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Article

Villages in the City: Spatial and Temporal Heterogeneity in Rurality and Urbanity in Bangalore, India

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Abstract: Urban-rural distinctions are particularly challenging in the context of fast growing cities in the developing world. Through an example of the Indian city of Bangalore, we demonstrate the case for development of more continuous approaches of urban representation that are needed in many parts of the world. Thus even some of the oldest areas in Bangalore, which have been part of an urban center for centuries, exhibit aspects of rurality, as much as other recently developing peri-urban parts of the city. We demonstrate the considerable heterogeneities in urbanity and rurality that exist in Bangalore, which constitutes complex mosaics of rural and urban systems. In contexts such as these, binary representations of the urban rural dichotomy break down, as does the gradient approach to urbanity. There does not appear to be any obvious relationship between the time span for which a site has been urbanized, and the degree to which rurality still maintains its influence on these fluid urban landscapes. New theories and methods are needed to fully represent the spatial and temporal heterogeneity of rurality and urbanity in these fluid landscapes, moving beyond traditional, discretized urban *vs*. rural classifications, as well as relatively simplistic gradient-based urban to rural analyses.

Keywords: rurality; urbanicity; urban-rural gradient; urban history

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1. Introduction

The continents of Asia and Africa are undergoing an urban transformation [1], moving from a predominantly rural demographic, towards one that will be dominated by cities by 2030. We do not know much about the nature of the urban transformation in these continents, especially in comparison to the better researched urban settlements in Europe and North America. Asia is especially critical in this context, with as much as half of the increase in urban land in the next two decades projected to take place here [2]. India plays a particularly critical role in this regard, with an urban population that is poised to double between now and 2030 [3], and a massive 2.5 fold increase in built area in the largest 100 Indian cities observed over the past two decades [4].

Urban-rural distinctions are particularly challenging to make or to defend in the context of fast growing cities in the developing world [1]. There are often substantial differences between areas that are administratively defined as urban, with formal urban governance structures, and areas of actual urban cover, dominated by built environments [5]. This is especially obvious in peri-urban areas [6], but not only confined to these areas. Thus, for instance, urban expansion in many parts of Asia, Africa and Latin America often follows a characteristic pattern wherein the city engulfs indigenous, formerly rural villages. These villages continue to exist within the city, where it is then common to find complex mosaics of high rise apartments with software engineers next to rural huts with livestock [5,6]. The dichotomous approach of the urban *vs*. rural classification breaks down in such contexts.

Some fields of research, such as landscape ecology, have attempted to move beyond the rural-urban dichotomy, focusing instead on the description and analyses of patterns and processes along an urban-rural gradient [7–9]. This approach views urbanity (and its converse, rurality) as being spatially distributed along gradients such that areas of greatest urbanity are within the city center, or in the oldest settled parts (typically the city center), while the more recent peri-urban, rapidly urbanizing city periphery has the greatest rurality. Yet such approaches assume that gradients exist along specific unique axes, while urban social-ecological gradients are frequently composed of multiple discongruent and contrasting variables [10]. Thus urban-rural gradient analysis, while representing an advancement over dichotomous conceptualization of the urban-rural divide, may not adequately capture the heterogeneities of urbanity and rurality within many cities, in particular in Asia, Africa and Latin America [11–14], where pockets of rurality intermingle with high rise urban settlements.

The south Indian city of Bangalore provides an interesting case within which to examine the heterogeneities of urban *vs*. rural distribution. The city, one of India's fastest growing urban areas which is known internationally for its software industry, also has a long history of settlement, having been an established urban center of commerce in south India since the mid-16th century. We examine gradients of urbanity and rurality across areas with different histories of urbanization within Bangalore. Our goal is to test the applicability of the discrete as well as the gradient approach to mapping patterns of urbanization, and to demonstrate the heterogeneity in distribution of urbanity that confounds the application of such relatively simple approaches to urban classification.

2. Study Area

Bangalore, one of India's fastest growing cities, is located in a fertile agricultural catchment. The city extends to include a number of villages that have a history extending over several centuries [15,16]. In recent decades, economic growth and concomitant urbanization has led increased sprawl, with a more than ten-fold increase in urban extent since 1949 [17]. Bangalore was known as a tiny village in the 12th century and has grown through the intervening centuries, to emerge as the fifth largest city in India today. While the exact etymology of the city's name in the local language of Kannada, "Bengaluru", is unknown, popular beliefs associate this with locally grown beans ("benda kaalu ooru"—town of boiled beans [18]), and alternatively with benga, the local Kannada language term for *Pterocarpus marsupium*, a species of dry and moist deciduous tree, and ooru, meaning town [18]. Whichever explanation one chooses, the name of the city appears to be closely linked with and to take inspiration from the ecology and species associated with the surrounding landscape.

The history of Bangalore as an urban center dates from 1537, when it was founded by Kempe Gowda, from the Yelahanka Nada Prabhu dynasty [19]. The city was demarcated by towers built in four directions, with the main commercial area located in the *Pete*, or market area, in the central part of the city. Since then, the city has grown several fold in population as well as in size [17,20]. As the city expanded it has repeatedly engulfed a number of small village settlements outside its boundaries. Administratively considered as part of the city, the rural influence is obvious in many of these former villages in terms of house construction, livelihoods and lifestyles [21]. These areas continue to retain a strong cultural identity of place through celebrations of iconic festivals such as annual temple processions that celebrate the worship of local (typically female) village deities [22]. Physically as well, while the city attempts to impose its notion of standardized urban form on the landscape that it engulfs, the villages located within the city are instantly recognizable, with features such as an *Ashwath Katte*: raised village platform with sacred trees, typically including a peepal (*Ficus religiosa*), forming a meeting place as well as a place of worship for the village [22,23].

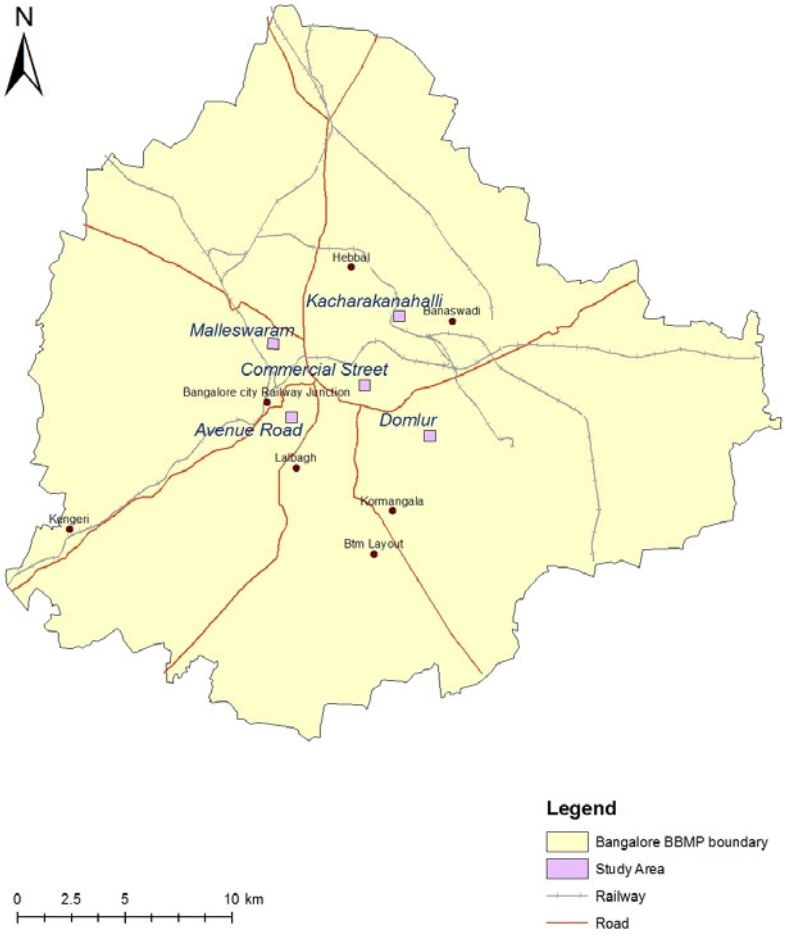
A well described example is a recent residential layout in eastern Bangalore, Hennur Road Banaswadi Road (HRBR) layout, which circumscribes a remnant of the original village located here, Kacharakanahalli. In this landscape, software engineers that gain their livelihoods from the city's famous Information Technology industry, with highly urbanized lifestyles, live in high-rise apartment complexes, adjacent to families of original inhabitants who rear pigs to supplement their livelihoods [23].

