An Analysis of change in Land Cover and Crops Production in Relation to Soil Types
A Case Study of Rwanda

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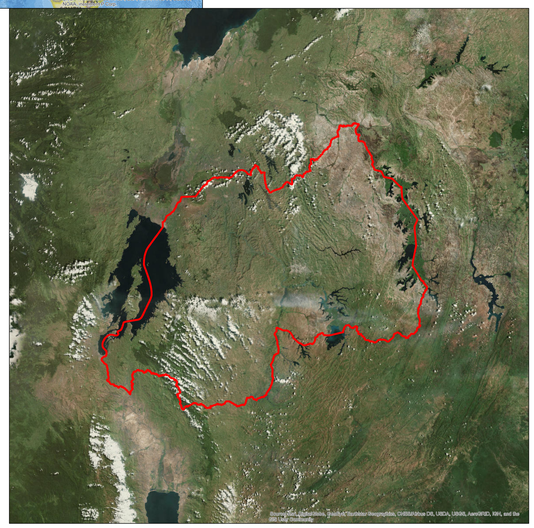
Introduction

Located in East Africa, Rwanda is a small landlocked country with an area of about 10169 mi² and a population of 12 million. It borders the far larger Democratic Republic of Congo, as well as its East African neighbors, Tanzania, Uganda, and Burundi. Rwanda is known as a country of a thousand hills for its green hilly landscapes.

Agriculture is an important sector in Rwanda because it is the main economic sector with 70% of the population engaged in the sector and around 72% of the working population employed in agriculture. The agricultural sector accounts for 33% of the national GDP. Tea and coffee are the major exports while plantains, cassava, irish potatoes, sweet potatoes, maize and beans are the most productive crops.

Since agriculture is a major sector in Rwanda, the purpose of this analysis is to understand how a change in land cover affects the lands used for growing crops and how soil types might be a factor in crops productivity in different districts of the country.



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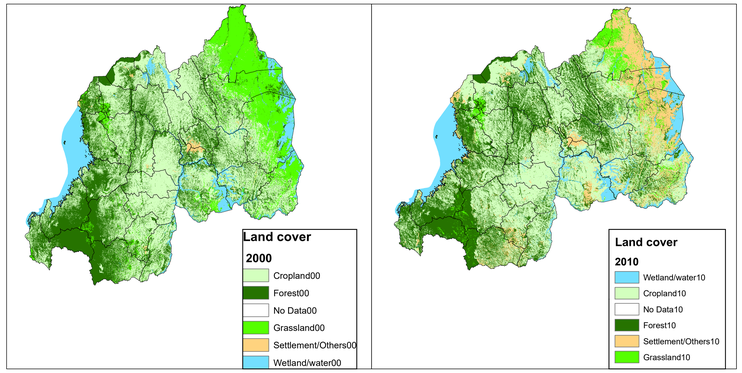
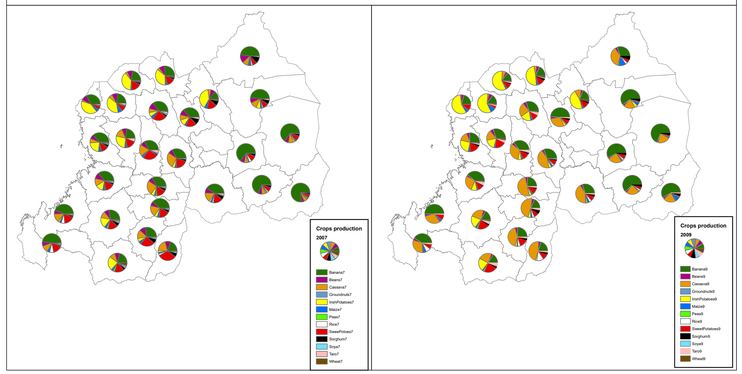
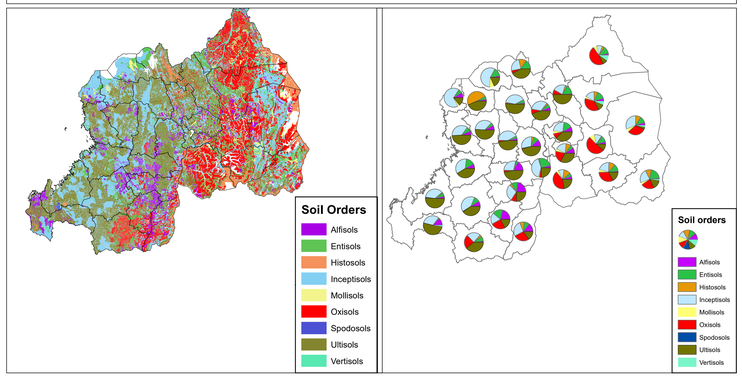
Land Cover 2000-2010



