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Urbanisation trends in developing countries: Comparative study of Yogyakarta City and Kathmandu Valley

Shreema Rana^a and Djaka Marwasta^b

^a PhD Candidate, The Faculty of Geography, Universitas Gadjah Mada, Yogyakarta. Indonesia

^b The Faculty of Geography, Universitas Gadjah Mada, Yogyakarta. Indonesia. marwasta_d@geo.ugm.ac.id

*Corresponding author: ranashreema@gmail.com

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Abstract

In the beginning of the third millennium, most third world countries faced a trend of high urbanisation rates. Many medium-sized cities tend to be metropolitan cities, so-called metropolitanisation. This paper examines the urbanisation of the Kathmandu Valley and Yogyakarta and their urban growth rates despite being in different geographical plates. In addition, we also analyse the common issues with urbanisation and haphazard conversion of the agricultural land into built-up areas within the city fringes. Yogyakarta is a city in Indonesia, which is experiencing an inevitable process of urbanisation and so is the Kathmandu Valley in Nepal. The aim of this paper is to explore the urbanisation process and trends in developing countries. A highly dynamic spatial pattern of urbanisation observed in Nepal and Indonesia where the spatial transformation is the main evidence that can be used to analyse the urbanisation process.

The review showed the urban area increased by 142.8 square kilometres from 1970 to 2010. The highest increasing number of urban areas occurred from 1990 to 2000, dominated by fertile agricultural land being converted into urban built-up areas. The very high increasing number of urban built-up areas do not cater for increasing population growth efficiently. In the case of the Kathmandu valley, urban built-up areas showed a slow growth trend in the 1960s and 1970s, dominated by agriculture urbanisation, but the growth became rapid from the 1980s onwards. This rapid growth is guided by higher conversion of land into urban built-up areas. The urbanisation process has developed fragmented and heterogeneous land use combinations in the valley, not complementing the natural environmental conditions. Therefore, urbanisation processes in Yogyakarta and the Kathmandu valley require planned development to best utilize resources and their potential.

1. Introduction

In the last three decades, we have seen interesting trends among third world countries due to dramatic increases in urban population. The increases in urban population proportion have an impact on physical urban areas. Urbanisation has been one of the dominant contemporary processes with a growing number of the global population living in cities. Some facts showing the trend of urbanisation, such as the document published by UN [21], show that the highest population growth takes place in the third world, notably in Asia-Pacific and African countries. There is also a future prediction where about 3 billion of world's population will live in urban areas by 2050. Facing the growth of urban population and its activities continuously, the uncontrolled spread of urban areas requires some early anticipation, because it will generate a wide variety of negative impacts on many human life dimensions (environment, social and economic) [23]. Since urban daily life has multidimensional characteristics, a holistic approach is required. The appearance of a change in urban phenomena does not stand alone, but is related to so many other issues, such as the local production of food, employment opportunities, availability of green areas etc. This emerging change due to haphazard urbanisation is caused by the local phenomena as well as other global factors.

This study particularly focuses on the development of physical urban features, which is deeply related to conversion of agricultural lands to non-agricultural uses. Through time this conversion process could have implications on the quality of life, preservation of the environment and other natural amenities, farming income, sustainable agricultural production, as well as on public interests of open space, farming tradition, and landscape preservation standards. In addition, the changes do not consider the social value and are economically driven. Basically, urbanisation is defined as "a process of becoming urban", although the definition of urbanisation actually has two dimensions, as follows:

- (1) physical-spatial, and
- (2) lifestyle.

Based on the physical-spatial dimension, urbanisation can be explained in a wide variety of processes, such as: (a) a movement of rural people to urban areas; (b) a changing of governmental status (from rural administration to municipality administration); and (c) physical sprawling of urban features over the surrounding rural areas.