At the opposite end of this temporal spectrum one of the oldest urbanized areas in the city is in Avenue Road, part of the original *Pete* or market center described above, dating back to the time of Kempe Gowda, the founder of the city. This area continues to be a major market center for the city, with items as varied as vegetables, books, and gold ornaments sold here. Other parts of the city have been developed at different points in time.

With the aim of characterizing locations with different time points of entry into "urbanity", we selected five locations within Bangalore (Figure 1). The oldest urbanized location is Avenue Road, with an urban history dating to the mid-16th century [19,24]. Next in the urban trajectory of development comes the commercial center of the city's colonial administration in the British cantonment, Commercial Street, developed in the 1820s–1840s to serve the needs of the British troops,

their families and attendant staff. The next areas to experience urban expansion were the planned settlements of Sheshadripuram, Chamarajapete, Basavanagudi and Malleswaram, developed during the end of the 19th century [23]. We selected the area of Malleswaram as representative of this phase of urban expansion, which was developed as an urban settlement by British colonial administration in 1897. Kacharakanahalli represents a peri-urban area that began to experience the transition towards urbanization somewhere in the 1970s. Finally, the area of Domlur has an ancient history of settlement, with one of Bangalore's oldest temples located here [22], but has witnessed accelerated urban expansion fairly recently. Thus, in terms of a temporal trajectory of urbanization, these areas can be ranked from oldest to most recently urbanized as: Avenue Road, Commercial Street, Malleswaram, Kacharakanahalli, and Domlur.

Figure 1. Location of five study areas in Bangalore, representing different time points in the history of urban expansion of the city.



These five locations with their very different urban histories represent different points in the temporal spectrum of urbanization. Do they correspond to similar trajectories in urbanity? That is, are the oldest areas in the city more "urban" and less "rural" compared to the newly developed areas of the city? Conventional urban planning would be based on an implicit assumption that spatial patterns of urbanization follow temporal patterns. However, we argue that the more organic growth patterns of Indian cities such as Bangalore preclude such assumptions, and rurality can be found within the oldest as well as the more recent parts of the city.

3. Methods

Mapping Changes in Urbanity

For the five selected areas (Figure 1), changes in land use and land cover were mapped using data from a set of maps. The oldest map dates from 1884 to 1885, and is titled "Map of Bangalore Cantonment and its Environs for the Year 1884–1885", from the holdings of the library of the Mythic Society of India in Bangalore. The second map is "Bangalore Guide Map for the Year 1935–1936", published in 1935 by the Survey of India, from the holdings of the Indian Institute of World Culture in Bangalore. The third set of maps are from Survey of India 1:25,000 topographic sheets dating from 1973, acquired from the Survey of India office in Bangalore. Finally, we used Google Earth images from 2013 to map land cover for the most recent date. Survey of India topographic sheets from 1973 were scanned and georeferenced to Google Earth images. The historical maps from 1884 to 1885 and 1935 to 1936 were subsequently georeferenced to topographic sheets using easily identifiable points such as road junctions and boundaries of lakes. Spatial registration errors were maintained within 20–60 m. Within each of the selected study areas, we created a grid of 0.5 km by 0.5 km to define an area of study. Within these grids, the area covered by different land cover and land use categories was digitized as polygons for different time periods, using ArcGIS 9.3 and QGIS 1.8. We quantified the percentage of urban cover in each of the study areas at different points in time based on the percentage of land cover within each grid within the urban polygons (1885, 1935, 1973 and 2013).

Field work was conducted between the months of August and September. Our goal was to collect data on aspects that provide indications of rurality within each of the urban locations. Urbanity and rurality can be defined in a number of ways, including indicators of lifestyle, livelihoods and teleconnections [25]. The set of indicators that comprehensively define rurality and its converse, urbanity, would be fairly large and difficult to define and comprehensively measure. We sought to create a limited subset of indicators which would be relatively easy to identify and quantify in a manner that would be comparable across study locations. In this, we focused largely on assessing the dimension of rurality in lifestyles [25] as other characteristics of rurality and urbanity such as livelihoods and teleconnections are much more challenging to assess across a fairly diverse set of urban locations in a city as populous as Bangalore.

First, we counted the number of houses with a rural character. Within the city of Bangalore, in locations occupied by the original villages that existed prior to the city's expansion, it is common to find houses that are in form characteristic of a typical south Indian village. These houses normally have thatched or tiled sloping roofs, with mud walls and narrow doors and windows (Figure 2). Dependency on poultry and other forms of livestock constitute an important indicator of the rurality of this urban landscape, and many of these houses also own livestock. For each study location, we counted and mapped the distribution of houses that retain this form.

Figure 2. (**a**) Rural style house in Domlur; (**b**) Rural style house in Malleswaram. Observe the sloping roof and characteristic structure of the houses that differentiate these from the urban form of the single or multi-level buildings in the background.

(**a**) (**b**)

Apartment buildings are a form of dwelling structure characteristic of an Indian city, and rarely if ever found in Indian villages. We defined apartment buildings as those having more than ten houses within a compound, which can range from quite basic apartment structures (Figure 3a) to more upscale apartments (Figure 3b), and counted the number of such buildings in each study location.

Figure 3. (**a**) Apartment building in Domlur; (**b**) Upscale apartment in Kacharakanahalli.

(**a**) (**b**)

Second, we compared the presence and distribution of traditional structures with religious significance, widely encountered in rural Indian areas [22], as constituting an indirect indicator that helps to assess rurality. Within each study area, we mapped and noted the number of *Ashwath Kattes* (Figure 4a), temple *Kattes* (raised platforms with sacred trees within temple compounds, Figure 4b), and temples.

Finally, the number of trees and type of species (native *vs*. introduced) is known to vary across different parts of Bangalore, reflecting differences in urban settlement histories [26]. We counted the number of trees, and the relative proportion of native species in each location, sampling nine sub-grids of 50 × 50 m distributed evenly through each 0.5 × 0.5 km location, with the expectation that locations with greater urbanity would have a greater proportion of trees of non-native species.

