ANALYZING THE WELFARE-IMPROVING POTENTIAL OF LAND POOLING IN THIMPHU CITY, BHUTAN

LESSONS LEARNED FROM ADB'S EXPERIENCE

Eleanor Bacani and Shinjini Mehta

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Analyzing the Welfare-Improving Potential of Land Pooling in Thimphu City, Bhutan: Lessons Learned from ADB's Experience

Eleanor Bacani and Shinjini Mehta
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ABBREVIATIONS

ADB	Asian Development Bank
DRC	Department of Revenue and Customs
EIRR	economic internal rate of return
ESRI	Environmental Systems Research Institute
FAR	floor area ratio
hectare	ha
km	kilometer
km ²	square kilometer
LA	land acquisition
LAP	local area plan
LP	land pooling
MoWHS	Ministry of Works and Human Settlements
NRW	nonrevenue water
Nu	ngultrum (currency unit of Bhutan)
OLS	ordinary least square
PAVA	Property Assessment and Valuation Agency
PVM	property valuation method
SAM	spatial autoregressive model
SEMP	Strengthening Economic Management Program
TSP	Thimphu Structure Plan
UIDP	Urban Infrastructure Development Project
WHO	World Health Organization

CURRENCY EQUIVALENTS

(as of 17 August 2020)

Currency unit = ngultrum (Nu)

Nu1.00 = \$0.0134

\$1.00 = Nu74.90

ABSTRACT

For the rapidly expanding Thimphu city, capital of Bhutan nestled in a Himalayan mountain valley, the economic importance of flat lands cannot be more emphasized, underlining why a robust and efficient land management system is required to balance private interests with benefits of improved livability for the city's residents. For the sustainable expansion of the city, it was extended into the peri-urban paddy fields through the planning of local area plans (LAPs). To ensure planned development of these LAPs, the Government of Bhutan, for the first time in the history of the country, piloted a land pooling scheme, under the Asian Development Bank (ADB)-financed Urban Infrastructure Development Project (UIDP, BHU:2258), 2007–2014, where private landowners in four LAPs pooled 27.5%–29% of their individual parcels for the provision of serviced orderly parcels in these newly planned LAPs. These LAP areas now house at least 16% of the city's population and have demonstrated that land pooling is a powerful urban and economic development tool that can address both the shortage of developable land and urban infrastructure and can, therefore, generate substantial welfare gains if the right conditions are met.

This paper examines how well the implementation of this land pooling scheme meets the principles of welfare efficiency. From empirical analysis based on plot-level spatial regression using residential housing transactions in Thimphu from 2005 to 2018, we find evidence of an increase in land value associated with infrastructure development of up to 36%, indicative of landowners' welfare gains. We also find a positive price premium in the value of neighboring parcels by 1%, with all else equal. Local benefits of land pooling are largely concentrated to private landowners. One unexpected effect is housing supply insufficiency as 31% of serviced-ready parcels remain undeveloped in the UIDP LAP areas. This is further compounded by haphazard growth on steep slopes and areas outside the planned LAP areas, classified as agro-environment where parcels tend to be cheaper and unserved.

With right policy instruments in place, haphazard growth in these areas can be better managed and remaining parcels in the UIDP LAP areas can be infilled for housing within 4 years or less. Increasing the land pooling ceiling contribution (beyond the current 30% limit) can provide benefits in terms of greater percentage of land devoted to green spaces which can increase the welfare and satisfaction of both landowners and LAP residents. A mature, well-functioning housing sector is a necessary step to drive this process. The long term, sustainable outcomes of land pooling can only be achieved if backed by a mix of fiscal and urban policy measures: (i) implementation of property tax reforms through market-based valuation, (ii) rationalization of valuation process to minimize asset price information differences in the real estate market, (iii) introduction of proper fiscal incentives to address housing supply inefficiencies and LAP buildout, (iv) implementation of a regional urban planning and management measures to address urban sprawl, (v) employing urban planning tools such as enhanced floor area ratio (FAR) allocations to enable greater pooling contributions with provisions for enhanced service provision capacities, and (vi) private sector involvement in implementing and managing land pooling schemes.

JEL Classification: I3, R14, R15

Keywords: land pooling, local area infrastructure development, spatial regression, sustainable urban expansion, value-based taxation, welfare improvement

I. INTRODUCTION

A. Socioeconomic and Urban Development Context

1. Landlocked Bhutan covers a small area of about 38,394 square kilometers (km²) in the eastern Himalayan range, with mostly steep ridges and rugged terrains and some plateaus and savannahs. It shares approximately 700 kilometer (km) border with India to the south and west and 470 km of its border with the People's Republic of China to the north. The central western region is dominated by urban expansion around the capital city of Thimphu and other thromdes (municipalities) in the west and river valleys with large and small plains in the east, which serve as the country's granaries.

