

Food Security, Development, and Land Degradation: Developing a Quantitative Methodology

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Process and Effects of Land Degradation

- Depletion of the natural endowments of the soil, as well as losses in water resources
- Land is a finite resource that must be conserved in order to maintain the fruits of productivity
- Land degradation results in excess spending on inputs or loss of profit from yield

Land Degradation and Food Security

- Individuals' ability to acquire food depends on the inter-relationship of their income to the price of agricultural goods
- Nations such as those in sub-Saharan Africa with high populations of farm laborers are sensitive to income losses from agricultural labor markets
- Land Degradation results in either a loss of agricultural employment opportunities or increases in food prices contributing to food insecurity

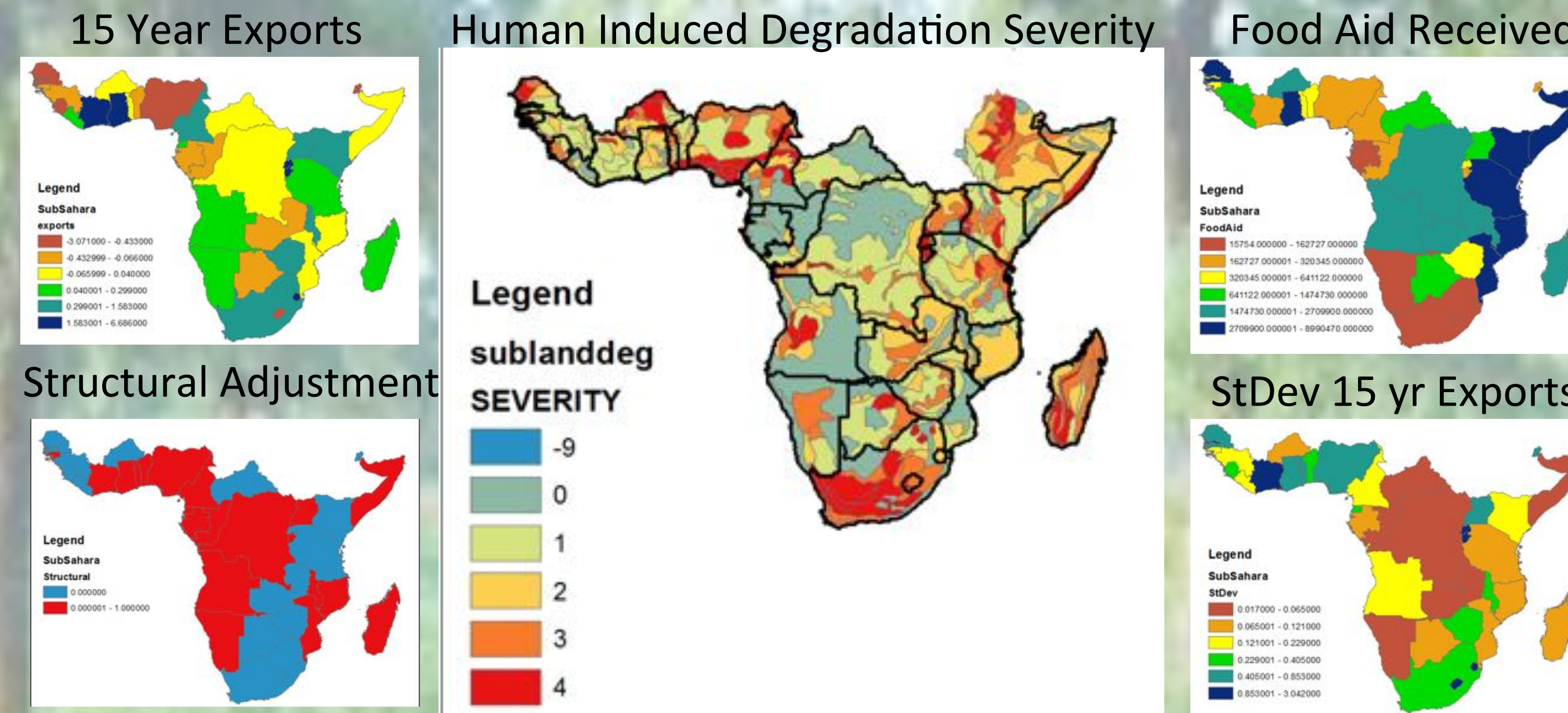
Farmers, Governments and Incentives

- ECONOMISTS MAINTAIN THE MARKET INCENTIVISES FARMERS TO CONSERVE LAND, SOIL SCIENTISTS BELIEVE THAT THE INCENTIVES ARE INADEQUATE TO FOSTER CONSERVATION
- Land degradation incurs a long term cost on farmers, however short term profit or subsistence needs may make long term conservation impractical or impossible
- Efficiency gains that the farmer creates are experienced by society as a whole not the farmer
- Governments through taxes, subsidies, and exchange rate valuations incentive farmers to act in various manners
- Farmers incentives are the result of a matrix of economic conditions that may be best captured through proxy measures such as: EXPORTS, FOOD AID, and STRUCTURAL ADJUSTMENT