Figure 4. (**a**) *Ashwath Katte* in Malleswaram; (**b**) Temple *Katte* in Avenue Road.

(**a**) (**b**)

4. Results and Discussion

4.1. Temporal Patterns of Urbanization across Different Parts of Bangalore

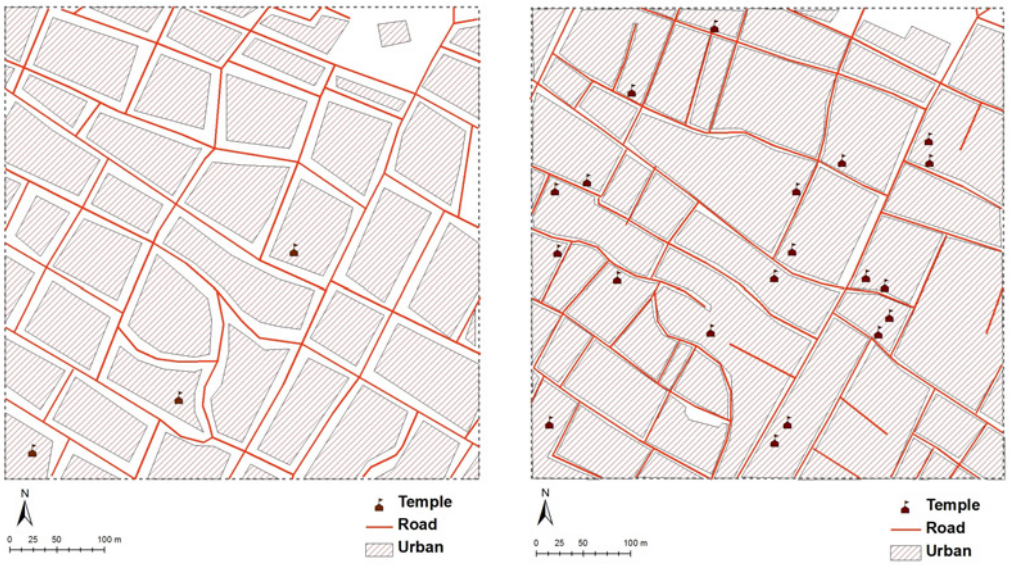
4.1.1. Avenue Road

Avenue Road is the oldest urban location in Bangalore, established in the mid-16th century. The urban cover is high in 1885, and continues relatively unchanged until the current date (Figure 5).

Figure 5. Avenue Road land cover (**a**) 1885; (**b**) 1935; (**c**) 1973; (**d**) 2013.

(**a**) (**b**)

Figure 5. *Cont.*

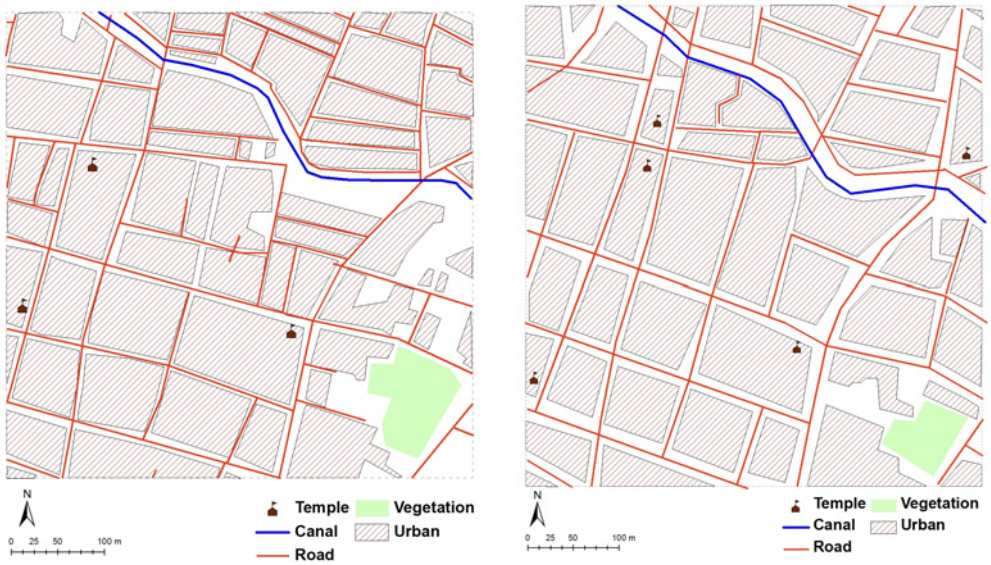


(**c**) (**d**)

4.1.2. Commercial Street

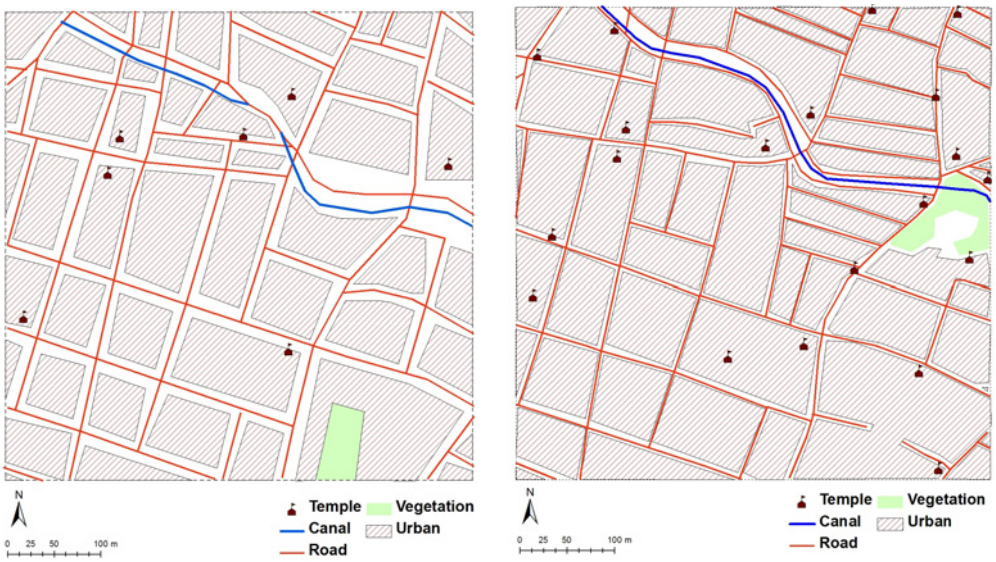
The Commercial Street area was developed as a commercial and urban center for the British cantonment between the 1820s and 1840s. As can be seen from Figure 6, the percentage of urban cover is very high in 1885, and continues to be relatively unchanged until the current time.

Figure 6. Commercial Street land cover (**a**) 1885; (**b**) 1935; (**c**) 1973; (**d**) 2013.