2. The country is at an interesting development stage. With a population of only 0.75 million people, which grew by an average of 1.5% per year from 1998–2018, the overall population density of 20 people per km² is very low, in comparison with the rest of South Asia (for example, Nepal at 196 people per km², India at 455 people per km², and Maldives at 1,719 people per km² in 2018).¹ But the percentage of urban population is much higher in comparison to its South Asian neighbors. Historically, Bhutan was below the average urbanization rate of South Asia before steadily outpacing these countries in 2002—an indication that it is now one of the fastest urbanizing economies in the subregion (Figure 1). The urbanization rate peaked at 6.8% in 1999, but grows nonetheless, with the current rate at 3%. There is a marked increase in urban share of population from 23% to 41% in 2018 (footnote 1). Majority of this population is concentrated in major cities including Phuentsholing, Punakha, and Thimphu. This fast pace of urban growth particularly impacted Thimphu city, the population of which grew from 79,185 in 2005 to 114,551 people in 2017.² In Thimphu thromde, the population density is estimated to be 4,389 people per km² in 2017 according to National Statistics Bureau (NSB) (footnote 2) and Urban Planning Division (UPD).³ Due to factors such as natural growth, pull of economic opportunities, and access to facilities and education systems, the share of urbanized population is expected to reach 56.8% by 2047.⁴

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¹ World Bank. 2020. World Development Indicators (accessed 16 April 2020).

² National Statistics Bureau (NSB). 2018. *2017 Population and Housing Census of Bhutan*. Thimphu.

³ Urban Planning Division (UPD). 2015. *Thimphu Structure Plan and Local Area Plans since 2002—An Update*. March.

⁴ NSB. 2019. *Population Projections for Bhutan 2017–2047*. Thimphu.

Figure 1: Urbanization Dynamics in Bhutan, 1998–2018

Notes: South Asia includes Bangladesh, Bhutan, Maldives, Nepal, India, Sri Lanka. Averages are weighted by gross national income, Atlas method.

Source: Authors' estimates using data from World Bank's World Development Indicators (accessed 13 February 2020).

3. A closer look reveals that with an increasing working-age population (from 55% in 1998 to 68% in 2018) and a lower age dependency ratio (from 82% to 47% for the same period), people are constantly moving from countryside to cities in response to economic opportunities (footnote 1). This reflects an early onset of structural transformation in terms of high-value labor that is shifting from predominantly agrarian activities to services, and risks disintegrating rural economies and overwhelming urban centers. At the same time, the student-age population is moving to major cities for better education facilities and access to basic urban infrastructure and services such as roads, water supply, electricity, and information and communication technology (ICT). The Ministry of Education (2018) reported that all 512 public and private schools across the country have 80%–100% infrastructure access to motorable roads, water and sanitation, and electricity, among others. But only schools located in urban areas tend to have complete access to the full range of infrastructure services. Altogether, these factors contribute to rural-to-urban migration and put considerable development pressure on major cities and towns, such as Thimphu, and on land resources along the city boundaries. In this context, the government recognized that a sustainable urban expansion strategy for Thimphu was essential to accommodate the influx of people by providing sufficient housing and infrastructure services through planned urban development of its peri-urban areas.

B. Policy Background

4. Recognizing the problem of rapid urbanization and the need to address it through sustainable and planned expansion of Thimphu city, the government, in 2003, developed and instituted a 25-year comprehensive urban master plan, the Thimphu Structure Plan (TSP) 2002–2027 (a living document

last updated in 2015 with a strategic environmental assessment update done in 2018) (Ministry of Works and Human Settlement [MOWHS] 2004, 2018). The TSP is the comprehensive urban master plan for guiding the future urban development direction of the city including the development of extension areas or LAPs, 14 of which were planned in the north and south of the city with detailed infrastructure networks and amenities so that people could develop their homes and businesses (Norbu 2015). About 12,000 people can be accommodated in each LAP (measuring 1 km²), which has accessible urban services (Norbu 2015). To make way for this planned growth, the city boundaries were expanded in 1999 from 8 km² to 26 km² by including Chang geog (block) to the south of the city and Kawang geog to the north. About 19 public consultations were held for the preparation of the TSP involving consultations with landowners and other stakeholders. The preparation of the TSP as a document to guide the future urban development direction of the city demonstrates the strong futures thinking, foresight, and planning principles which are a central part of Bhutan's governance.

