Tufts

West Bengal's Rural Water Sector—An Introductory Spatial Analysis Using ArcGIS

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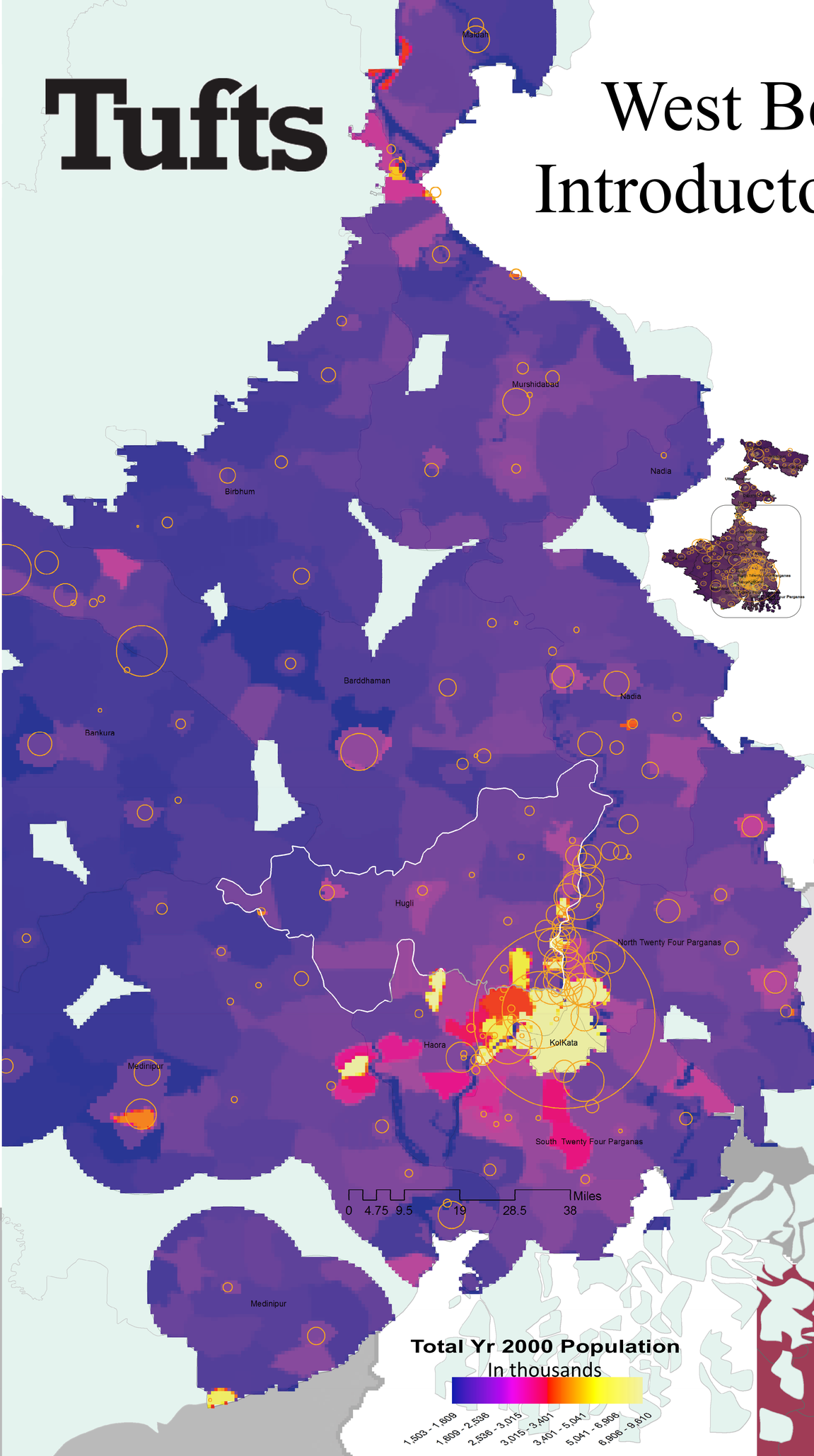
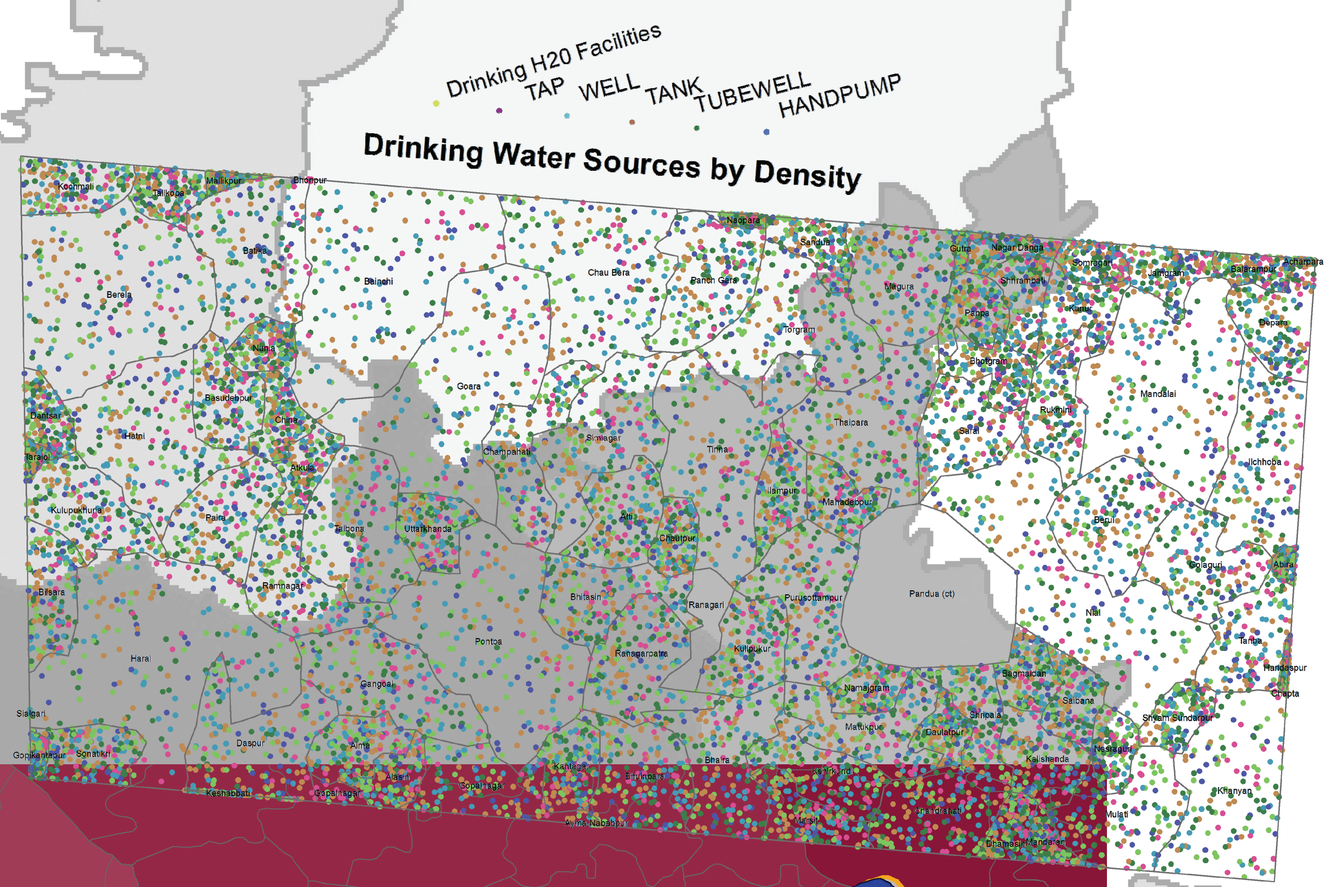
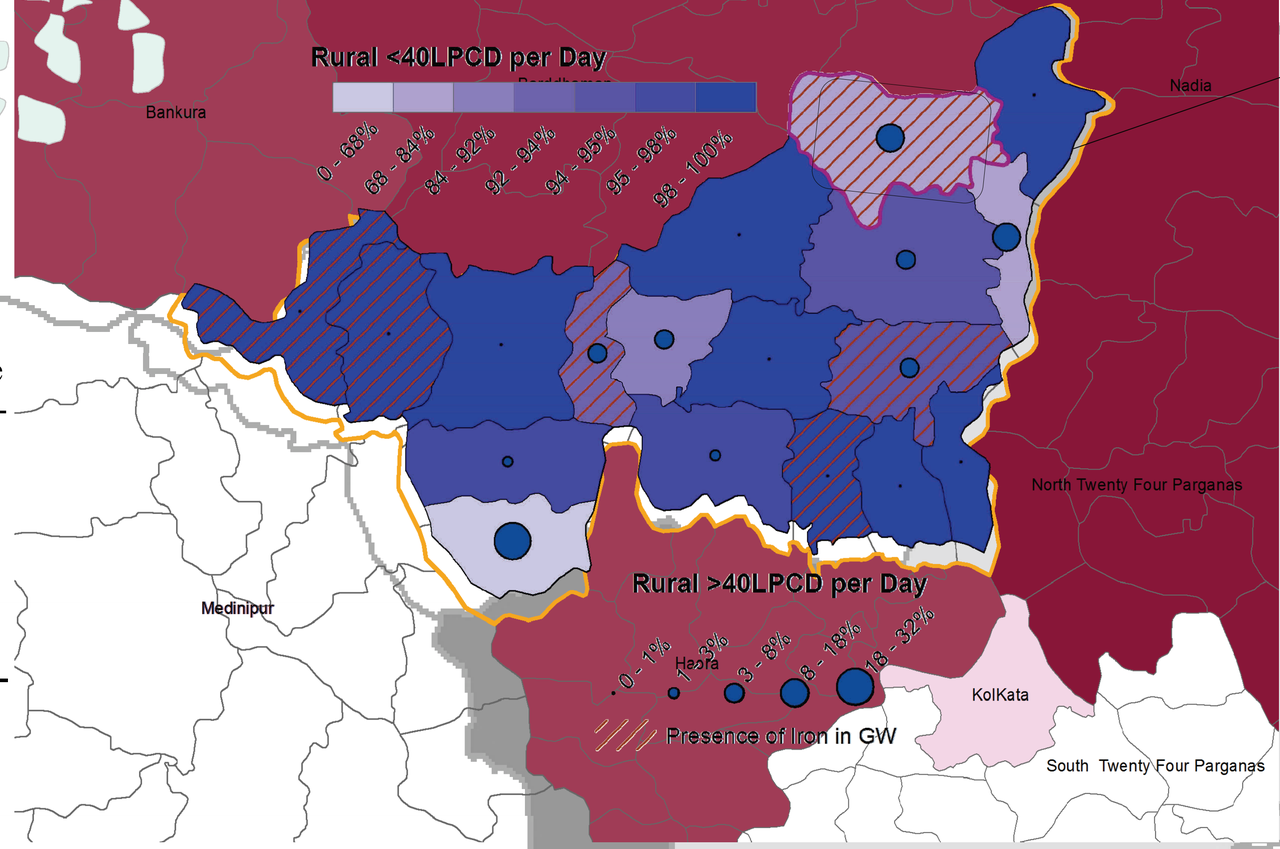
Information gathered from: CEISIN Global Rural-Urban Mapping Project and Gridded Population of the World http://sedac.ciesin.columbia.edu/gpw/country.jsp?iso=IND
India-WRIS WebGIS. Department of Drinking Water and Sanitation portal. http://www.india-wris.nrsc.gov.in/
Indian Ministry of Drinking Water and Sanitation portal. http://indiawater.gov.in/imisreports/nrdwpmain.aspx