(**a**) (**b**)

Figure 6. *Cont.*

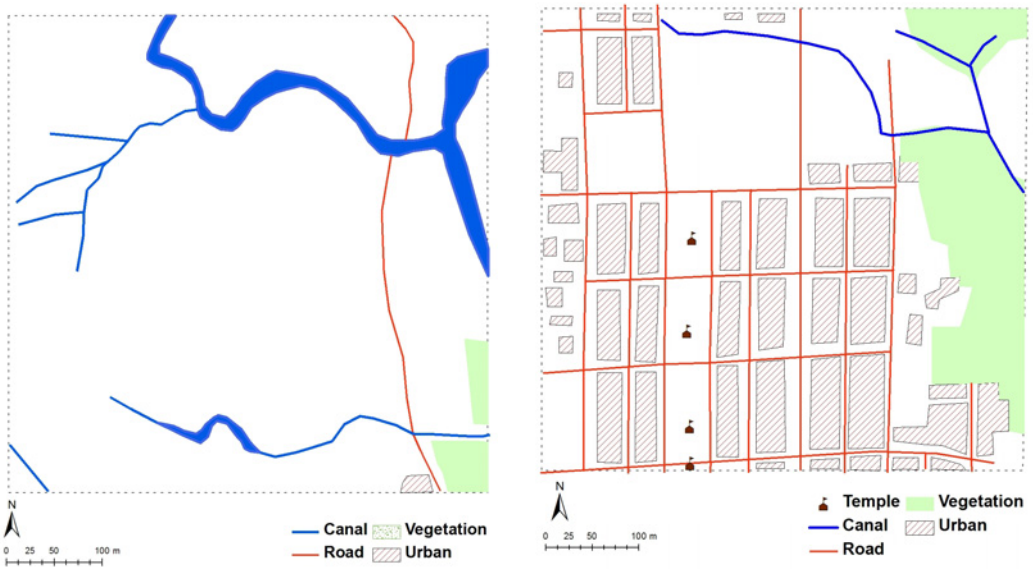


(**c**) (**d**)

4.1.3. Malleswaram

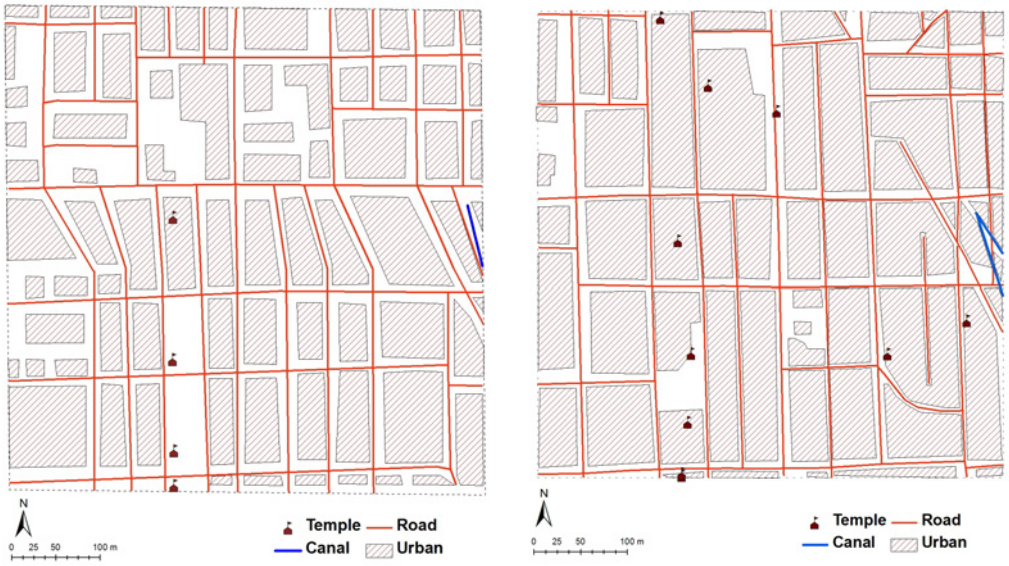
The Malleswaram area is a planned urban settlement that dates from 1897. The urban history of settlement is clear from the maps below (Figure 7), where the landscape largely consists of open areas with minimal area occupied by settlements in 1885, following which there is a rapid expansion of urban cover in 1948. By 1973, almost the entire site's land cover is urban.

Figure 7. Malleswaram land cover (**a**) 1885; (**b**) 1935; (**c**) 1973; (**d**) 2013.



(**a**) (**b**)

Figure 7. *Cont.*

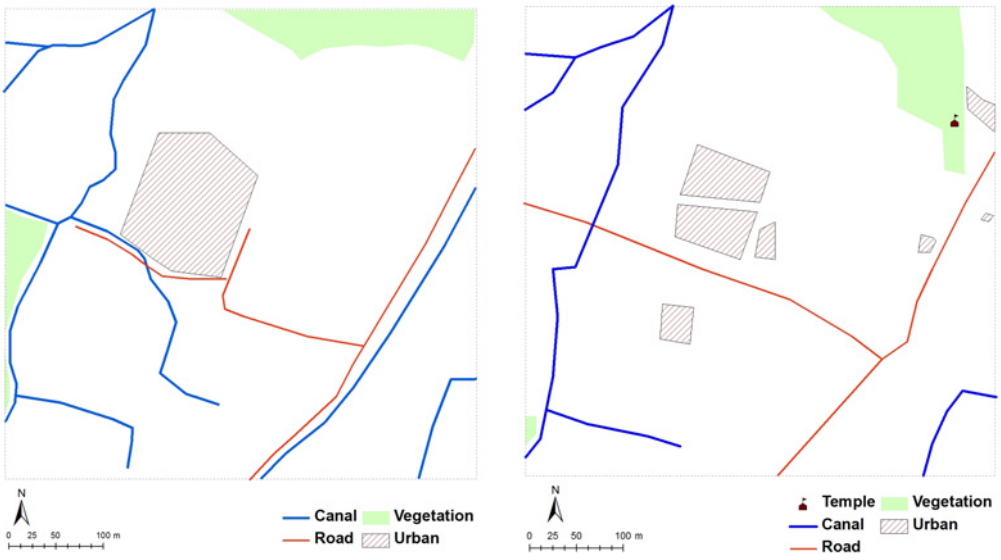


(c) **(d)**

4.1.4. Kacharakanahalli

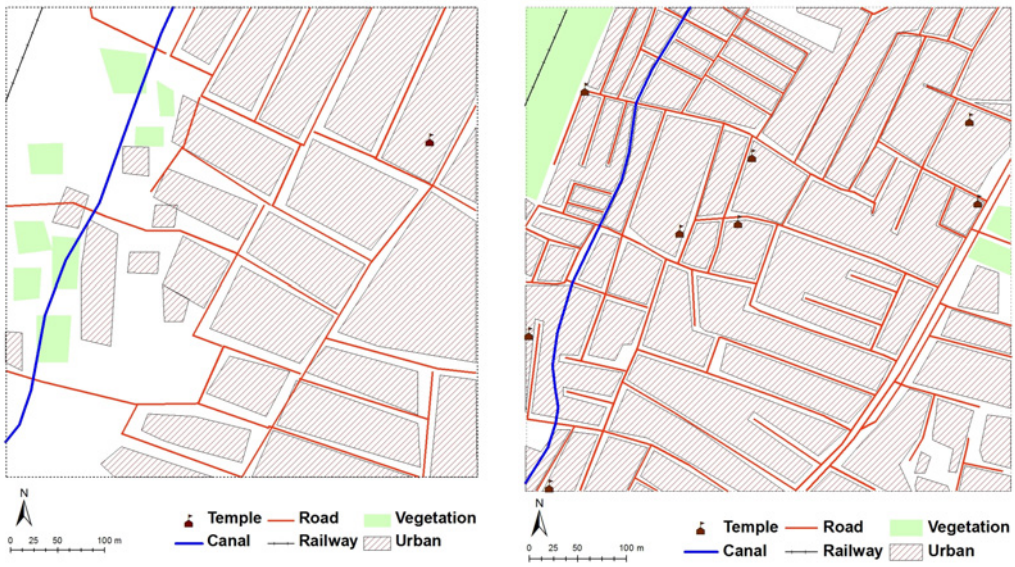
Kacharakanahalli contains an old village settlement which expanded between 1935 and 1973 to cover the east side of the study area. Since 2000, accelerated urbanization has led to the almost complete domination of the site by urban cover (Figure 8).