5. LAP development through land acquisition (eminent domain) was not popular for several reasons: (i) high cost of acquisition for the government, (ii) perception of a dual land price system in which the rate for acquiring land for public urban development is below market rate, (iii) asset price information differences on land transaction data which may not accurately reflect consumer valuation on land, and (iv) lack of transparent and inclusive planning process and public consultations (United Nations Human Settlements Programme 2018). To get around these challenges, the city was keen to pilot the land pooling technique as an alternative approach to enable sustainable urbanization.⁵

6. The land pooling technique is widely used for creating planned serviced development of urban-fringe lands, in which a public or private entity aggregates several private land lots with government land contribution (if available) and replots them based on a grid layout (Archer 1992, Larsson 1997, Mathur 2012, and Adam 2019). It is also referred to as land readjustment or land consolidation. Consider, for example, Figure 2, in which seven plots of uneven shapes, sizes, and slopes are pooled from private landowners such as farmers (plots A, B, D, E, and G) and government (plots C and F) and remapped with adequate space for roads, infrastructure, communal amenities, and open space. Under the planning and reorganization process, landowners commit to participate in the scheme on a voluntary basis. Although participation is voluntary, the jurisdiction of the land pooling entity usually requires a minimum proportion of total landowners to be in agreement with the scheme, before it can be implemented. Landowners, while retaining private ownership of their land, are not compensated for the foregone land parcels—the benefit they receive in lieu of the deducted land is the receipt of orderly parcels which are serviced with infrastructure and services as well as additional public amenities such as parks and open spaces. A land pooling entity (developer) may, in addition, retain some of the replotted land parcels under its own ownership to sell later at a higher value (for example, plot adjacent to F) to help finance the capital expenditures for the scheme implementation (development of infrastructure and other communal amenities in a LAP). The contribution ratio for all privately-held land parcels follows the principle of equity, in which a more or less uniform ceiling contribution ratio is applied for each participating landowner, subject to their having the minimum land size to participate in the scheme. Actual contribution may vary within the site, but cannot exceed the ceiling contribution ratio (for example, in Thimphu, contribution ceilings are not to exceed 30%). Reshaped land parcels are returned to landowners according to area and value of land inputs. In some cases, the reshaped parcels are reconstituted at a different location to give way to the overall replotting requirements (for example, plots D, E, and G). Although the returned portion is smaller than the original area (for example, plots D and G), there is generally a strong incentive to participate in a land pooling scheme. Reasons being that the replotted land parcels have improved buildability from a more regular shape, get proper road access

⁵ The original city area included the core area, Changzamtog, Changangkha, Motithang, Kawangiangsa, Ziluka, Hejo, and Langiophakha. The newly planned LAPs were paddy fields at that time the TSP was approved. Norbu, G. 2015. Land Pooling in Thimphu, Bhutan [Blog post]. 9 August. <https://geleynorbu.wordpress.com/2015/08/>.

(which may not have existed before), and benefit from good infrastructure networks. Another added benefit is the increase in land value associated with infrastructure service provision. With land pooling, the new plot configurations are more suitable for developing urban structures and accommodating residential and commercial growth in the city.

7. In Thimphu, land pooling was the preferred technique for the development of the LAPs as it provided the opportunity of reducing social and resettlement impacts by enabling in-situ development, Figure 3).⁶ There are 14 LAPs where land pooling scheme is applied, comprising both ADB and non-ADB financed LAPs. An individual LAP ranges between 0.03 km² and 1.27 km².⁷ To minimize the burden on individual landowners and increase the acceptability of the scheme, the total private land contribution was kept to below 30% in the LAPs. This, along with land contributed by government, was then reconfigured into regular shaped plots with provisions for common urban infrastructure such as roads, drainage, sewerage, electricity, and water supply. Land pooling in Thimphu was first piloted under the ADB-financed Urban Infrastructure Development Project (UIDP) in the four southern LAPs (Figure 3 and para. 9).⁸ Figure 4 shows before and after examples of a land pooling scheme in Simtokha LAP (one of the LAPs financed under the ADB project). The land pooling scheme minimized the need for relocation and demolition of few structures that were present in the peri-urban paddy fields as planning was done to cause least damage to permanent structures. In addition, the historic farmhouses were preserved to help maintain the social and architectural fabric of the communities and minimize any perverse impacts on living standards.

⁶ ADB working paper on “Land Pooling in Nepal: from Planned Urban “Islands” to City Transformation” provides a good discussion of land pooling practices in other cities.

⁷ The LAPs financed under the ADB UIDP range between 0.39 km² and 0.83 km² in area. See Urban Planning Division. 2015. TSP and LAPs since 2002– An Update. March.

⁸ ADB. 2006. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Technical Assistance Grant. Kingdom of Bhutan: Urban Infrastructure Development Project*. Manila.

Figure 3: Urban Infrastructure Development Project Local Area Plan Areas in Thimphu

LAP = local area plan.

Source: Authors' illustrations based on overlaid spatial data from Bhutan's Ministry of Works and Human Settlement and the National Land Commission Secretariat.