Methods

- Download political map and GLADSOD
- Select states in sub-Saharan Africa
- Clip GLADSOS with nations state layers
- Export degradation severity attributes for each nation
- Calculate weighted average of degradation severity
- FAO data Exports 1975-1990, total food aid
- Normalize by area
- Absolute value of exports and structural adjustment
- SPSS bivariate analysis between weighted average and independent variables: exports, stDev(exports), absolute value of exports, food aid, structural adjustment

Research Question: How does the economic environment of a nation, indicated by export trends, food aid, and structural adjustment implementation correlate to patterns of land degradation

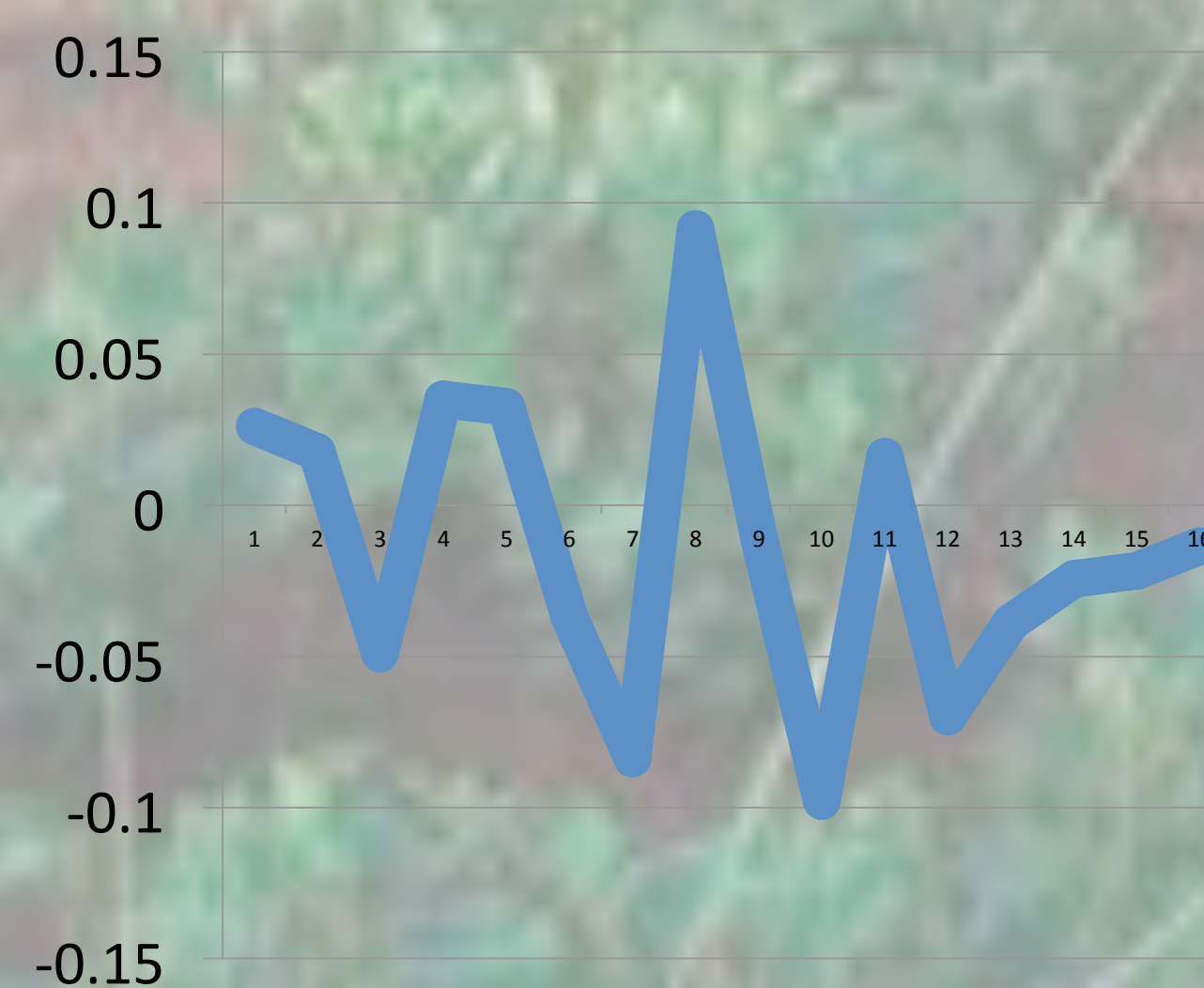


		Exports	Stdev Exports	Food Aid	Structural Adjustment	Absolute Value
Severity	r	0.013	0.314	.378*	-0.252	0.31
	N	36	36	36	36	36