Figure 8. Kacharakanahalli land cover (**a**) 1885; (**b**) 1935; (**c**) 1973; (**d**) 2013.



(a) **(b)**

Figure 8. *Cont.*

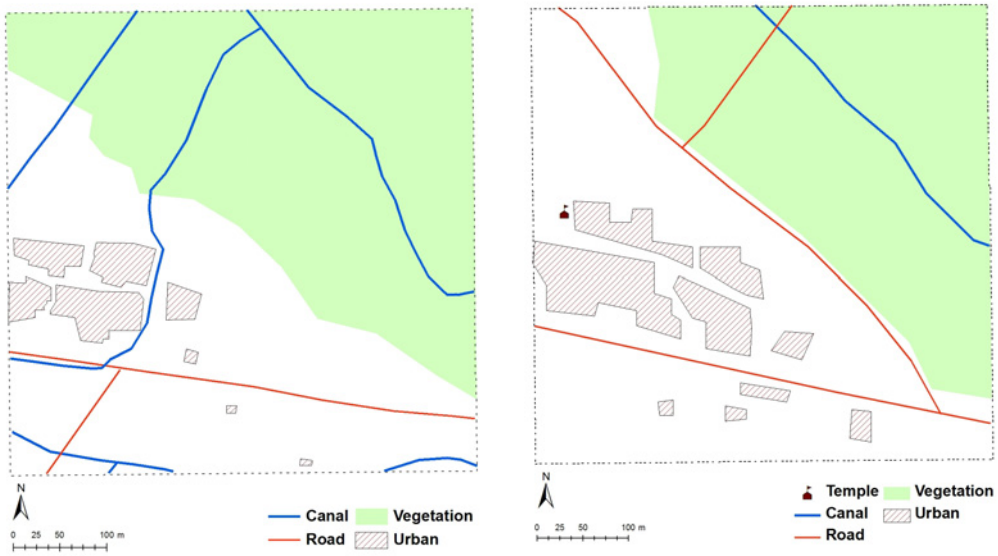


(**c**) (**d**)

4.1.5. Domlur

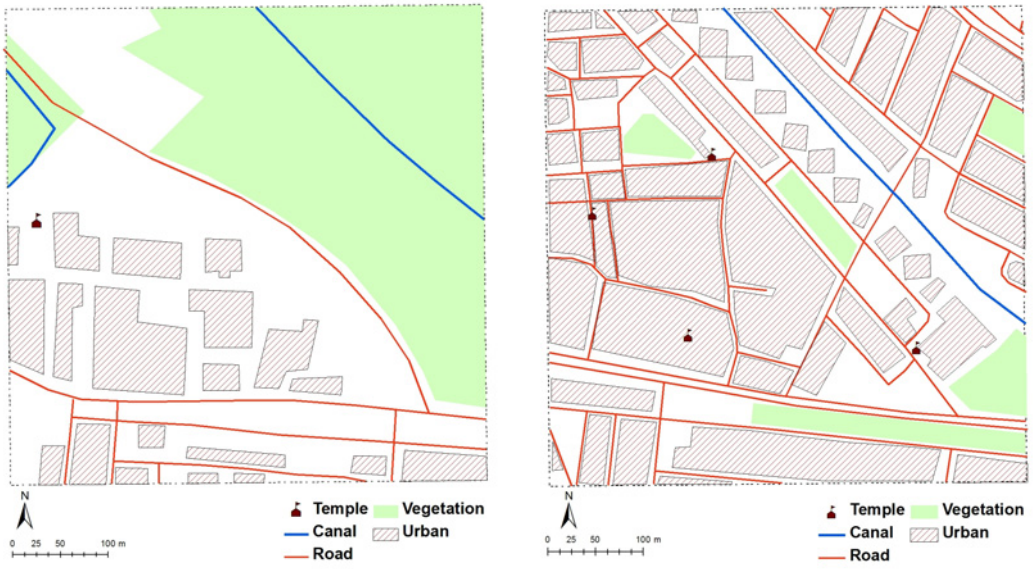
Domlur contains an old settlement which existed prior to 1885 (Figure 9). This location also contains one of the oldest temples in Bangalore, dating to the 10th century A.D. The area experienced some growth between 1935 and 1973, but only went through significant urban expansion after 1973. By 2013, the area has become almost completely dominated by urban cover.

Figure 9. Domlur land cover (**a**) 1885; (**b**) 1935; (**c**) 1973; (**d**) 2013.



(**a**) (**b**)

Figure 9. *Cont.*



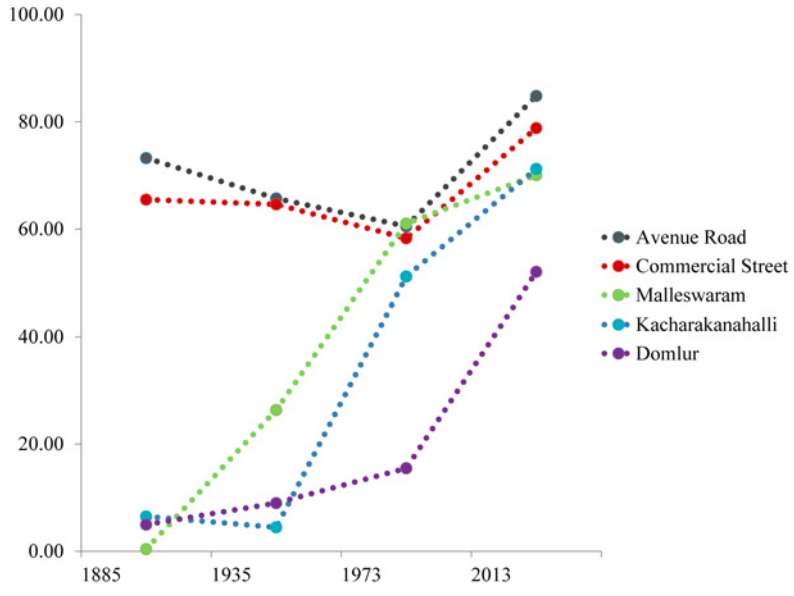
(c) **(d)**

4.2. Rurality in the City

4.2.1. Temporal Patterns of Urbanization

As illustrated by Figures 5–9, the five study areas follow a temporal gradient in urbanization: with Avenue Road having being urbanized earliest, followed in sequence by Commercial Street, Malleswaram, Kacharakanahalli, and finally by Domlur. This is also corroborated by the changes in the percentage of urban land cover within each of the 0.5 × 0.5 km grids within these five locations based on data from the maps of 1885, 1935, 1973 and 2013 (Figure 10).