8. The application of land pooling in development of LAPs not only provided much needed developable space to accommodate the growing city, but laid the foundations for proper planning and sustainable development of human settlements across the country with land pooling schemes being replicated throughout urban settlements in the country. LAPs are embedded within the planning guidelines pertaining to land use zoning and density, built to open space ratios, public open space guidelines, and community facilities, to name a few. As outlined in the TSP, the implementation of LAPs through land pooling is an effective delivery tool for translating broader sustainable urban development objectives into more practical requirements within a local urban setting. For example, a LAP may be designed in a manner that can accommodate distribution of population capacity and axis of location of residential and work areas through embedding of sufficient drainage capacity and water supply, and appropriate laying out of road network pattern and public transit system within walking distance from plots (footnote 3). The city would not have been able to cope with the demands of increasing urbanization without the deployment of such a planned and systematic approach to urban development.

Figure 4: Before and After Land Pooling in Simtokha Local Area Plan

Note: These are views of the Simtokha local area plan from the Olakha side.

Source: ADB. 2017. Completion Report: Urban Infrastructure Development Project in Bhutan. Manila.

9. In 2005, the government sought ADB's financing support to implement infrastructure development in four LAPs in the south of Thimphu thromde where land pooling was going to be implemented: Babesa, Changbangdu, Lungtenphu, and Simtokha (Figure 5). The ADB-financed UIDP, approved in September 2006, provided a loan of \$24.6 million for the financing of critical common urban infrastructures in these areas such as roads, drainage, electricity, telecommunications, water supply, and sewerage. During project appraisal, there were few permanent structures in the project areas which were developed through land pooling as these areas were predominantly paddy fields on the periphery of the city. Community facilities such as parks and outdoor gyms were planned in the LAPs, but not financed under the ADB loan. Figure 6 illustrates the originally planned land pooling arrangements in the four LAPs, where the overall LAP area is larger than the portions planned and developed under the UIDP (Figure 3). Figure 7 shows that over 16-year period (2003–2019), all four southern LAPs experienced significant building development. It also shows that the most rapid growth took place from 2013–2019 which coincided with the physical completion of the infrastructure development in the LAPs between 2012 and 2014.⁹ Certain LAPs such as Simtokha, Lungtenphu, and Chang Gedaphu (Chang Gedaphu is not financed by ADB) to the south of the core city experienced the greatest nominal increase in development.¹⁰ The completion of service-ready land parcels across the four LAPs paved the way to increase the much needed housing supply in the city, thus easing the burden on the already cramped core area of the city. The project's completion report, prepared in 2015, found that 640 housing units were privately developed by individual landowners in these LAPs which had accommodated 16% of the city's population (out of Thimphu thromde's total population of 116,012).¹¹ Later, the government also received financing support from the World Bank for developing infrastructure in the northern LAPs of Dechencholing and Langjophaka, which were financed under the Second Bhutan Urban Development Project and later, the lower Taba LAP under the additional financing of the same loan. These projects had a transformational impact on the city, which would otherwise been unable to cope with the demands of increasing urbanization without the deployment of such a planned and systematic approach to urban development. The added benefit was that the thromde's participatory approach in the implementation of land pooling led to social acceptance and easier implementation of these projects.

⁹ Changbangdu and Babesa LAP works were completed in 2014; Lungtenphu in 2012; Simtokha in 2013.

¹⁰ It represents the greatest increase in total number of buildings, although it should be noted that growth rates, which represent the % change over time, are in some cases lower than other LAPs such as Babesa and Changbangdu, which had fewer buildings to begin with.

¹¹ Ministry of Works and Human Settlement. 2016. Formulation of National Human Settlement Strategy Analysis Report. Thimphu; ADB. 2017. Completion Report: Urban Infrastructure Development Project in Bhutan. Manila.

Figure 5: Historic Trends in Building Development in Thimphu

LAP = local area plan.

Notes: The spatial assessment was done using a shapefile of building footprints provided by the National Land Commission, which was updated to include buildings which were visible in 2019 satellite imagery, but not present in the provided shapefile. This shapefile was overlaid on historic satellite imagery, and visual interpretation was done to determine the year a building was constructed (i.e., the year it first became visible in the satellite imagery). LAP areas developed under the Urban Infrastructure Development Project are only a small portion of planned areas.

Source: Authors' illustrations based on overlaid spatial data from Bhutan's Ministry of Works and Human Settlement and National Land Commission Secretariat.

Figure 6: Originally Planned Land Pooling Arrangements, 2011

Babesa LAP

Changbangdu LAP

Lungtenphu LAP

Simtokha LAP

LAP = local area plan.

Notes: Presentation of 2011 Plans. The National Land Commission provided the original plans to ADB in AutoCad format. These files were imported into the geographic information system and geo-referenced to fit satellite imagery and parcel and building shapefiles, also provided by the National Land Commission Secretariat.

