

In situ Urbanization in India: Evidence from 30 years of settlement-level census data

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Urban growth in poor countries is commonly parsed into three distinct contributions: urban natural increase; net in-migration; and an ill-defined third category known as reclassification. Even when net migration data are available, reclassification is exceedingly difficult to measure with national-level data, and is therefore often consigned to the residual in growth accounting. This is unfortunate, for of the three contributions to growth, reclassification is perhaps the most intimately related to the political economy of national, urban, and city-specific development. In India, the process by which rural villages are merged into and reclassified as components of municipalities is typically contentious, often involving years of back-and-forth during which development plans are proposed by the absorbing municipality only to be met with resistance or at least hard bargaining on the part of village leadership. Village leaders are rightly concerned with the fundamental question of political economy: “Which kind of government would best know our needs and strive to meet them?” Once local agreement on a development plan has been hammered out, further approvals must then be sought at the state level, where decision-makers can take a dim view of the loss of access to rural-specific development funds that village reclassification would imply, and may be unconvinced of the potential of urban development funds to make up the difference.

This paper investigates the empirical determinants of reclassification in India, using detailed, spatially-specific, settlement-level socioeconomic data from the censuses of 1991, 2001 and 2011, complemented by high-resolution (250 meter) remotely-sensed data that span the period from 1990 to 2015. We ask whether the socioeconomic characteristics of a village, and its location vis-à-vis nearby cities and towns, are predictive of reclassification over the 1991–2001 and 2001–2011 intercensal periods. We give close attention not only to legal reclassification, but also to two transitions of village status which in India are often seen as precursors to it: the designation of villages as *census towns* or *outgrowths* of statutory towns.¹

Village- and town/city-level data To examine the reclassification process in the depth it deserves, we draw on settlement-level census data from the Indian censuses of 1991, 2001, and 2011, which include detailed tabulations of village-level populations, numbers of households, literacy and educational levels, workforce composition, housing quality, and access to adequate drinking water, sanitation, and electricity, all of these being factors that can shape views of the net benefits to be secured through reclassification. These census data are available for over 600,000 individual villages in 2011, and similarly for the earlier two censuses. The data include spatial coordinates

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¹The main focus of our empirical analysis is on the steps by which rural villages make their way to legally urban status. Transitions from legally urban back to rural also take place, if only rarely. It is not uncommon, however, for census towns to be reclassified as rural. We will explore these transitions.

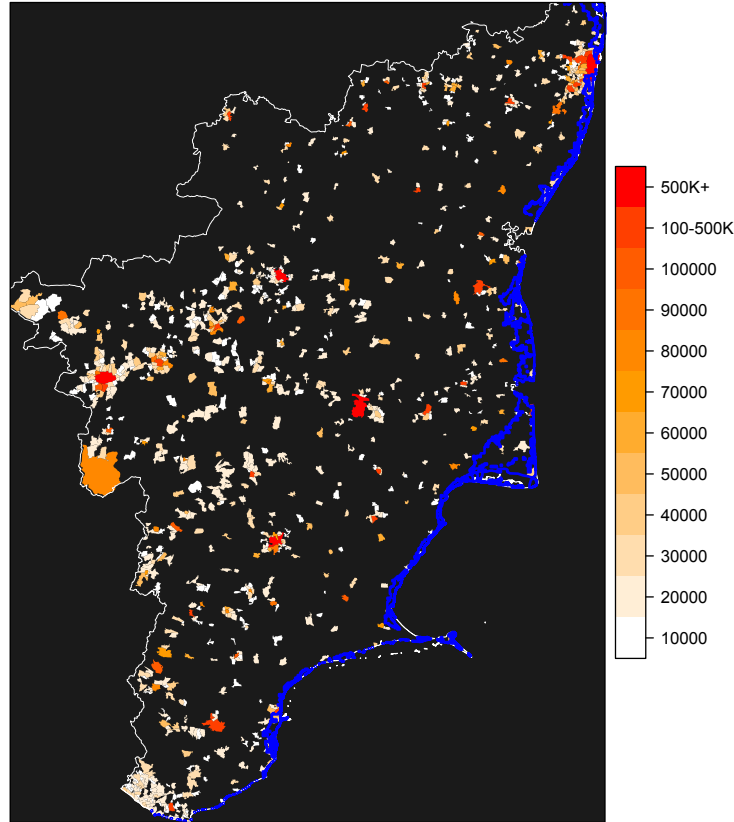


Figure 1: The boundaries of the cities and towns of Tamil Nadu, with population as recorded in the 2011 Indian census. (The low-elevation coastal zone is shown in blue.)