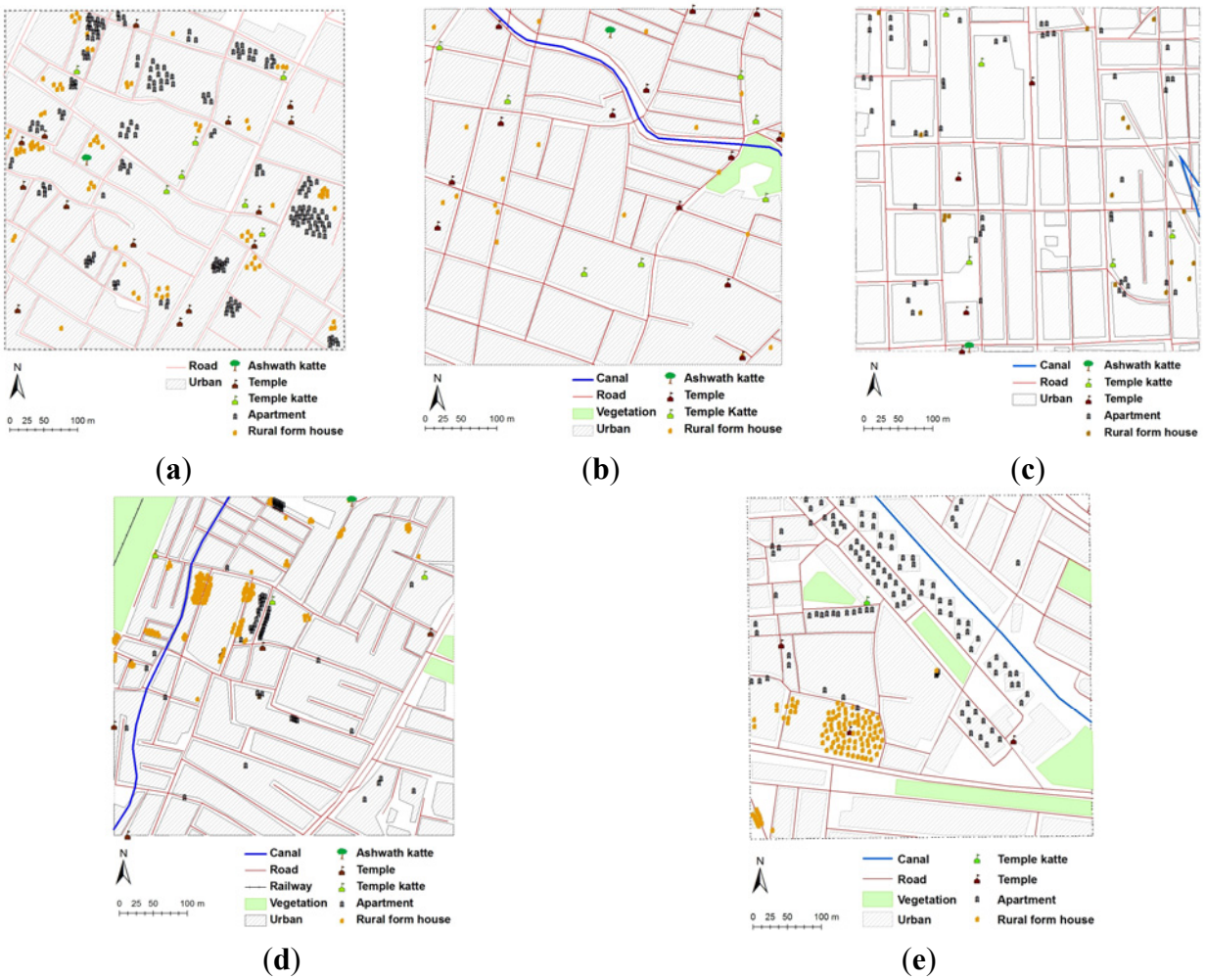
Figure 10. Variation in the percentage of urban cover across time for the five study location grids in Bangalore.



4.2.2. Patterns of Rurality

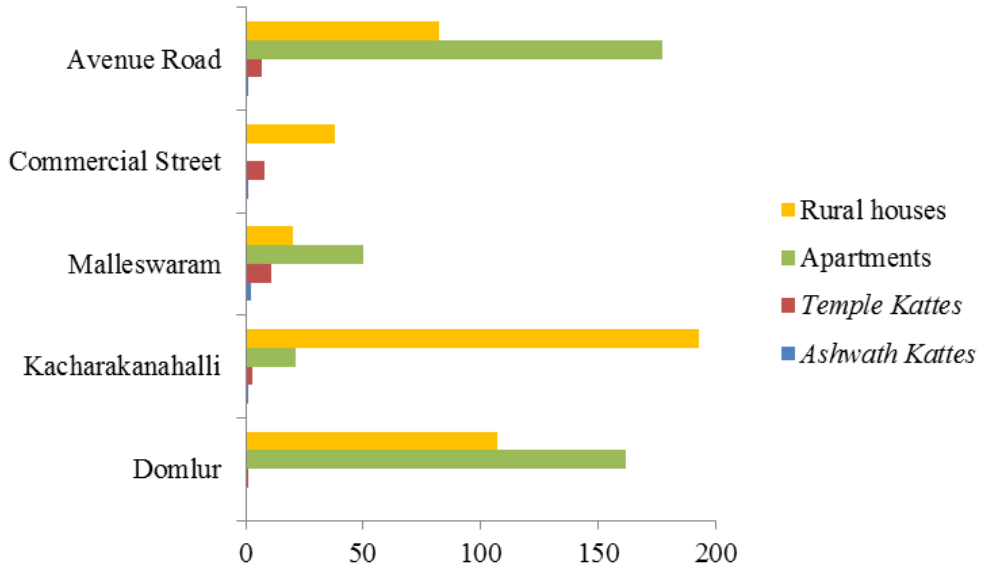
If the temporal history of urbanization is related to the gradient of urbanity in Bangalore, then we would expect Avenue Road, which has been part of the city center from the mid-16th century, to be the most urban of our five study locations, while Domlur, urbanized in the past 10–20 years, should be most rural in character. Yet, the distribution of various indicators of rurality does not fit the expected picture. Thus, Avenue Road has a number of houses of village form, as well as a number of traditional religious structures such as *Ashwath Kattes*, which does not seem perceptibly different from the distribution of these structures in Domlur (Figure 11).

Figure 11. Distribution of indicators of rurality in the five study locations in Bangalore, based on field surveys. (**a**) Avenue Road; (**b**) Commercial Street; (**c**) Malleswaram; (**d**) Kacharakanahalli; (**e**) Domlur.



This can also be seen from Figure 12, which demonstrates the variability in the indices of rurality and urbanity measured, and the lack of association between the temporal extent of urbanization and rurality or urbanity. For instance, Avenue Road (urbanized in the 16th century), and Kacharakanahalli and Domlur (recently urbanized) all have a fairly large number of village houses in comparison to Commercial Street and Malleswaram (which were urbanized in the 19th century). Temple *Kattes* appear more frequently in the older sites as compared to the newer locations.