Some urban geographers, Strait, Burchell, Duany, Freeman, Heimlich, Jackson, Kunstler and Popenoe respectively; [2], [3], [5], [6], [7], [8], [10], [16] have discussed the impacts of urban sprawl, such as:

1. Increased and insufficient land use and energy consumption
2. Increased traffic congestion
3. Negative environmental effects (reduces air and water quality and loss of open spaces)
4. Higher public costs for new facilities and services for the newly developed areas

5. Loss of community character
6. The decline of inner city as people leave for sprawled areas
7. The increase of crime in sprawled areas

The effects caused by urban expansion into rural and peri-urban areas is the emergence of widespread conflicts of interest. Currently, the conversion of agricultural land for urban and development uses is an important issue worldwide and it needs guidance. 'The World Resource Institute', in its 1996-97 land conversion assessment, reported that the amount of land converted to urban uses is small globally. On the other hand, there is conversion of high potential agricultural land, reducing local food production. This urban sprawl, characterised by low-density development and vacant and derelict land, leads to waste of limited land resources, higher infrastructure costs, and excessive energy consumption with air and water pollution.

2. Trends and process of urbanisation

Rapid population growth in cities and towns can have a dual effect on agriculture. It can lead to urban encroachment on agricultural lands and facilitate the faster conversion process resulting to increased demand for food and fiber. Although technology in agricultural production plays a large role in increasing output, this may not help the local and especially urban poor who are dependent on the locally farmed products and other related activities. There are constantly increasing food prices and shortages of food across the world, some observers expect that the continued loss of farmland to urban uses may interfere with the ability to produce food and fiber for the increasing population [15] & [22]. More than the developed nations of the world, less developed and developing countries have the problems of food imports and they are affected.

The impact of this land conversion trend away from agricultural production to development is the focus of this study. Sub-urbanisation has had a significant impact on the social and political environments of farmers on the urban fringe; however, relatively little is known about its economic impact on agriculture [12]. The concern is further strengthened by the fact that land converted to other uses is, in most cases, irreversible. The fact that many current land use choices have irreversible effects has added a sense of urgency to this subject [19].

There are different theories explaining what forces have driven unplanned land conversion. One factor focuses on the difference in rates of return from land due to its use and its relative locations explained by Von Thunen's location theory. The conversion process based on this theory suggests that land use patterns and the market price of land are established by relative rental gradients for urban and agricultural uses. Conversion of land to urban uses proceeds in concentric circles around a central city, at the equilibrium boundary between urban and agricultural uses, relative rents of competing uses are equal. Policy and planning that favor sub-urbanisation and growth in housing must be associated with population growth shifting the urban and rural rent gradient so that the equilibrium

boundary moves away from the city center. Land speculation causes the market value of agricultural land to rise above the agricultural use value [12].

The Kathmandu Valley is a region in central Nepal as shown in the (see Figure 1) accommodates Kathmandu, the capital of Nepal.

The valley is bowl shaped the most populous metropolitan region, and the urban centre of the whole nation. It is an interesting case to study as it imposes topographic constraints for horizontal urban expansion but faces rapid urbanisation around the valley (see Figure 2), with an annual urban population growth rate of 5.2%.



Figure 1: Nepal in Asia (above) and Nepal map showing Kathmandu Valley (down). Source: Sharma [17]

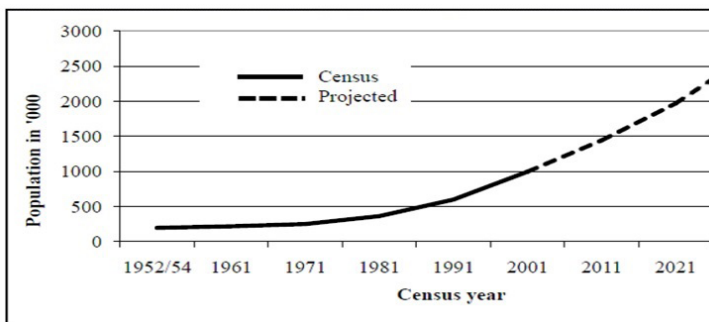


Figure 2: Urban population in Kathmandu Valley. Source: CBS [4]