pinpointing village locations, as well as demographic data and spatial boundaries for all of India’s urban localities. (See Figure 1 for the cities and towns of Tamil Nadu in southeastern India. There are thousands of tabulated and spatially located villages in this state; they are too numerous to show in the figure.) With the data available, we are able to situate individual villages in the spatial and socioeconomic context of all neighboring and nearby urban and rural settlements.

The census data also provide socioeconomic detail on two types of settlements that occupy a kind of intermediate status between the wholly rural and the legally urban: census towns and outgrowths. As the name suggests, *census towns* are settlements that are designated as urban for the purposes of an upcoming population census, on the basis of criteria that, in practice, are at least partly worked out in consultations between the census authorities and state-level officials (Kundu 2014; Kundu and Saraswati 2016; Pradhan 2012). Census towns can then transition in the post-census period either to become new statutory-urban settlements or merge into pre-existing cities and towns. Until that transition occurs, however, they remain legally rural. *Outgrowths* are areas of high-density, arguably urban settlement that are spatially adjacent to statutory cities and towns, and which would thus seem to be poised on the threshold of becoming legally urban. In the meantime, however, they too continue to be governed by rural authorities. The intermediate status of outgrowths is captured in the identifier codes that in India, mark settlements as officially urban or rural: outgrowths are assigned *both* codes, receiving a village code and also a code defining the outgrowth as a “ward” of the statutory town. Figure 2 shows these quasi-urban classifications—census towns and outgrowths—in addition to statutory towns. As can be seen, most but certainly

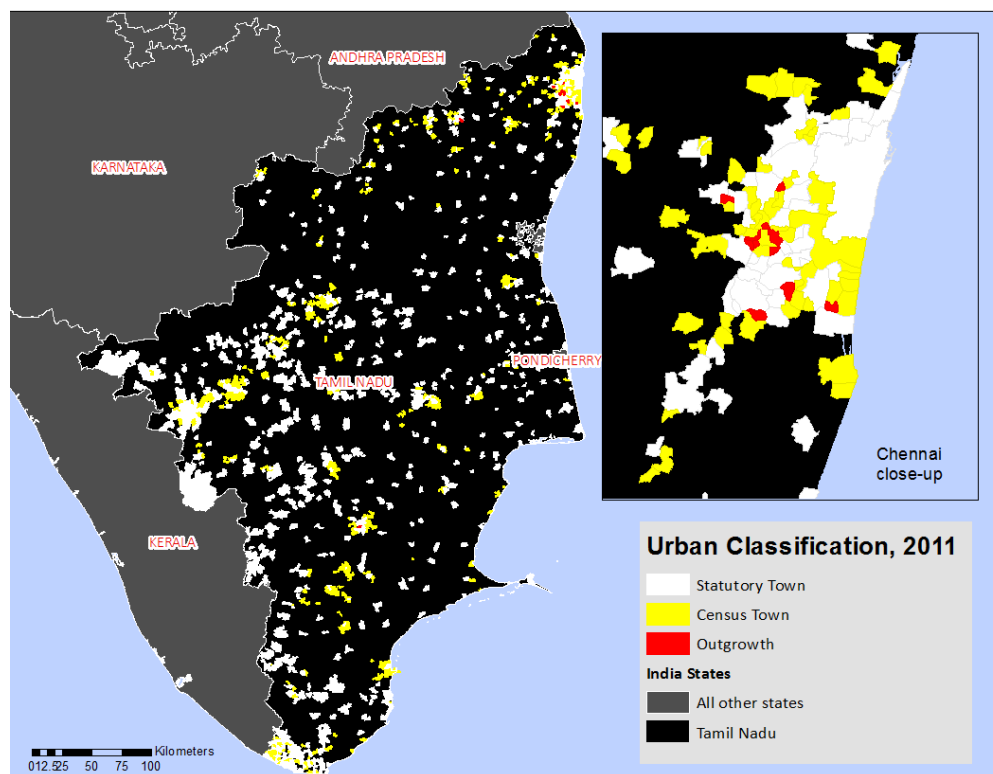


Figure 2: Statutory towns, census towns, and outgrowths in Tamil Nadu, 2011.

not all of the census towns are situated near statutory towns. Outgrowths, which are by definition adjacent to an existing statutory town, are shown for Chennai.