Figure 12. Distribution of indicators of rurality: number of rural houses, apartments, Temple *Kattes* and Ashwath *Kattes* in the five study locations in Bangalore, based on field surveys.



There is also considerable variation in the density of trees (Figure 13) and the percentage of endemic trees (Figure 14) across sites: again, this variation does not appear to be related to the temporal extent of urbanization.

Figure 13. Density of trees in the five study locations in Bangalore, based on field surveys.

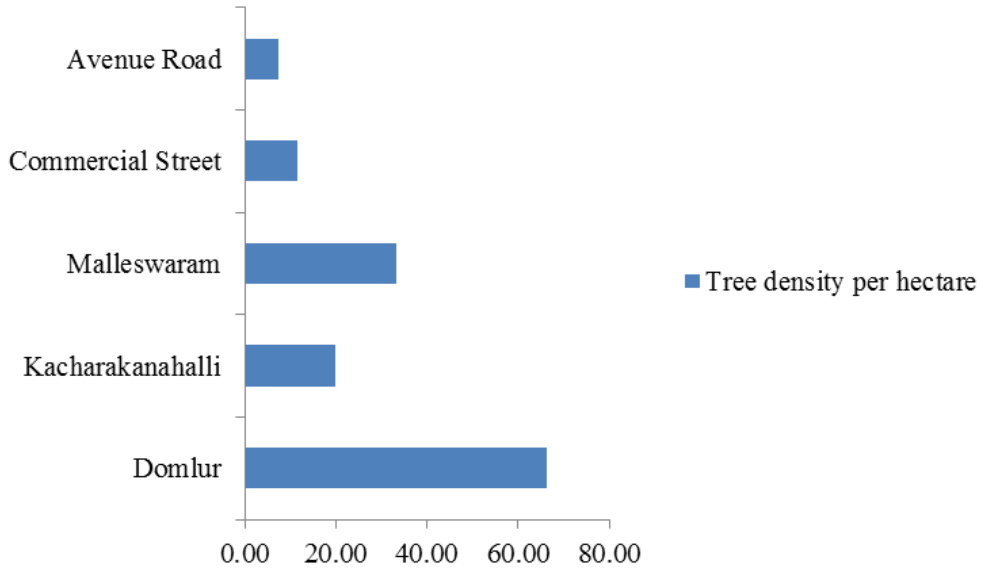
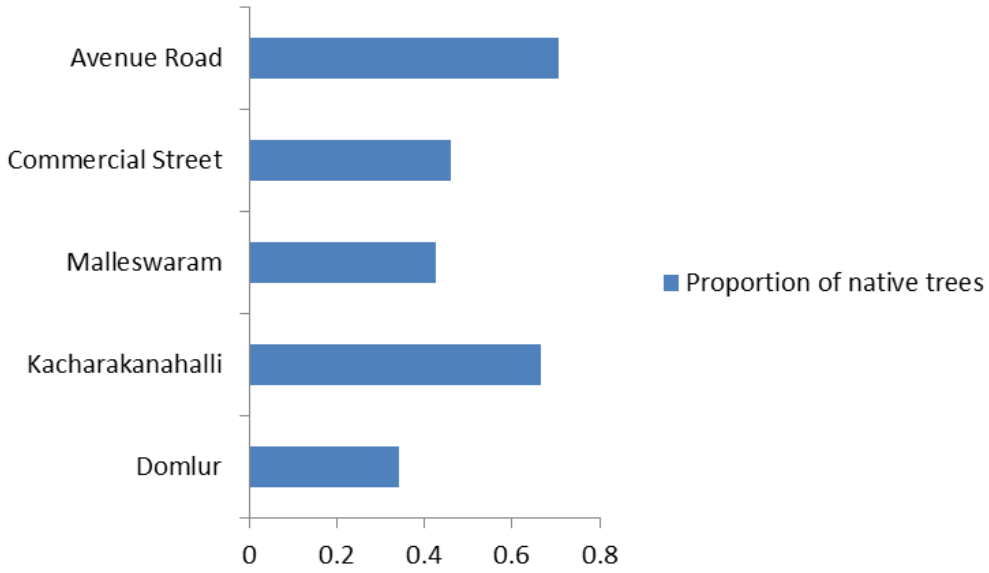


Figure 14. Percentage of endemic trees in the five study locations in Bangalore, based on field surveys.



5. Conclusions

The example of Bangalore demonstrates the need for more continuous approaches of urban representation, which is also necessary in many parts of the world. It is well recognized that countryside areas, classified as rural, are often influenced by the urban, with such influences manifesting themselves in lifestyle, livelihoods and rural-urban teleconnections [2,25]. Thus, for instance, scholars have discussed the phenomenon of urbanization of the countryside [27], relating this to the increasing footprint of globalization. Analogous to this, cities exhibit forms of rural life in many parts of the world, in terms of their cultural character, lifestyle, and livelihoods. Thus, rurality has been observed in cities as diverse as Kampala [11], Mexico City [12], and in the Philippines [14]. The rapid expansion of Mexico City has encompassed a number of villages, with the result that it is commonplace to encounter rural forms of livelihood, such as livestock, along with Western relationships with animals, such as pet rearing, and to find a mix of agriculture with hobby gardening [12]. In these contexts especially, cities constitute complex mosaics of rural and urban systems, with heterogeneous social structures that embody tension between cultural stability and constant flux [28].

Our study incorporates a partial examination of specific indicators of rurality. Thus, we recognize that choosing a different set of indicators may have led to different results. Our intent, however, was not to identify a specific gradient of rurality, or to argue that this provides the only way to map rurality. Rather, our goal was to illustrate the lack of coherence between binary representations of the urban rural dichotomy, and the lack of application of the gradient approach to urbanity that has been propounded by fields such as landscape ecology, as an alternative to such dichotomization [7–9]. Instead, we seek to demonstrate the heterogeneity in patterns of rurality and urbanity within Bangalore, a heterogeneity that does not neatly conform to single variables such as the time period of urbanization, or to the distance from the city center (Figure 1), a limitation pointed out by other scholars [10].

Some of the oldest urban locations in Bangalore (such as, but not confined to, Avenue Road) harbor indicators of rurality such as the existence of rural homes with livestock, coexisting in close proximity with apartments. There does not appear to be any obvious relationship between the time span for which a site has been urbanized, and the degree to which rurality still maintains its influence on these fluid urban landscapes. This is not a characteristic unique of Indian cities, although rather obvious in this context. Other studies in Europe have for instance demonstrated the limitation of the rural-urban gradient approach to explain the variation in the provisioning of ecosystem services [29], Advanced analytical techniques such as kernel gradient analysis, and the use of landscape metrics computed using moving windows, have been utilized for the continuous profiling of urban-rural gradients in Serra San Bruno, Italy [30] and Beijing, China [31]. As the example of Bangalore discussed here demonstrates, urban land change research requires new theoretical and analytical approaches that can encompass and illustrate ideas of continuous, multi-scaled urban representation. For instance, recent studies in China [13] and the Philippines [14] represent the heterogeneity of distribution of urbanity and rurality in cities using multi-factor analyses that consider criteria such as population, infrastructure, economic and market influences. Such innovation in theory and method [25] is needed to fully represent the spatial and temporal heterogeneity of rurality and urbanity in these fluid landscapes, moving beyond traditional, discretized urban *vs*. rural classifications, as well as relatively simplistic gradient-based urban to rural analyses.