Proposal and Methodology

The purpose of this project is to outline one aspect of one of the government of India's water sector schemes—namely, the Rural Drinking Water scheme. In developing an area for analysis, areas of high population density and proximity to urban areas was of particular focus, because it may be considered that areas within a buffer range of large urban areas might reap better benefits from their proximity to urban regions, such as having comparable civil services. After analyzing the population density for West Bengal and a map of rural drinking water coverage for the state and its districts, the focus was one district (Hugli) with particularly low rural drinking water coverage and high proximity to a massive urban region (Kolkata). Within Hugli, the sub-district of Pandua was analyzed for its drinking water sources. It must be noted that the base year for this study and all analysis is 2000, because it was the highest common denominator in all analyses.





Methods and Results

West Bengal's Urban Extents with Population Density: CEISIN Rural/Urban population grid (rasterized), CEISIN Urban Extents points, a 10 mile buffer shapefile of the Urban Extents points, and State of West Bengal polygon. The resulting map shows that the population densities and urban extents are highest around Kolkata, the state capitol, located in the southeast districts.

West Bengal Rural Drinking Water Coverage by District: State of West Bengal and a table of West Bengal's percent-wise rural drinking water coverage. This is the background for District of Hugli analysis.

District of Hugli Rural Population with Iron-Contaminated Groundwater: District-wide shapefile, and three Hugli district shapefiles clipped for: presence of iron in groundwater, population covered with less than 40 LPCDs drinking water per day, and those with more than 40 LPCDs per day. This map reveals the amount of water individuals were receiving on a daily basis in the sub-districts.

It was at the sub-district level that the research began to give substantial results. First, although at the sub-district level the population coverage was high, it was only by looking closely that one would see that 'coverage' meant. There was a high percentage of the population which were provided less than 40 liters per capita per day (LPCD). The point densities provide a percent rate of the rural population with *more than* 40 LPCDs per day—an astoundingly low percentage.

Sub-District of Pandua Villages Drinking Water Source Points: Unfortunately the data in this sub-sub-region was very limited—the downloadable data for this layer was limited to 200 square kilometers. Overall, this map gives a general idea of which regions within the sub-district have such technologies. Their locations are not given as coordinates and their presence is merely marked as either 1(present) or 0 (absent), with drinking water sources present shown by density per source.

Conclusions

The overall conclusion found from performing this study is that spatial analysis of India's water sector is being done in small bites, with special focus given to rural progress. An effort has been made here to combine statistical and spatial data. Further analysis might combine information on the political and social structures in rural areas that underpin these efforts. In addition, the use of a spatial layer on the functionality of the existing drinking water sources can provide valuable information in determining the efficacy of local *panchayats* in serving its village with the given infrastructure. Although according to some Indian scholars the democratic process of a participatory civil society is the most prideful and important of Indian civic pursuits, impact assessments have determined that decentralization of authority has led to inefficiencies and loss of accountability in resource management. If it is going to be done efficiently, it may be best to centralize the responsibility of building sustainable infrastructure on the large scale to India's central government. Spatial analysis using GIS technologies and remote sensing can be effective tools for planning a new infrastructure system, but as a method for determining the efficacy of current infrastructure the current project reflects the redundancy of previous studies in beginning to suggest that the current system is not efficient or sustainable for the rural population.