Such settlement-level data shed light on long-standing puzzles about the level and nature of urbanization in India (Deuskar and Stewart 2016; Denis and Marius-Gnanou 2011; Bhagat and Mohanty 2009). The southern Indian state of Kerala is often cited as an example of seriously under-estimated urban percentages, owing to the disinclination of the state government to lose rural development funds by allowing large villages to become statutory towns. Our calculations reveal how important census-town designations are to Kerala's overall percentage urban. The 2011 Census put the urban percentage of India as a whole at 35.1 percent, with census towns accounting for only 4.2 percentage points of the total. In the state of Kerala, however, roughly 50.8 percent of the population is urban, a total well above the all-India average, with census towns accounting for almost 29 points of this total. Indeed, had the census towns of Kerala been ignored, only 21.9 percent of the state's residents would have been counted as urban. Since the status of "census town" holds only for a given census, these towns can transition from rural village to census-urban status and then back, or alternatively can go on to become statutory urban, a complication that induces confusion about the longer-term meaning of India's urban percentages and which obscures the true pace of the country's urbanization.

Transitions to legally urban To identify legal changes in village status, we have supplemented the census data with records drawn from India's *District Census Handbooks* that identify the villages (by district, subdistrict, village name, and code) that were formally merged into urban areas between one census and the next. These *Handbooks* also record changes of villages to census towns and outgrowths. Figure 3 shows (in red) the districts of India in which transitions to census

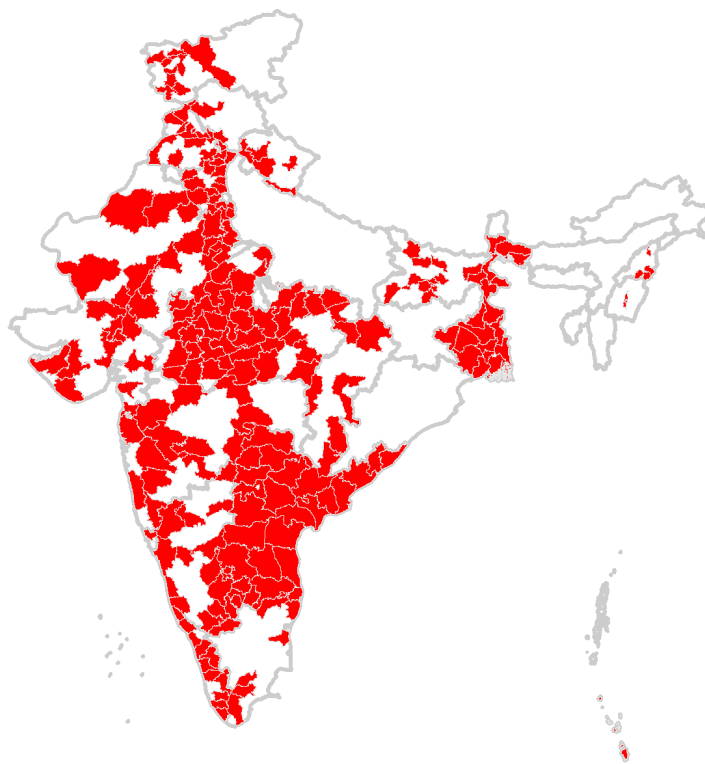


Figure 3: Districts of India in which 2011 *District Census Handbooks* record village reclassifications, or transitions to census towns and outgrowths, taking place between the 2001 and 2011 censuses.