The Kathmandu valley is also the administrative centre and a major tourist gateway. It is the place for the highest economic activities due to the strategic location. The presence of infrastructure and other facilities are the triggering factors for the high population growth, dramatic land use changes, and socio-economic transformations. These transformations have brought inconsistent urban development and environmental consequences to the Kathmandu valley landscape as well as the residents [17]. The rapid population growth in the city and along the city fringes is putting pressure on existing resources. The Kathmandu valley, including the villages around it, still has agriculture as its major source of income [18]. Despite this, conversion activities are taking place resulting in environmental deterioration, haphazard landscape development and competition between urban and peri-urban fertile land for agriculture (Figure 3 and Figure 4)

Yogyakarta, the capital city of the DIY Province located on the volcanic footplain of Merapi, faces similar urban issues (see Figure 5). As with the Kathmandu valley, Yogyakarta is also established in the centre of intensely agricultural land, and is now being modernised meticulously

in step with increasing urban population. At the national level, Yogyakarta is known as the major international tourist destination, and the centre of education and culture. It has not seen dramatic urban population growth like that of Kathmandu valley, but it faces similar problems from the haphazard urban population growth (from both natural increases and net migration). Nevertheless, the urbanisation taking place (spatially) does not consider the agriculture potential of the land. There has been dramatic encroachment of the fertile land around the province of Yogyakarta (i.e. Sleman and Bantul) which was once famous for its agriculture productivity (see Figure 6).

Marwasta [13] identified that rapid spatial urbanisation has a dual effect on agriculture, (1) it leads to urban encroachment on agricultural lands and (2) it facilitates the land conversion process as well as resulting in increased demand for food and fiber. Spatial urbanisation has a significant impact on the social conditions of farmers on the urban fringe with high potential. The spatial urbanisation which is represented by urban built-up areas is triggered by the construction or improvement of transportation networks, notably main roads and highways [13]. He also states that the high rate of agricultural land conversion into urban land use has a number of economic implications that need policy consideration. Competition between rural and urban uses leads to a gradual diminishing of supply of prime agricultural land. It results in agricultural and farmer marginalization.

The comparative study reveals similar urban issues resulting from unplanned urbanisation in the cases of the Kathmandu valley in Nepal and Yogyakarta in Indonesia. The urban growth of the Kathmandu valley and urban population data for Yogyakarta show the direction of urbanisation, which requires moulding based on contextual potential and need (see Figure 2 & Figure 7).



Figure 3: A perspective view of urban landscape development in Kathmandu Valley. Source: Photo By Shreema Rana, 2011



Figure 4: A competition between land for urban use and agriculture (Agricultural Land Conversion). Source: Photo By Shreema Rana, 2011



Figure 5: Yogyakarta in Java Map. Source: Google Earth.



Figure 6: Encroachment into the agricultural fields. Source: Photo by Djaka 2010

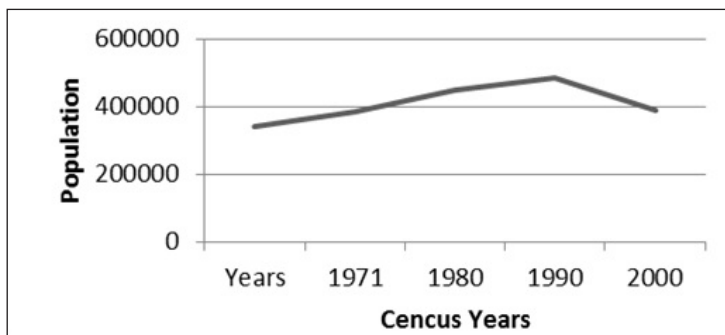


Figure 7: Population of Yogyakarta Source: BPS [1]

3. Comparative study of the cases

Urbanisation affects agriculture practices (the primary occupation) and the availability of the land for farming. Past experiences of the Kathmandu valley have been about "distributional justice" where the towns draw upon surrounding areas, in a concentrated setting. This very process of urbanising considering the natural setting and the

farmland can be termed as Agricultural Urbanisation. From the spatial perspective this agricultural urbanisation is more organised, with a compact settlement on a hilltop surrounded by fertile farming lands (Figure 8). This has now exceeded carrying capacity and is becoming unsustainable. In the experience of historic towns in the Kathmandu valley, three areas are particularly instructive i.e. Kirata, Lichchhavi and Malla due to their particular urban development.