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Conflicts of Interest

The authors declare no conflict of interest.

References

1. Montgomery, M.R. The urban transformation of the developing world. *Science* **2008**, *319*, 761–764.
2. Seto, K.C.; Güneralp, B.; Hutyra, L.R. Global forecasts of urban expansion to 2030 and direct impacts on biodiversity and carbon pools. *Proc. Natl. Acad. Sci. USA* **2012**, *109*, 16083–16088.
3. United Nations. *World Urbanization Prospects: The 2011 Revision*; Department of Economics and Social Affairs-Population Division, United Nations/United Nations Publication: New York, NY, USA, 2011.
4. Nagendra, H.; Sudhira, H.S.; Katti, M.; Schewenius, M. Sub-Regional Assessment of India: Effects on Land Use, Biodiversity and Ecosystem Services. In *Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities*; Elmqvist, T., Fragkias, M., Goodness, J., Güneralp, B., Marcotullio, P.J., McDonald, R.I., Parnell, S., Schewenius, M., Sendstad, M., Seto, K.C., *et al*., Eds.; Springer: Dordrecht, The Netherlands, 2013; pp. 65–74.
5. Simon, D.; McGregor, D.; Nsiah-Gyabaah, K. The changing urban-rural interface of African cities: Definitional issues and an application to Kumasi, Ghana. *Environ. Urban.* **2004**, *16*, 235–248.

6. Narain, V.; Nischal, S. The peri-urban interface in Shahpur Khurd and Karnera, India. *Environ. Urban.* **2007**, *19*, 261–273.
7. McIntyre, N.E.; Knowles-Yánez, K.; Hope, D. Urban ecology as an interdisciplinary field: Differences in the use of "urban" between the social and natural sciences. *Urban Ecosyst.* **2000**, *1*, 5–24.
8. Theobald, D.M. Land-use dynamics beyond the American urban fringe. *Geogr. Rev.* **2001**, *91*, 544–564.
9. Gagné, S.A. The distinguishing features of the study of the ecology of urban landscapes. *Geogr. Compass* **2013**, *7*, 266–286.
10. McDonnell, M.J.; Hahs, A.K. The use of gradient analysis studies in advancing our understanding of the ecology of urbanizing landscapes: Current status and future directions. *Landsc. Ecol.* **2008**, *23*, 1143–1155.
11. Ishagi, N.; Ossiya, S.; Aliguma, L.; Aisu, C. *Urban and Peri-Urban Livestock Keeping Among the Poor in Kampala City*; Ibaren Konsultants: Kampala, Uganda, 2002.
12. Losada, H.; Martinez, H.; Vieyra, J.; Pealing, R.; Zavala, R.; Cortés, J. Urban agriculture in the metropolitan zone of Mexico City: Changes over time in urban, suburban and peri-urban areas. *Environ. Urban.* **1998**, *10*, 37–54.
13. Jones-Smith, J.C.; Popkin, B.M. Understanding community context and adult health changes in China: development of an urbanicity scale. *Soc. Sci. Med.* **2010**, *71*, 1436–1446.
14. Dahly, D.L.; Adair, L.S. Quantifying the urban environment: A scale measure of urbanicity outperforms the urban–rural dichotomy. *Soc. Sci. Med.* **2007**, *64*, 1407–1419.
15. Rice, B.L. *Epigraphica Carnatica Volume IX: Inscriptions in the Bangalore District*; Mysore Government Central Press: Bangalore, India, 1905.
16. Annaswamy, T.V. *Bengaluru to Bangalore: Urban History of Bangalore from the Pre-Historic Period to the End of the 18th Century*; Vengadam Publications: Bangalore, India, 2003.
17. Sudhira, H.S.; Ramachandra, T.V.; Subrahmanya, M.H.B. City profile Bangalore. *Cities* **2007**, *24*, 379–390.
18. Rice, B.L. *Mysore: A Gazetteer Compiled for Government, Revised Edition, Volume I—Mysore in General*; Archibald Constable and Company: Westminister, UK, 1897.
19. Kamath, S. Chapter 2 History. In *Karnataka State Gazetteer: Bangalore District*; Government of Karnataka: Bangalore, India, 1990.
20. Sudhira, H.S.; Nagendra, H. Local Assessment of Bangalore: Graying and Greening in Bangalore—Effects of Urbanization on Land Use, Biodiversity and Ecosystem Services. In *Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities*; Elmqvist, T., Fragkias, M., Goodness, J., Güneralp, B., Marcotullio, P.J., McDonald, R.I., Parnell, S., Schewenius, M., Sendstad, M., Seto, K.C., *et al*., Eds.; Springer: Dordrecht, The Netherlands, 2013; pp. 75–92.
21. Gopal, D. Flora in Slums of Bangalore, India: Ecological and Socio-Cultural Perspectives. M.Sc. Thesis, Ernst Moritz Arndt University of Greifswald, Greifswald, Germany, 2011.
22. Srinivas, S. *Landscapes of Urban Memory: The Sacred and the Civic in India's High-Tech City*; Orient Longman: Hyderabad, India, 2004.

23. Nair, J. *The Promise of the Metropolis: Bangalore's Twentieth Century*; Oxford University Press: New Delhi, India, 2005.
24. Buchanan, F. *A Journey from Madras through the Countries of Mysore, Canara, and Malabar*, 2nd ed.; Higginbotham and Co.: Madras, India, 1870; Volume I.
25. Boone, C.G.; Redman, C.L.; Blanco, H.; Haase, D.; Koch, J.; Lwasa, S.; Nagendra, H.; Pauleit, S.; Pickett, S.T.A.; Seto, K.C.; *et al*. *Reconceptualizing Land Use in an Urban Era. Forthcoming in Rethinking Global Land Use in an Urban Era*; Seto, K.C., Reenberg, A., Eds.; MIT Press: Cambridge, UK, 2013.
26. Nagendra, H.; Gopal, D. Tree diversity, distribution, history and change in urban parks. *Urban Ecosyst.* **2011**, *14*, 211–223.
27. McCarthy, J. Rural geography: Globalizing the countryside. *Prog. Hum. Geogr.* **2008**, *32*, 129–137.
28. Allen, A. Environmental planning and management of the peri-urban interface: Perspectives on an emerging field. *Environ. Urban.* **2003**, *15*, 135–148.
29. Kroll, F.; Müller, F.; Haase, D.; Fohrer, N. Rural-urban gradient analysis of ecosystem services supply and demand dynamics. *Land Use Policy* **2012**, *29*, 521–535.
30. Modica, G.; Vizzari, M.; Pollino, M.; Fichera, C.R.; Zoccali, P.; Fazio, S.D. Spatio-temporal analysis of the urban-rural gradient structure: An application in a Mediterranean mountainous landscape (Serra San Bruno, Italy). *Earth Syst. Dyn. Discuss.* **2012**, *3*, 827–870.
31. Yang, Y.T.; Zhou, Q.M.; Gong, J.Y.; Wang, Y.Y. Gradient analysis of landscape spatial and temporal pattern changes in Beijing metropolitan area. *Sci. China Technol. Sci.* **2010**, *53*, 91–98.