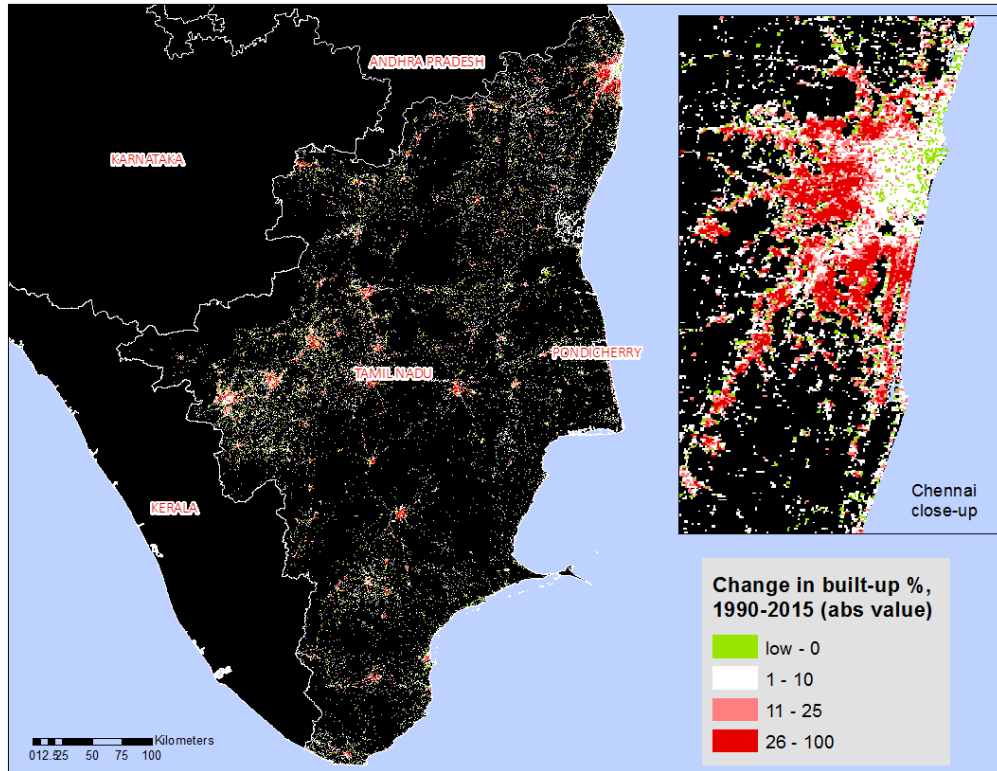


Figure 4: Percentage-point changes from 1990 to 2015 in the degree to which GHSL 250-meter pixels are built-up.

towns, outgrowths, or reclassifications took place between the 2001 and 2011 censuses. As the map indicates, some Indian states—e.g., Uttar Pradesh, Odisha—are evidently reluctant to allow rural-to-urban reclassification to take place.

Remotely-sensed data In addition to the census data, for 1990, 2000, and 2015 we have access to high-resolution satellite data: the Global Human Settlement Layer [GHSL], which measures the density of structures within 250-meter grid cells (Pesaresi et al. 2015). These satellite data allow us to trace with good precision the spatial evolution of high-density growth taking place near individual villages and towns, by which (for example) corridors of development can arise that link formerly isolated villages with nearby urban centers, thereby providing a rationale for integrating such villages into a broader governance units. These data can also expose patches of growth and development that might have been officially designated as outgrowths, but which curiously failed to be so designated by the Indian authorities. Figure 4 depicts the changes in the GHSL density-of-structures measure from 1990 to 2015—what’s shown is the change in the built-up percentage of each grid cell—within Tamil Nadu and the environs of Chennai in particular. It is evident from the Chennai close-up that much development occurs on the periphery of cities as well as in corridors between cities.

Empirical methods These rich data resources, available for the 1991, 2001, and 2011 census, and further enriched by the GHSL satellite data, provide the means of studying reclassification—or what some would term *in-situ urbanization*—by using the census-collected indicators of the type and internal composition of each formally rural settlement that is plausibly “at risk” of being reclassified.