Kathmandu valley's agricultural urbanism took a totally different perspective with changing political power. After the medieval period with infrastructure and services developed to become more concentrated in the valley, urbanisation patterns changed from being systematised to unorganised. The valley now consists of the municipal areas of Kathmandu Metropolitan City, Lalitpur Sub Metropolitan city, Bhaktapur Municipality, Kirtipur Municipality and Thimi Municipality; the remaining area is made up of a number of Village Development Committees, VDCs (Figure 9). The urbanisation is guided by definitions where 'urban areas' such as those containing a threshold population of size 10,000 together with basic urban facilities like electricity, drinking water, roads, communication and others are designated by government municipalities. Therefore, with

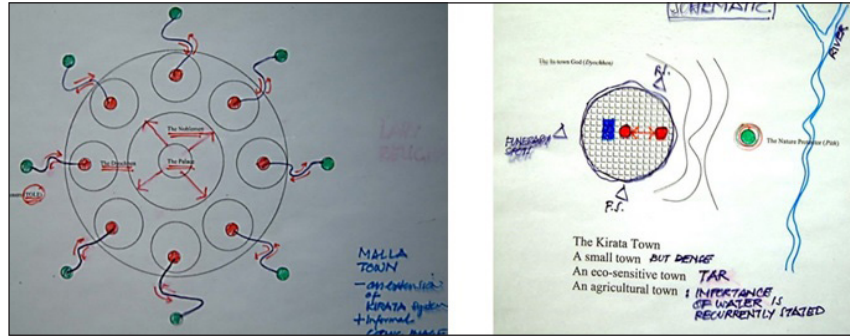


Figure 8: Malla Town as an extension to Kirata town. Source: Tiwari [20]

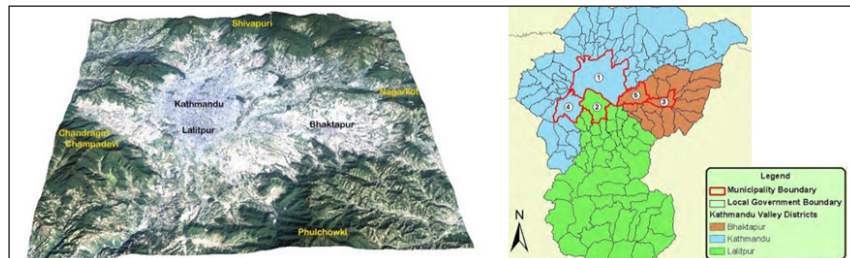


Figure 9: Landsat; Kathmandu valley in 3D perspective (Left) & Kathmandu Valley with districts. Source: KMC [9]

the growing population there are urban areas with unfinished urban facilities just bases on population size.

Table 1: Urban Population in Nepal and Kathmandu Valley

Region	1952/54	1961	1971	1981	1991	2001
Kathmandu valley	196,777	218,092	249,563	363,507	598,528	995,966
Nepal	238,275	336,222	461,938	956,721	1,695,719	3,227,879

Source: CBS [4]

The population in designated urban areas of the Kathmandu valley has increased considerably by 2001 to about 5 times that of 1952/1954 (see Table 1). It also shows the non-uniform growth pattern where most is rigorous in the capital. Most of the urbanised areas are in the Kathmandu valley, which contributes significantly to the overall urbanisation status of the country. The urban population density of Kathmandu valley was 10,265 (the population is 995,966 and the area 97 sq.km). On the other hand, the rural population is also increasing slowly in the valley. The average annual growth of the rural population was comparatively higher than for Nepal as a whole.

The conversion of agricultural land is also supported by infrastructure development. A ring road around the existing urban core built during the 1970s enhanced the urbanisation process after which the agricultural lands near the road began to be transformed into urban/built-up areas. From the CBS data [4], the Kathmandu Valley supports over 40% of the total urban population of total country's population (see Table 2). Due to unplanned urban growth, contemporary

Kathmandu dwellers face many risks. With increasing population, the Kathmandu valley has increasing food demand. Agricultural land has been decreasing annually by 7.4%. Meanwhile, non-agricultural land has increased from 5.6% to 14.5% to 28% in the Valley during the same periods [11]; (Figure 2).