Source: Data from the National Land Commission Secretariat, Bhutan.

Figure 7: Time Lapse of Building Development, 2003–2019

LAP = local area plan.

Source: Authors' illustrations based on data from the National Land Commission Secretariat, Bhutan.

10. To examine the welfare gain potential from land pooling scheme, we first explored whether the initial land pooling scheme under the UIDP has improved the economic welfare of landowners using a combined data set from cross-sectional household survey (2005–2018) conducted under ADB Technical Assistance (TA) 9050 (Regional: Strengthening Capacities to Design and Implement Smart Urban Infrastructure) and geospatial data obtained from the National Land Commission for the planned areas of four UIDP LAP areas. A spatial autoregressive model (SAM) is developed to estimate incremental service-ready values associated with infrastructure development. Next, we looked at how asset value growths respond to different levels of land pooling contributions and market conditions using a simple pricing simulation exercise. This is to determine whether landowners can still accrue benefits beyond the statutory ceiling contribution ratio in Bhutan (30%). Third, we looked into the economic and social conditions of residents and renters to better understand how they can fully enjoy improved livability, particularly in relation to housing affordability, and communal facilities and infrastructure service quality using perception survey based on the household data and geospatial mapping analysis. Then, we also explored the potential for the local government to recoup a proportion of incremental real estate value gains generated by public improvements through market-based tax revenue for land and buildings. In particular, we looked at the potential to unlock additional funding for maintenance (or recover costs) of infrastructure provision through property tax revenue improvements, which has a significant impact on resident's satisfaction (as was revealed through the survey questionnaire

results). Finally, by using geospatial mapping analysis, we examined the nature of growth occurring within the existing developable parcels in the serviced UIDP LAP areas and outside the thromde boundary (adjacent to the four UIDP LAPs) to understand how inefficiencies in housing supply and haphazard growth can be better managed.¹² This paper proceeds as follows. Section II describes the land pooling scheme and ADB's support through the UIDP in Thimphu. It also assesses the welfare impacts of land pooling to landowners through empirical analysis. We present results of economic analysis based on (i) hedonic price model using semi-linear and spatial regression methods, and (ii) pricing simulations. Section III presents a review of implementation of land pooling under the UIDP based on data from household survey and spatial analysis, and assesses the welfare impacts on renters and the Thimphu thromde. In Section IV, we provide recommendations on how Thimphu's land pooling practice can be best supported based on welfare and spatial analysis and review of related ADB projects. Section V provides the conclusion.

11. The findings are limited to the four UIDP LAP areas in Thimphu thromde (Babesa, Changbangdu, Lungtenphu, and Simtokha), but offer lessons for the wider Thimphu thromde as well as Bhutan's other human settlements with similar urban challenges and real estate market conditions.

II. WELFARE ANALYSIS

12. Acknowledging that the implementation of land pooling and associated infrastructure development has improved the welfare of the city (through increased orderly land and housing supply, sprawl prevention, and increased tax base) and its residents, in this section, the paper assesses the welfare gains to the private landowners from the UIDP-supported land pooling scheme based on a pareto efficiency principle.¹³ Based on the concept of land pooling, private landowners that participated in the scheme should become economically better-off, primarily through increases in the value of the returned portion of their land and the added convenience in asset building for rental income generation. At the same time, however, it should not imply that the public has become worse off as a result of land pooling (for example, housing becomes less affordable in serviced LAPs, deteriorating service quality due to maintenance inefficiencies, or no change in land tax revenue of appreciated land value). The overall welfare improvement of both private and public parties should be ensured by, for example, access to affordable housing options and quality services provision.

13. In general, the contribution ratio of land pooling may differ among LAPs because of infrastructure requirements, available government land and topography. Under the UIDP, landowners contributed similar percentages of land ranging between 27.5%–29.0% (but not exceeding 30%) of their plot area (Table 1). Land pooling excluded traditional villages,¹⁴ and the participatory planning process helped minimize shifts in land plots.¹⁵ At project completion, 115.02 hectares (ha) of land was used for establishing public amenities, green areas and urban infrastructure facilities (water supply and sewerage connections, roads, and drainage). Of this area, 29.08% (33.45 ha) were for readjustment of private land from 727 landowners; 70.92% (81.57 ha) was from the government's contribution.

¹² The development in the steep slopes and thromde periphery manifested as urban sprawl resulting in mixed-use zoning with clusters of permanent structures being built on land designated for agricultural or environmental uses and along steep slopes.

¹³ In addition to LAP residents and renters, the government is deemed better-off when it is able to offer options to accommodate residential and commercial growth through planned urban development while minimizing haphazard growth, and to recover such costs incurred from infrastructure development. This is made possible, for example, through capturing a portion of incremental private gain from infrastructure development (increase in property tax revenue associated with increase in land value in these LAPs).

