information, we are exploring the overall patterns of transactions and preparing to analyze these patterns relative to patterns of social and environmental covariates (as identified in the proposal) within each country. We are also collecting the data need for the co-variates, by accessing (through our in-country partners) national statistics offices and available environmental data sets. We are not yet at a point where we can perform the analyses, but have identified the sources of census and survey data sets and are developing analytical strategies for each country, which differ in format and specific content of the different data sets.
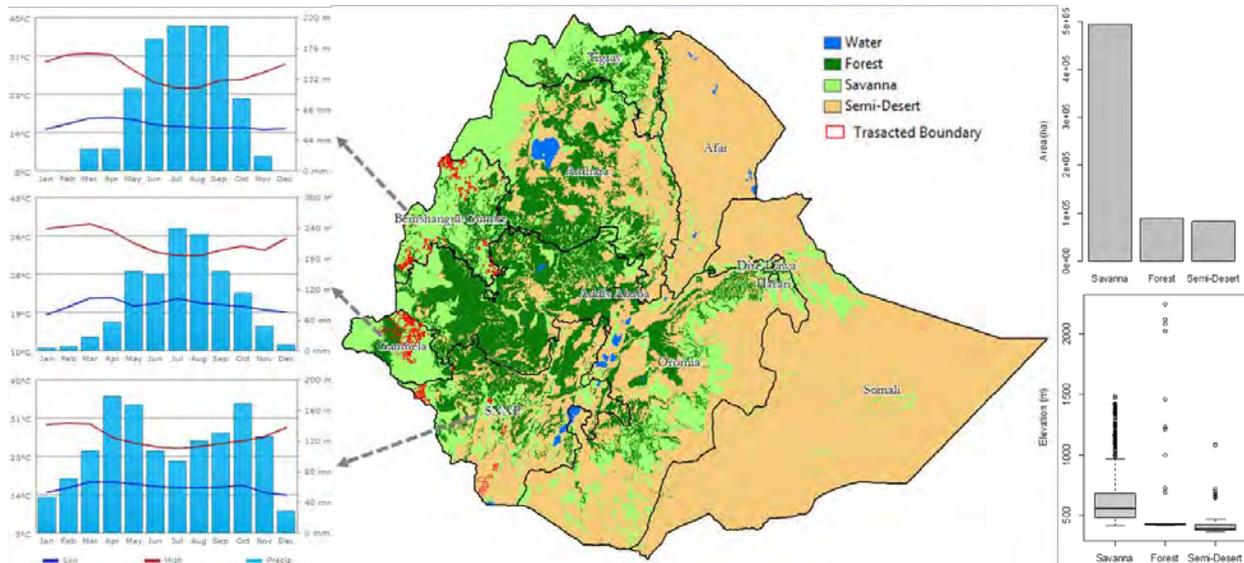
Fig. 1: Transacted areas in three provinces of Ethiopia and their distribution relative to climate and land cover patterns.

2. *How have land cover and livelihood outcomes changed in and around a selection of transacted properties, and how do these changes compare to changes observed at similar locations within the same countries?*

In order to answer this question, we are using compiled data on transactions to analyze their impacts a two primary scales. The first is to analyze the land cover changes in and around the transacted areas. In order to isolate the influence of the transaction on any observed differences in land-cover change from other possible influences, e.g., related to either environmental or social variability, we will identify areas of the same size as the transacted areas with similar characteristics. We are in the process of developing the region-growing algorithm that we will use in a propensity score matching exercise to compare land cover changes in transacted areas with those in areas that were not transacted but are otherwise similar. Land-cover change for this analysis will be analyzed through use of Hansen's forest cover change product, change in Landsat annual NDVI composites, and change in MODIS land-cover.

The second level of analysis involves sampling eight transactions within each country. We are going to sample transactions so that we have two each from the cells of two-by-two sample design based on large and small transactions and two geographic regions within each country (to reduce travel costs). Each sampled transaction will be paired with a matched control site based on the region-growing algorithm. For each transaction and control site, we will collect and interpret high-resolution satellite imagery over time (satellite image availability figures into our selection of regions). Additionally, in years two and three, we will work with our in-country partners to collect household survey information for households living in and around transacted and control sites, to be able to evaluate livelihood differences. We have begun the process of sampling and acquiring high resolution imagery in Ethiopia and will deploy similar procedures in the other two countries.

Synthesis Activities
Because this is a synthesis project, our aim is to use our empirical work as a spring board for broader discussion of the evidence for impacts of land tenure changes more broadly. To this end, we are already planning a workshop (not identified in the proposal) to be held in Ann Arbor, May 2016, with support from the University of Michigan and funding from DFID (which funds a related project on forest-sector interventions. Further, we are developing a proposal for a special session at the GLP meeting in Beijing. We had intended to hold our synthesis conference in conjunction with the GLP meeting, but the GLP meeting was scheduled earlier than anticipated. Our current plans are to propose a second meeting in Ann Arbor, with support from our NASA project and funds from the University of Michigan, to develop the synthesis products planned for the project.

Staffing
Staffing for this project has been met through employment of two new post-docs at the University of Michigan. The staff members are listed below in alphabetical order:

Suhyun Jung (PhD Minnesota) – his training is in natural resource economics, with expertise is in use of econometric methods for impact evaluation.
Chuan Liao (PhD Cornell) – his training is in natural resources, with expertise in the use of remote sensing, GIS and spatial analysis tools for resource measurement and assessment.

In-Country Collaborations
The UM team has traveled to Tanzania and Ethiopia in July 2015 to meet with our in-country collaborators and negotiate Memoranda of Understanding, which are now in place for each institution:
Dr. Felister Mombo, Dept of Forest Economics, Sokoine University of Agriculture, Tanzania
Dr. Alemayehu Ayana, Ethiopian Environment and Forestry Research Institute, Ministry of Environment
Dr. Ali Kaba, Sustainable Development Institute, Liberia

Additionally, we have been interacting with Melvin Sheriff, Director of Concessions and Public-Private Partnerships in Liberia.