

Mapping Agrarian Distress in India

INTRODUCTION

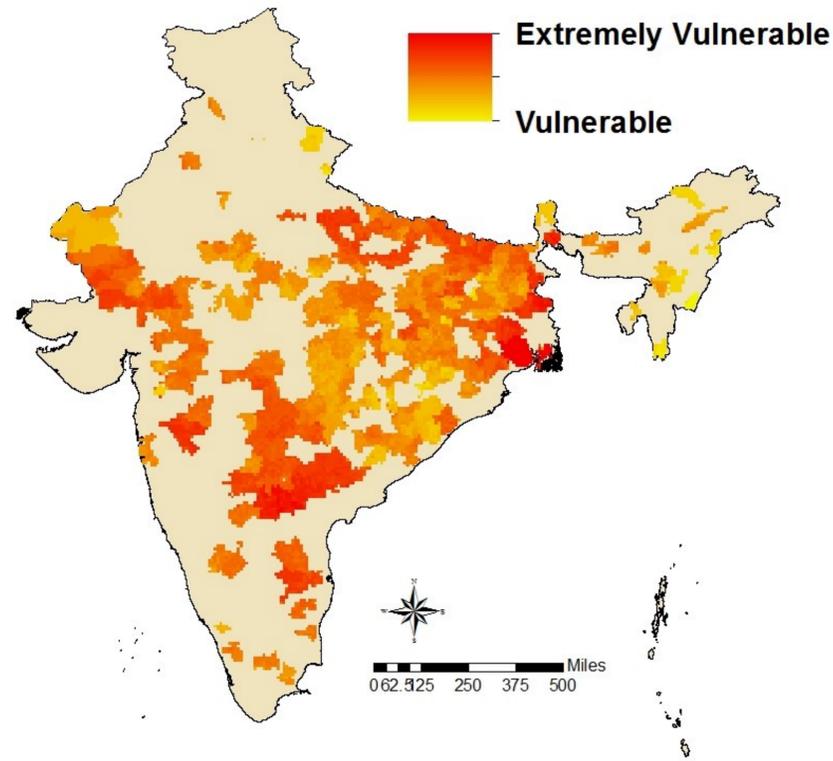
The Green Revolution and Trade Liberalization has pushed many farmers to switch to monoculture cash cropping, promising agricultural prosperity through the global export market. In actuality, this transition has made many rural farmers, particularly in developing countries and the Global South, extremely vulnerable to global market price volatility. Not to mention climate conditions, water stress, extreme weather events, and their predicted intensification due to climate change leaves farmers and agricultural workers susceptible to debt and distress. Agrarian Distress, is a term typically used to describe the increasing number of farmer suicides within India and the socio-political, economic, and environmental conditions causing this phenomena. Agrarian Distress has been said to be caused by indebtedness, lack of landownership, crop failure, and lack of rural development and government support for the agriculture sector. There are many organizations interested in promoting sustainable development and creating sustainable livelihood opportunities for vulnerable populations within India. To explore **which areas within India are the most vulnerable to agrarian distress and decide where sustainable living programs should be prioritized** I pursued varying demographic, social, and environmental indicators to map Agrarian Distress vulnerability within India. Understanding where and how agrarian distress is manifested is an issue of extreme importance, especially in India where agriculture provides livelihood for two-thirds of the country's population (Sharma, 2012).

INDICATORS & ASSUMPTIONS

- **Total Agricultural Workers:** Districts with High Numbers of Total Agricultural Workers considered more vulnerable.
- **Backward Regions Grant Fund (BRGF) Receiving Districts:** Districts entitled to larger BRGF grants considered to be more vulnerable.
- **Scheduled Tribes Population:** Districts with high total scheduled tribe populations considered more vulnerable.
- **Scheduled Caste Population:** Scheduled Caste is used to describe disadvantaged caste populations (Dalits) within India. Districts with higher numbers of people belonging to scheduled caste were considered more vulnerable.
- **Female Unemployment Rates:** Districts with high number of unemployed females considered more vulnerable.
- **District Unemployment Rates:** Districts with high number of unemployed people considered more vulnerable.
- **Flood Severity:** Areas with higher flood severity considered more vulnerable.
- **Drought Severity:** Areas indicated as having higher drought severity considered more vulnerable.
- **Groundwater Stress:** Areas with higher groundwater stress considered more vulnerable.
- **Total Cultivated Land:** Areas with more cultivated land considered more vulnerable.
- **Suicide Rates:** States with high suicide rates considered more vulnerable.
- **Illiteracy:** Districts with high number of illiterate people considered more vulnerable