Table 2: Average Annual Growth Rates of Urban and Rural Populations in Nepal and the Kathmandu Valley

Region	1952/54		1961-1971		1981		1991		2001	
	U	R	U	R	U	R	U	R	U	R
Kathmandu valley	1.29	1.53	1.36	4.32	3.83	0.87	5.11	2.32	5.22	2.5
Nepal	4.4	1.56	3.23	2.03	7.55	2.4	5.89	1.79	6.65	1.72

U = Urban R = Rural

Source: CBS [4]

Nepal is predominantly an agricultural country with over half of its gross domestic product originating in agriculture, and about 70% of its labour force engaged in the sector [14]. It is obvious that agriculture must play a dominant role in the country's development, mainly through the creation of employment for the expanding labour force and by increasing labour productivity. However, agricultural land in the urban & peri-urban areas of the Kathmandu valley is not being used fully for agricultural production (see Figure 10). Unplanned urban development fostered by weak institutional arrangements has encouraged rapid and uncontrolled sprawl, which has contributed to dramatic changes in the landscape.

By 1970 Yogyakarta City had 5.2 sq. km spread over urban built-up

areas. Then, in 1980, the built-up area had increased and become 6.4sq.km. By 1990, the total number of urban built up areas was 9.3 sq.km. It means that from 1970 to 1990, Yogyakarta City was dominated by non-built-up areas (see **Figure 11**). It also indicates that Yogyakarta urban areas grew up physically, but with very low intention.

Entering the year 2000, urban built-up areas in Yogyakarta changed dramatically. Prior to the year 2000, the total of built-up areas was always smaller than the municipality area (32.5 sq.km), but in 2000, it was 107.8 sq.km. Suddenly, Yogyakarta had become an under-bounded city with low-density development sprawling over agricultural fields. This situation continued on to 2010 with increasing total built-up areas reaching 152 sq.km (see **Table 3** and **Figure 11**). This means that during the last 20 years, the total amount of built-up area in Yogyakarta City was 15 times more than before.

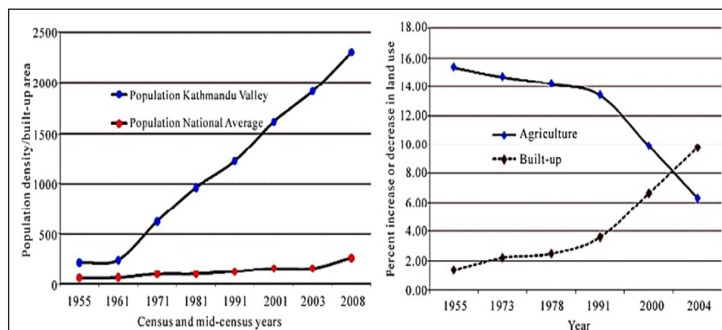


Figure 10: Kathmandu Valley: Increases in built-up areas at the cost of Agricultural Land. Source: CBS [4]

Table 3: Spread of Built-Up Areas and Total Population of Yogyakarta City 1970-2010.

Year	1970	1980	1990	2000	2010
Total Built-Up Area (sq.km)	5.2	6.4	9.2	107.8	152
Total Population	340908	384437	448758	483760	388088

Source: BPS [1]

Based on the **Table 3**, it can be seen that the total built-up area is growing much faster than population growth. This means that the urbanisation process is not driven by rural to urban migration, and not by natural increase but that urbanisation in Yogyakarta is driven by reclassification and suburbanisation process, or so-called spatial urbanisation. It is shaping a city which is still organic despite not being driven by the increasing population. The large footprint of the individual residence over the agricultural land is the binding factor of urbanisation in Yogyakarta.

According to socio-economic conditions in the findings, there is significant variability in the proportion of farmers in the urban fringe of Yogyakarta City. Three villages along the periphery of Yogyakarta (i.e. Baturetno, Potorono, and Wirokerten) have seen a tremendous

decrease in the proportion of farmers from 1990 to 2000 (see **Table 4**). It has been noted that the proportion of farmers has a close relationship with the decline in agricultural land. These three villages have the most conversion of agricultural land to built-up areas causing farmers to lose their farmland as well as their livelihood.