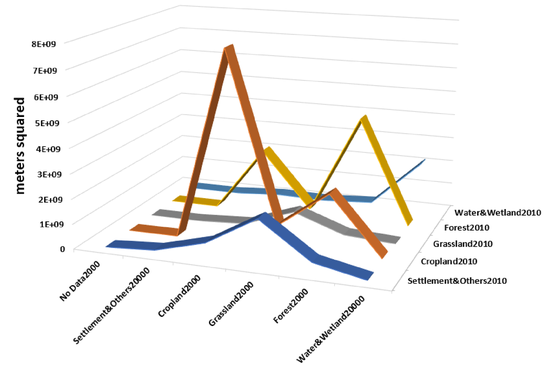
Crops Production by District 2007-2009

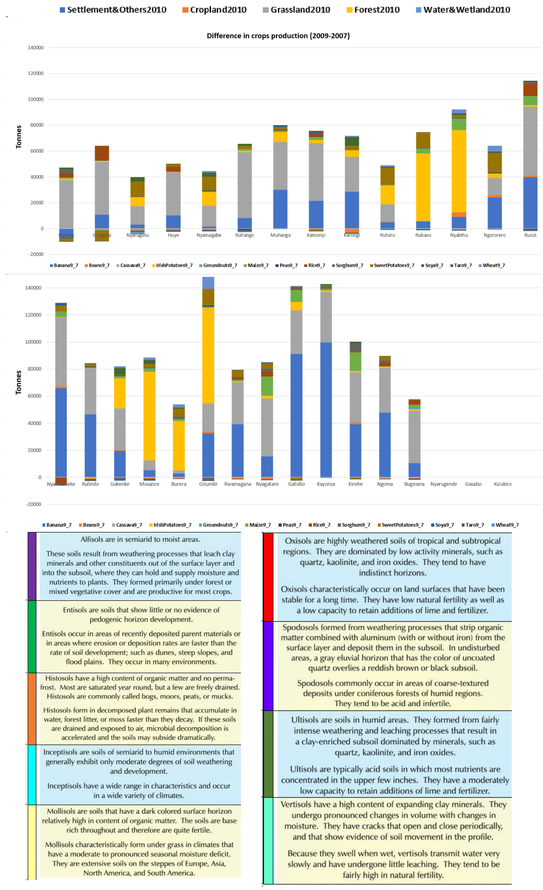


Types of Soils



Change in Land Cover (2000-2010)





Allisols are in semiarid to moist areas.
These soils result from weathering processes that leach clay minerals and other constituents out of the surface layer and into the subsoil, where they can hold and supply moisture and nutrients to plants. They formed primarily under forest or mixed vegetative cover and are productive for most crops.

Entisols are soils that show little or no evidence of pedogenic horizon development.
Entisols occur in areas of recently deposited parent materials or in areas where erosion or deposition rates are faster than the rate of soil development; such as dunes, steep slopes, and flood plains. They occur in many environments.

Histosols have a high content of organic matter and no perma-frost. Most are saturated year round, but a few are freely drained. Histosols are commonly called bogs, moors, peats, or mucks.
Histosols form in decomposed plant remains that accumulate in water, forest litter, or moss faster than they decay. If these soils are drained and exposed to air, microbial decomposition is accelerated and the soils may subside dramatically.