To get a better sense of the individual indicators that I used, you can see the individual maps along the borders of this poster. If further in depth analysis were to be done, I recommend analyzing suicide rates related specifically to farmer suicides, focusing more attention to areas with high numbers of marginal agricultural labors, including land ownership, and access to irrigation to improve the analysis.

AGRARIAN DISTRESS VULNERABILITY



METHODOLOGY

Individual map layers were created using demographic data from the India Census as well as information from the National Institute of Rural Development Data, the National Crime Records Bureau, the World Resource Institute Global Water Risk Data, and the FAO's Total Cultivated Land Data. Some of these layers are displayed as Individual maps on this poster.

I then converted all these layers, which were mostly in vector polygon format, to rasters and reclassified them all into five natural break categories ensuring that their specific variables coordinated from low to high for their individual agrarian distress vulnerability characteristics. I then labeled each of these indicators to match the following label scheme by labeling the class breaks from 1 (least vulnerable) -5 (more vulnerable).

SPATIAL ANALYSIS

I used a Raster Calculator to combine my reclassified raster layers for my vulnerability analysis. By using the Raster Calculator tool, I created an "Additive Model" by adding the 12 reclassified layers together to get a new raster with values ranging from a possible score of 12 (least vulnerable) to 60 (most vulnerable).

It turned out that vulnerable areas ranged from values between 14 to 51, meaning that they experienced between 2 to 10 variables. I demonstrated this layer as stretched values along a color ramp to highlight that those which experiences a high number of variables (up to 10) as deep red to those experiencing less variables (as low as 2) in yellow. I displayed this raster layer on top of a polygon shape file outlining the political borders of India. Those experiencing up to 10 variables were labeled as "extremely vulnerable", whereas those experiences as low as 2 are considered "vulnerable".

The results are visually demonstrated by the Map in the Center of the Poster, in which all the areas

CONCLUSIONS

highlighted indicate they are experiencing indications or vulnerability of agrarian distress. I recommend promoting sustainable livelihood opportunities such as education, skill training, financial skills and management tools, and increasing investments into infrastructure, technology, and institutions especially related to agroecology in these extremely vulnerable areas. Sustainable living programs should be implemented in all of the highlighted regions, in particular those indicated as extremely vulnerable.