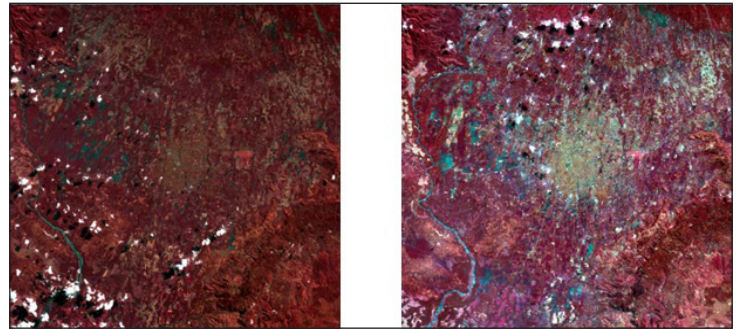


Figure 11: Landsat Image (532 Composition) of Yogyakarta City 1990 (left) and 2010 (right)

Table 4: Proportion of Farmers in Village Surrounding of Yogyakarta

Villages	% of Farmers in 1990		% of Farmers in 2000	
	Farmers	Others	Farmers	Others
Caturtunggal	8	92	5	95
Banguntapan	31	69	32	68
Baturetno	74	26	42	58
Potorono	77	23	41	59
Wirokerten	73	27	54	46
Tamanan	79	21	52	48
Bangunharjo	37	63	32	68
Nogotirto	61	39	54	46
Trihanggo	35	65	40	60
Sinduadi	25	75	8	92

Source: BPS [1]

In addition, it can be seen that the extension of built-up areas is triggered by the construction or improvement of transportation networks, notably main roads and highways. In this case, construction of the outer ringroad stimulated the emergence of new urban residential surroundings, and many other urban functions as well. By the 1980s, Yogyakarta Municipality government introduced the construction of the outer ringroad, and it was started at the northeastern part of the Yogyakarta urban fringe area. Suddenly, new housing appeared, which was developed by developers, and in consequence of this event some others urban functions came after.

Throughout the past 40 years, the total built-up areas of Yogyakarta extended 146.8 sq. km, within not only its administrative territory, but also within the adjacent district. It sounds ironic that most of the urban extension encroached upon fertile farmland supported

by an established irrigation system. The encroachment process was mostly dominated by the construction of housing. Although the other aspects of urban development are also important, expansions of urbanised areas are dependent on and driven by how and where people live.

This review also showed significant correlation between government policies, developer initiative, and farmer response for taking advantage of urban physical development. This finding has important implications for the socio-economic conditions of indigenous people, especially farmers. Most of the farmers were losing their farmland when the constructors developed new housing in urban fringe areas.

Figure 12 and Figure 13 show the decreasing farmland in the peri-urban region of Yogyakarta. During 20 years (between 1990 and 2010), 142.7 sq. km of agriculture fields were lost and converted into built-up land, notably for residential use. Equally, 1.95 hectares of very productive farmland with fertile soil is lost every day. Furthermore, with regard to the average number of farmers owning land in Yogyakarta Province, it can be said that 8 farmer households lose rice fields every day. This situation is more terrible when considering that the contribution of agricultural activities to household income is still dominant.