The definition of “at risk” clearly must begin with the location of the village vis-à-vis neighboring cities and towns. The essence of our method is to construct a spatial buffer extending beyond the outer boundaries of cities and towns, such that any villages falling into the buffer are considered to be candidates for reclassification over the upcoming intercensal period. A complicating factor in implementing this idea is that in the 2001 and 1991 spatial data, villages, towns, and cities are all represented as points rather than in terms of the more realistic polygon boundaries that later came into use in connection with the 2011 census. Fortunately, the GHSL remote-sensing data available for 1990 and 2000 will reveal clusters of settlement around the urban points of 1991 and 2001, and in this way will inform the design of the spatial buffers. Additionally, the buffers defined for cities and towns in 1991 and 2001 can be shaped with reference to the 2011 polygon boundaries of these places, allowing the buffers for 2001 and 1991 to extend somewhat beyond the 2011 boundaries.

Given a spatially-defined set of villages that are candidates for transition as of census year $t = 1991, 2001$, we incorporate their demographic and socioeconomic features into probit models of the form $Y_{i,t}^* = \mathbf{X}_{i,t}'\beta + \epsilon_{i,t}$, in which $Y_{i,t}^*$ represents the propensity for village i to be reclassified before the next census (the observed variable $Y_{i,t} = 1$ when reclassification takes place), and $\mathbf{X}_{i,t}$ represents the explanatory variables. The distance from the village to the urban buffer will be included in the explanatory variables, as will the total population of the village. Because India's states vary greatly in the extent to which they depend on rural development funds, we include state-level dummy variables to capture such local public finance considerations.

Of greater interest is the composition of the village workforce, as indicated by the percentage of its adult men and women who are engaged in agricultural employment (including both the permanent cultivators and “marginal” landless workers who work on a seasonal or part-time basis). Villages with high proportions of agriculturalists might be expected to resist urban reclassification on the grounds that an urban local government is unlikely to fully appreciate and support agriculture-related needs. Conversely, with other things being equal, villages with high percentages of literate residents might well be in favor of tighter integration with local urban governments. The census data also provide village-level tabulations of access to adequate sanitation, drinking water, and electricity, and it seems likely that places with poor access to these basic needs would view reclassification as potentially beneficial.

In addition to focusing on transitions of villages to legally urban status via merges into pre-existing cities and towns, we will also explore their transitions to become outgrowths of statutory towns or census towns, and will examine whether settlements that are already in one of these intermediate statuses at the 1991 or 2001 census tend to complete the transition to legally urban before the next census. This approach will also allow us to identify villages seemingly at high risk of transition which in the end did not change status. We will draw out the implications of our findings for the modeling of future urbanization and city growth.

References

- [1] R. B. Bhagat and Soumya Mohanty. “Emerging Pattern of Urbanization and the Contribution of Migration in Urban Growth in India”. *Asian Population Studies* 5.1 (2009), pp. 1744–1749. DOI: 10.1080/17441730902790024.
- [2] Eric Denis and Kamala Marius-Gnanou. “Toward a Better Appraisal of Urbanization in India”. *Cybergeo: European Journal of Geography* (2011). DOI: 10.4000/cybergeo.24798. URL: <http://cybergeo.revues.org/24798>.

- [3] Chandan Deuskar and Benjamin Stewart. *Measuring Global Urbanization using a Standard Definition of Urban Areas: Analysis of Preliminary Results*. Draft Working Paper. Washington, DC: World Bank. 2016.
- [4] Amitabh Kundu. "India's Sluggish Urbanization and Its Exclusionary Development". *Urban Growth in Emerging Economies: Lessons from the BRICS*. Ed. by Gordon McGranahan and George Martine. New York: Routledge, 2014, pp. 191–232.
- [5] Amitabh Kundu and Lopamudra Ray Saraswati. "Changing Patterns of Migration in India: A Perspective on Urban Exclusion". *International Handbook of Migration and Population Distribution*. Ed. by Michael J. White. Springer, 2016. Chap. 15, pp. 311–332.
- [6] Martino Pesaresi et al. "Global Human Settlement Analysis for Disaster Risk Reduction". *The International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences* 40.7 (2015), p. 837. DOI: 10.5194/isprsarchives-xl-7-w3-837-2015.
- [7] Kanhu Charan Pradhan. *Unacknowledged Urbanisation: The New Census Towns of India*. Centre for Policy Research, Urban Working Paper 2, New Delhi, India. 2012. URL: <http://www.cprindia.org>.