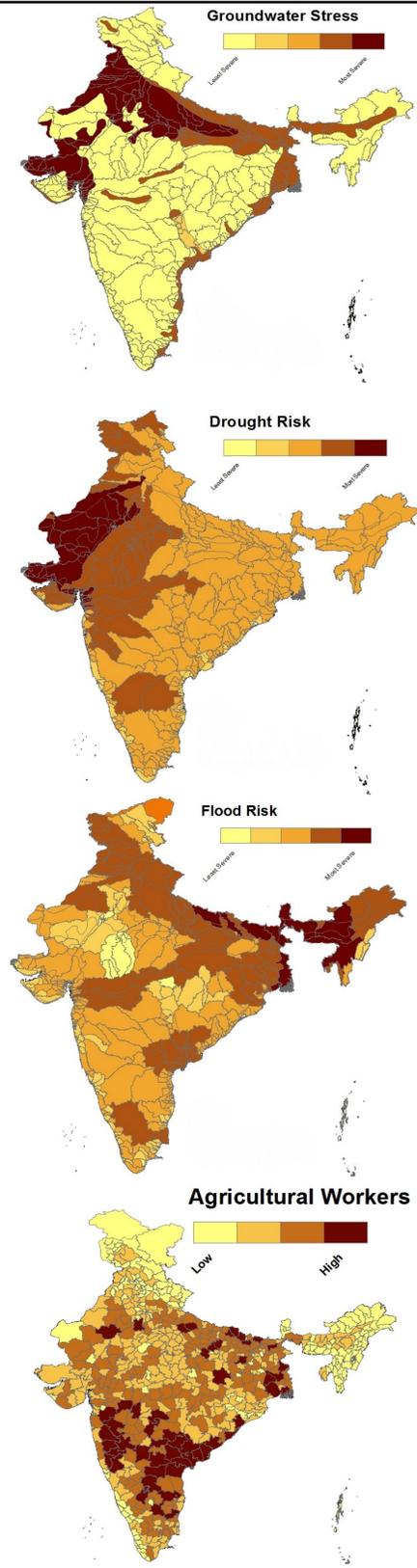
Cartography by: Allison Platt, UEP 232

Projections: WGS_1984

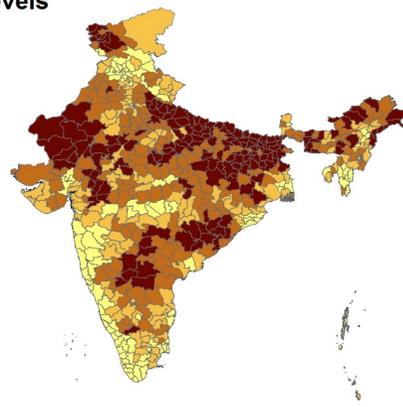
December 17, 2015

Data sources: GADM, India Census 2011, National Institute of Rural Development Data (2015), the National Crime Records Bureau (2014), the World Resource Institute Global Water Risk Data (2015), and the FAO's Total Cultivated Land Data (2015).

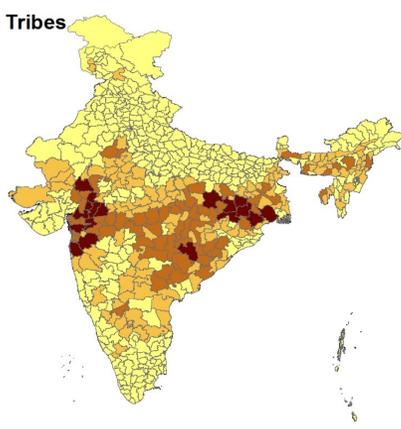
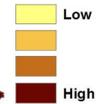
References: Sharma, H. R.. Agrarian Distress in India: Problems and Remedies. *Indian Journal of Agricultural Economics*. Jan-Mar 2012; 67, 1.



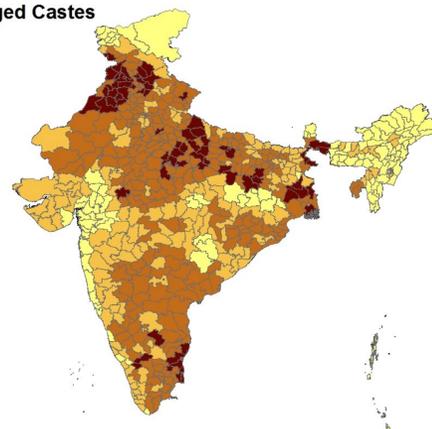
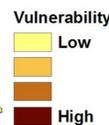
Illiteracy Levels



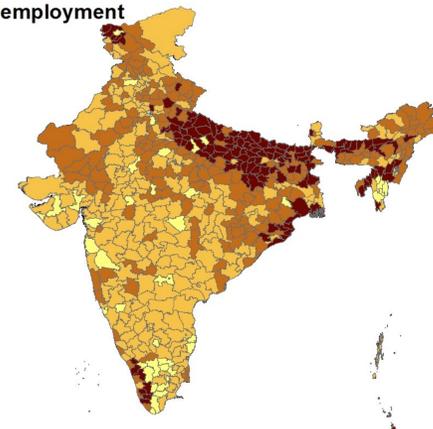
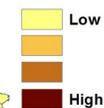
Disadvantaged Tribes



Disadvantaged Castes



District Unemployment



"Backward" Regions