¹⁴ A traditional village is a government-designated area with historic value. Structures may include traditional houses, warehouses, and animal sheds. There are few traditional villages within these LAPs.

¹⁵ The planning process prioritized reallocation of plots within the same zone.

Table 1: Land Pooling Contribution Ratio under the Urban Infrastructure Development Project, by Local Area Plan

ADB-Financed LAP	Government Land Contributed or Pooled (ha)	Land Contribution from Private Land (ha)	Total Landholding Area of Private Landholders (Land Pooled and Returned) (ha)	Number of Landowners under UIDP	Average % of Land Contributed by Landowners as a Proportion of their Plot Size (%)
Babesa	41.76	9.10	33.1	222	27.5
Changbangdu	18.16	4.41	16.04	151	27.5
Lungtenphu	14.42	11.53	39.90	231	28.9
Simtokha	7.23	8.41	29.00	203	29.0
Total	81.57 (70.92%)	33.45 (29.08%)	118.04	727	

LAP = local area plan, ha = hectare, UIDP = Urban Infrastructure Development Project.

Source: Data received from Project Management Unit, UIDP. April 2020.

A. Valuation in ADB-Financed Local Area Plans

1. Empirical Model and Estimation Method

14. Land represents a fundamental fraction of wealth in Bhutan's national and household economy, which is made even more critical with the scarcity of flat land due to topographic conditions. At the national level, land use holds important implications for agriculture, urban, and peri-urban development, and open space amenity. At the household level, land is a significant investment asset as private landowners' benefit through rental property incomes and capital gains derived from sale of land, particularly flat lands, which sell at a premium. The general scarcity of flat land underlines the need to manage local public needs (including accommodating urban population growth) with private gains interests and, thus, highlighting the importance of having a robust and efficient land management system in place.

15. The implicit value of characteristics that make up the pricing structure of real estate is usually determined using a hedonic price model.¹⁶ Its theoretical foundation and associated empirical applications linking real estate values with observed real estate characteristics are extensively discussed in the literature by Huh and Kwak (1997), Kanemoto (1988), Palmquist (1989, 1991), and Rosen (1974), among others.¹⁷ Ordinary least squares (OLS) is the most common method of estimation for hedonic pricing.¹⁸ However, it overlooks the problem of spatial autocorrelation, as not explicitly modelled is the influence of landowners' expectations about future revenue streams and opportunity cost of developing returned parcels based on neighborhood appraisals and speculative development in nearby parcels.

¹⁶ A hedonic model offers an advantage in nonmarket valuations like externalities and public goods (for example, impact of air quality or lake view in housing value). Haab, T. C. and McConnell, K. E. 2002. *Valuing Environmental and Natural Resources: The Econometrics of Non-Market Valuation*. Northampton: Edward Elgar Publishing.

¹⁷ A hedonic price equation represents market land prices at equilibrium. See Rosen, S. 1974. Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *Journal of Political Economy*. 82 (1). pp. 34–55.

¹⁸ The implicit price of the characteristic z of plot i , is obtained as marginal change in price against standardized variable of the model, $\partial p_i / \partial z_i$. For example, the implicit price of access to urban infrastructure services is the marginal impact on land price, assuming the market is in equilibrium.

16. Disentangling direct and spillover impacts of urban infrastructure improvements is a simplifying assumption, but following the arguments of Anselin (1988) and LeSage (1999), ignoring spatial dependence presents a potential bias in estimating the overall contribution of urban infrastructure improvements in the pricing structure of land values. Accounting for spatial effects associated with infrastructure improvements is a first step to understanding empirically landowners' investment decisions on parcel use and ownership in a planned use development. This is especially important as landowners may exercise greater bargaining power over what can be done on the returned portion of land at the urban fringe, which may present a counterproductive effect such as vacant or undeveloped service-ready parcels (resulting in distressed market conditions).

17. Following Rosen (1974) and Anselin (1988), the paper develops a log-linear SAM that is fundamentally based on the hedonic price approach to examine how changes in infrastructure development can impact land value in the four LAPs since the land pooling scheme was introduced in Thimphu. We add a spatial dimension to the usual specification of a hedonic price equation by including spatial weights matrix and autocorrelation coefficient.¹⁹ The model is well-supported in literature as a more accurate alternative to OLS-based regression²⁰ with location-specific dummy variables and/or distance coefficients (for example, Bidanset and Lombard 2014; Huang et al. 2010). Our model extends to other model variations applied to describe this interaction and similar applications (for example, Conway et al. 2007; Hession and Moore 2010; Kostov 2008). The full SAM equation is:

$$\log(p_i) = \beta_0 + \beta_1 N_i + \beta_2 \log L_i + \beta_3 R_i + \beta_4 C_i + \sum_{i=1}^n \beta_i Y_i + \theta W\varepsilon + \rho Wp + u \quad (1)$$