Inceptisols are soils of semiarid to humid environments that generally exhibit only moderate degrees of soil weathering and development.
Inceptisols have a wide range in characteristics and occur in a wide variety of climates.

Mollisols are soils that have a dark colored surface horizon relatively high in content of organic matter. The soils are base rich throughout and therefore are quite fertile.
Mollisols characteristically form under grass in climates that have a moderate to pronounced seasonal moisture deficit. They are extensive soils on the steppes of Europe, Asia, North America, and South America.

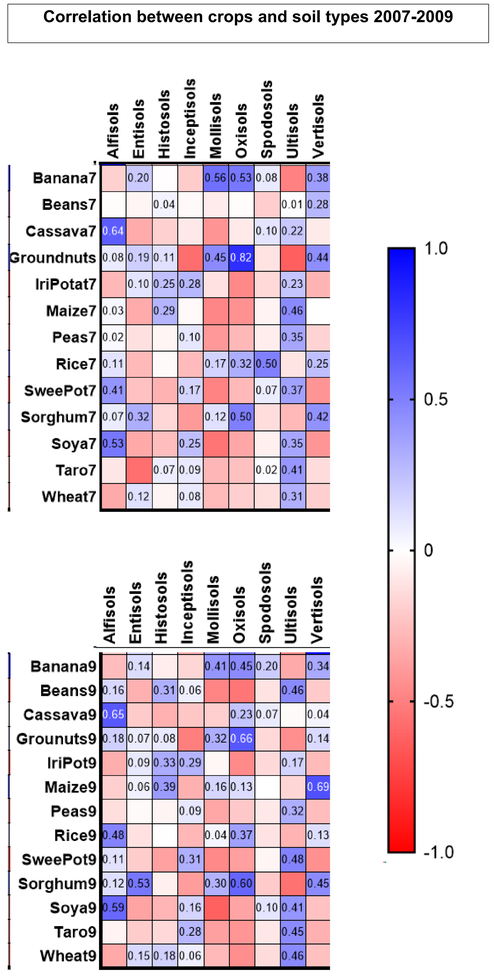
Oxisols are highly weathered soils of tropical and subtropical regions. They are dominated by low activity minerals, such as quartz, kaolinite, and iron oxides. They tend to have indistinct horizons.
Oxisols characteristically occur on land surfaces that have been stable for a long time. They have low natural fertility as well as a low capacity to retain additions of lime and fertilizer.

Spodosols formed from weathering processes that strip organic matter combined with aluminum (with or without iron) from the surface layer and deposit them in the subsoil. In undisturbed areas, a gray eluvial horizon that has the color of uncoated quartz overlies a reddish brown or black subsoil.
Spodosols commonly occur in areas of coarse-textured deposits under coniferous forests of humid regions.
They tend to be acid and infertile.

Ultisols are soils in humid areas. They formed from fairly intense weathering and leaching processes that result in a clay-enriched subsoil dominated by minerals, such as quartz, kaolinite, and iron oxides.
Ultisols are typically acid soils in which most nutrients are concentrated in the upper few inches. They have a moderately low capacity to retain additions of lime and fertilizer.

Vertisols have a high content of expanding clay minerals. They undergo pronounced changes in volume with changes in moisture. They have cracks that open and close periodically, and that show evidence of soil movement in the profile.
Because they swell when wet, vertisols transmit water very slowly and have undergone little leaching. They tend to be fairly high in natural fertility.

Correlation between crops and soil types 2007-2009



Conclusion

The land used for growing crops did not experience much reduction in area as other landcovers from 2000-2010 because crops productivity increased or reduced by a few tonnes in that period.
There is a consistent correlation in soil types and crops productivity in the years of 2007 and 2009. For instance, Cassava is more prevelant in areas with Alfisols in both years, Bananas are more prevelant in areas with Oxisols and Mollisols in both years as well, and Sweet Potatoes are more successfully grown in areas with Ultisols in both years.
So, since crops were grown in the same soil types and on the same lands in the period of 2000-2010, crops productivity influences the use of land in the different districts of the country.