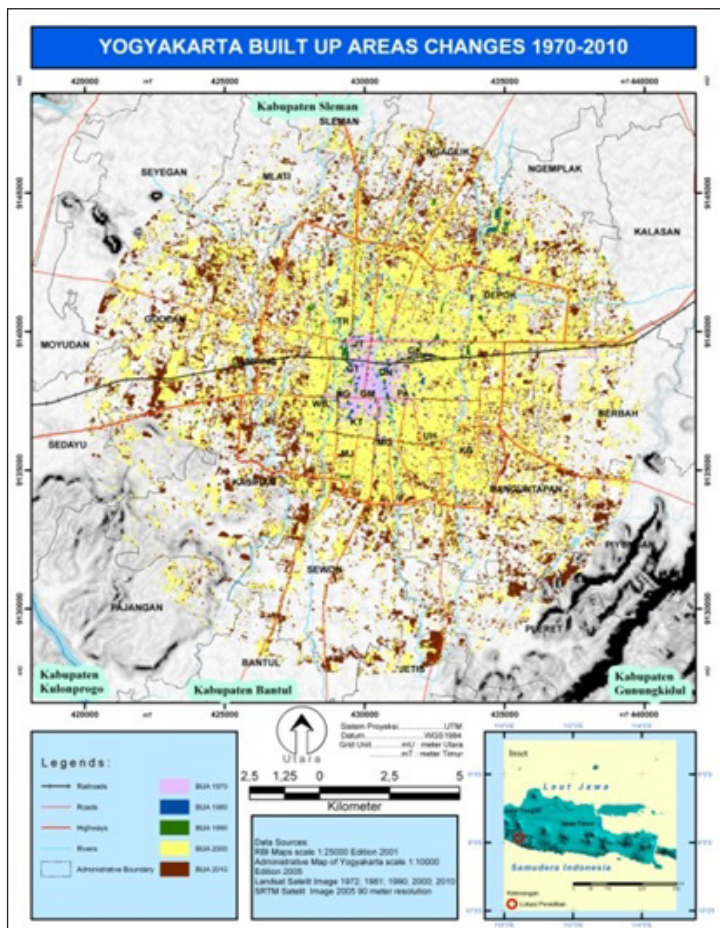


Figure 12: Built-up area map of Yogyakarta City from 1970 to 2010.

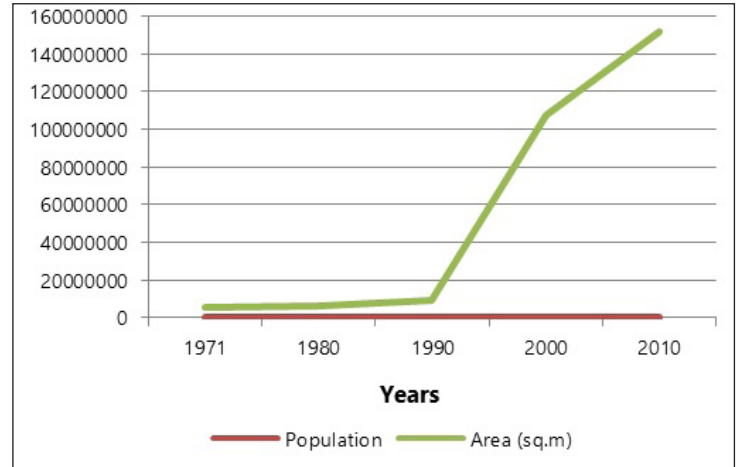


Figure 13: Changing urban population in different years

Continual and alarming rates of land use changes, especially away from agricultural uses can have a number of economic implications that are important for policy consideration. The competing demands of rural land and urban land uses lead to a gradually decreasing supply of prime agricultural land. As a result, land brought into production to compensate for farmland losses is often of lower quality, and is marginal in agricultural productivity. Historically, it can be seen that industrialisation in Indonesia did not take place smoothly. It is time to undo the false parallel between urban growth and urban sprawl.

4. Findings and conclusion

In summary, the comparison of urbanisation patterns in the Kathmandu valley and Yogyakarta City, it can be said that despite the geographical differences the urbanisation has caused spatial changes that do not favour food production in the development agenda. The predominantly agricultural landscape gradually changed to an urban landscape with an organic footprint. The sparsely developed built-up area with individual unplanned development activities indicates a complex urbanisation process in Yogyakarta city and the capital city of Nepal that requires attention from the respective authorities.

The haphazard loss of agricultural land is moving away from the availability of food. There is the urge to realise the importance of keeping the sources of food production close to places of food consumption especially in developing nations with the majority of the population on the poverty line. Thus, this heterogeneous landscaping observed in these cities and fringes needs to be smoothed out to avoid strain on the natural environment and socioeconomic conditions. Being able to tap the urbanisation well might be a boon to a city and the dwellers as well as a curse.

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