18. Where p_i is the log-transformed, per-square-meter-price of plot i . Previous literature has identified economic characteristics associated with physical improvements made on adjoining parcels (urban infrastructure, building, landscaping, open space), location preference, land use regulations, and expectations about future appreciation in land asset as some key factors in the variation of real estate value (Can 1992; Fan et al. 2006; Fletcher et al. 2000; Kok et al. 2014). Research by Ooi and Lee (2006) and Deng et al. (2012) also suggest the dynamic price relationship between land and housing. Based on these literature and available data, and in line with a priori expectations, 13 variables were used to generate a statistically meaningful empirical model, which are presented in Equation 1.²¹ β is a set of estimated coefficients. Neighborhood characteristics, N_i , represent the total number of available infrastructure services in plot i such as paved road, water supply, drainage, and sewerage. Location characteristics, L_i , refer to driving distance of plot i to the center of Thimphu (central business district [CBD]).²² Real estate characteristics, R_i , of plot i at the time of land purchase (or sale) transaction are represented by a control (dummy) variable for whether a plot has any existing building structure prior to a transaction taking place. Credit availability, C_i , refers to a control variable for loans that may be associated with plot i . (for example, housing construction). Time-specific dummies, Y_i , comprise nine control variables for 2005–2018 (footnote 31).

19. There are other factors interacting with land and real estate market other than those mentioned above. Floor area ratio (FAR), for instance, has some implications for land use efficiency and in quality living conditions in relation to residential density. While accounting for this variable is ideal, the actual FAR at the plot level may lack variability because a majority of parcels is likely to observe the maximum

¹⁹ See Appendix 2 for empirical framework and modelling results using OLS estimation.

²⁰ The general hedonic model is $\log(p_i) = f(M_i, L_i, R_i, C_i, Y_i)$ and using OLS, it can be expressed as $p = \beta X + \varepsilon$, where X is a vector of explanatory variables.

²¹ Appendix 1 provides additional details. The Household Survey was funded by ADB in 2018 under its Technical Assistance: Strengthening Capacities to Design and Implement Smart Urban Infrastructure.

²² Driving distance between the land plot and city center is derived from Google Maps.

that is permissible.²³ More generally, one can expect, a priori, that a flat and leveled parcel with access to full infrastructure services such as road, water supply, sewerage, and drainage is worth more than a similar piece of land with partial (or no) service provision.

20. To account for spatial dependence (paras. 15–16), a spatial weighting matrix, W , is added based on distance and location information from location coordinates following an inverse distance matrix.²⁴ Each element $w_{i,j}$ represents the inverse of the distance between plot j and plot i (LeSage 1999). As the distance increases, weights decrease in proportion with ρ which is the spatial coefficient and p is vector of geo-referenced endogenous variable, plot price. Every element of W represents the indirect (or spillover) effect of observation j on observation i . Residuals in Equation 1, ε_i , are not independently identically distributed (i.i.d.), in contrast with OLS. It is assumed to follow a spatially auto-correlated process, which can be presented as $\varepsilon = \theta W \varepsilon + u$. The error process can be modelled by a spatially autoregressive process, θ , which implies that $W \varepsilon$ is endogenous and the OLS estimators are inconsistent. u is vector i.i.d. random variables. A normally distributed data for spatial regressions was assumed and maximum likelihood estimation is carried out to modify the estimation errors generated by the model.²⁵

2. Data

21. The analysis is conducted based on plot-level data from 2005 and 2018 in Babesa, Changbangdu, Lungtenphu, and Simtokha LAPs (financed under UIDP). For each land parcel, we compiled a static dataset on land transaction price, number of infrastructure services it has access to, driving distance to city center, presence of existing structure, landowner's credit transaction history in relation to the credit moratorium on housing (that the Royal Monetary Authority imposed in March 2012–September 2014 to curtail domestic liquidity in response to a shortage in Indian rupees), and year the plot was purchased or sold. All data described above, except for driving location, is derived from an ADB-supported *Survey on the Impact of Land Pooling on Landowners in Thimphu* that was conducted in 2018. The survey recorded 1,202 observations comprising renters, original and new landowners (Table A1.1). The plot transaction roster contained the most crucial data for this empirical exercise, which comprises recall questions on market information (i.e., land price, year of transaction) and physical characteristics (i.e., land area, presence of existing structures, access to infrastructure services such as paved road and water supply, proximity of transacted plot to a school and recreational area), and reason for purchasing or selling. The transaction sample with complete information on prices, real estate, and neighborhood characteristics recorded 242 plot-level observations of sales and purchases from original landowners.²⁶ This dataset was sufficient for estimating a hedonic price model based on the OLS method.²⁷