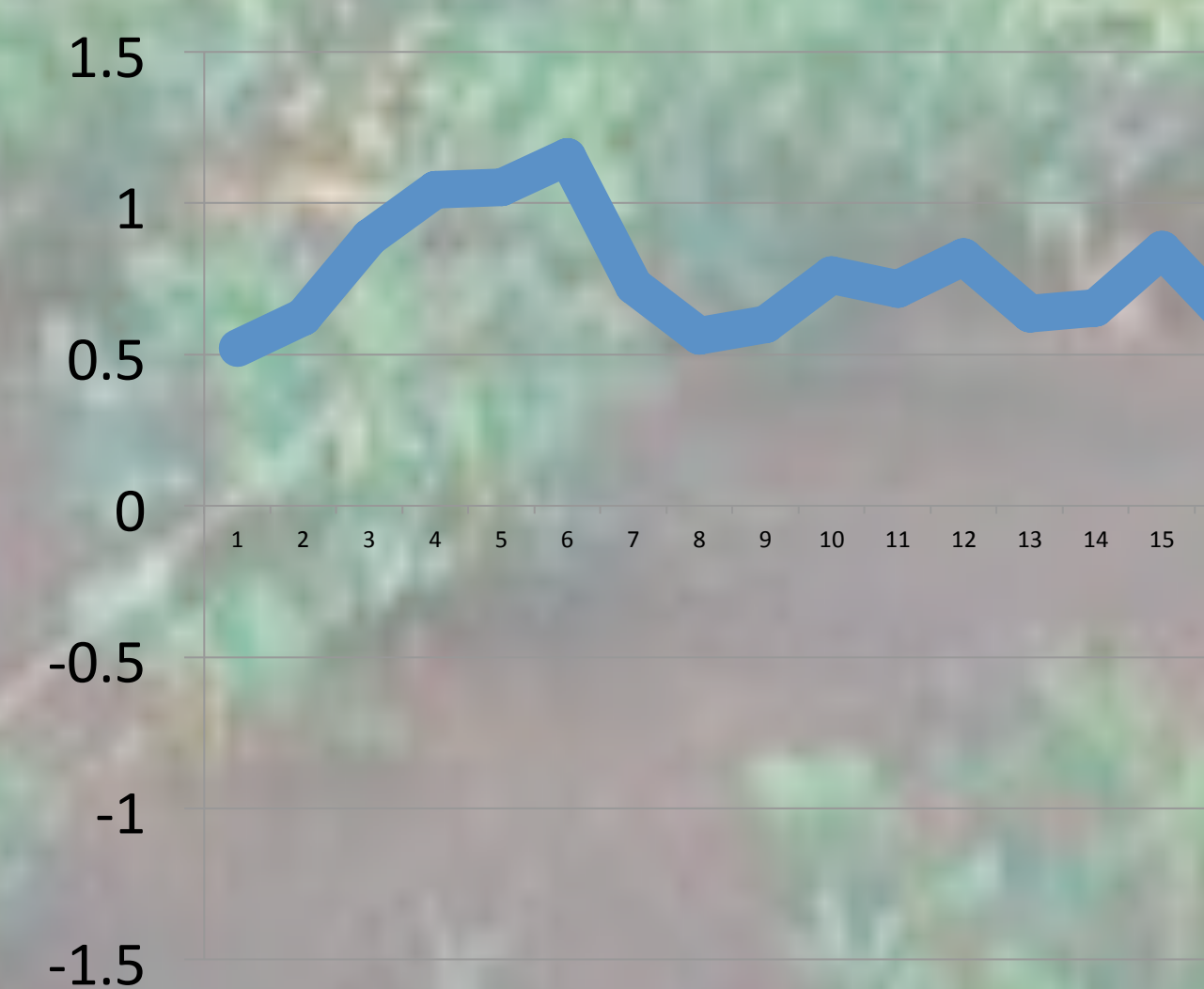
Results

- Food aid significant, however causal relationship unknown
- Absolute value significant, indicating extreme export/import may be associated w/ degradation
- Standard Deviation of Exports significant indicating that changing practices may be associated with degradation
- Difference between export patterns in Somalia and Cameroon illustrate why significance is difficult to achieve

Somalia 15 year exports



Cameroon 15 year exports



Difficulties within methodology

- Time
 - GLADSOD map does not show land degradation through time
 - Time lag between land degradation process and sociopolitical systems difficult to capture
- Space
 - How does GLADSOD treat modernization/urbanization
 - Area normalization assumes each nation is equally endowed with productive capacity
 - Lack of regional specificity
- Complexity
 - Integrating land, social, and climatic data
 - Rain->erosion
 - Drought-> nutrient loss
 - Expert Survey GLADSOD Methodology

Moving Forward

- Population growth will continue
- Food production will have to expand to meet future demand
- Sub-Saharan Africa is home to large stretches of valuable wilderness that will come into conflict with expanding agricultural lands
- Preservation of wilderness thus depends on understanding how to maintain quality of existing agricultural lands
- In addition reducing efficiency losses to degrading process will augment food security in the region by stabilizing agricultural employment
- Creating methodologies that can accurately correlate government actions to land quality can help governments plan land use patterns and foster development

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