22. To generate hedonic pricing estimates based on spatial regressions, a geo-coded transaction roster is needed. A plot-level data point comprising transaction price and neighborhood and real estate characteristics is matched with the plot's location using georeferenced coordinates to create a spatial weights matrix. The spatial data is based on the original plans for the four ADB-financed LAPs, provided by the National Land Commission Secretariat to ADB in AutoCad format. These were imported into the Geographical Information System (GIS) and georeferenced to match with satellite imagery and parcel maps. The spatial data has 2,400

²³ A maximum FAR of 150 generally applies for structures with 3–5 levels in UV-1 (core) and UV-2 (medium density) districts in Thimphu, which varies by land use and zoning. It is assumed that plot owners will build to maximum permissible FAR. Urban Planning Division. 2015. *Thimphu Structure Plan (TSP) and Local Area Plans (LAPs) since 2002–An Update*. March.

²⁴ Due to limited matched and linked spatial plots than desired, the available data did not allow adding weights based on contiguity approach (as none of the matched data shares the same boundary and spatial dependence can only be determined through linear distances based on location coordinates).

²⁵ OLS and spatial estimations of hedonic price model are generated using Stata. See StataCorp (2019) for guidance on spatial regressions.

²⁶ The plot transaction roster initially recorded 366 sales and purchases for original landowners.

²⁷ Data cleaning and processing of household survey was undertaken by the Economics Analysis and Operations Support Division, Economic Research and Regional Cooperation Department, ADB in 2018.

observations covering the four ADB-financed LAPs and with plot information on location coordinates, location characteristics (for example, driving distance to CBD), and plot size, which is then matched with 242 plot-level household observations using a unique identifier.²⁸ During this matching of datasets, the observations were further reduced as some transaction data did not have information on either LAP or plot number, or both. Table 2 presents the final dataset with 135 plot-level observations.²⁹

Table 2: Final Dataset for Regression Analysis, by Local Area Plan

Year	Babesa	Changbangdu	Lungtenphu	Simtokha	Total
2005	4	–	2	2	8
2006	3	–	3	3	9
2007	4	–	5	2	11
2008	6	–	7	5	18
2009	2	–	3	2	7
2010	2	1	4	3	10
2011	5	3	2	2	12
2012	1	1	2	4	8
2013	1	1	4	2	8
2014	1	4	3	2	10
2015	1	–	2	4	7
2016	3	1	2	5	11
2017	6	1	2	2	11
2018	3	–	1	1	5
Total	42 (31%)	12 (9%)	42 (31%)	39 (29%)	135

Note: Dash (–) refers to zero observation.

Source: Authors' estimates.

3. Results and Discussion

23. Results are presented in Table 3. In the estimations, we find that the SAM, which considers spatial dependence in the neighborhood, outperforms OLS when the spatial autocorrelation in the regression residuals are statistically significant.³⁰ One salient feature of spatial regressions is that the standard interpretation of coefficient estimates, β , as marginal impacts on plot prices no longer applies. The coefficient estimates represent total effects. For example, β_i is the sum of spillover and direct benefits of access to services on land prices. In general, the results are in line with our expectations, although a few estimated coefficients are not statistically significant, even at the marginal level of 10%. The year dummies are highly statistically significant from 2008 and have the expected positive signs, and this result may be capturing the effect of systematically rising land prices driven by economic conditions.³¹

²⁸ A unique identifier is generated for each plot using information on LAP and plot number.

²⁹ Babesa (31%), Lungtenphu (31%), and Simtokha (29%) have a more balanced representation in terms of location characteristics, while Changbangdu represents only 9% of final transaction dataset. A distance variable that reflects real values was added, computed as driving distance between a plot and the city center (rather than use of location specific dummy variables). One reason is to allow for more variation in the LAPs throughout the range of a small sample in Changbangdu in comparison with the other LAPs.

³⁰ The Wald test of spatial terms confirms that spatial specification is preferable to OLS.

³¹ Dependent variable is not de-trended. Nine YEAR dummies are added in the model (Equation 1). For example, Y2006 is equal to 1 if sale or purchase occurred in year 2006, and 0 otherwise. Y2005 is used as base year and hence, dropped in regression estimations to retain the constant variable.

Table 3: Determinants of Land Prices in Urban Infrastructure Development Project Local Area Plans using Spatial Autoregressive Model

Variable	Coefficient
Neighborhood (infrastructure access), N	0.31*** (0.08)
Location (driving distance to city center), L	-1.24*** (0.28)
Real estate (existing structure), dummy, R	1.06*** (0.27)
Credit supply, dummy, C	-0.25 (0.18)
Y_{2006} dummy	0.59 (0.51)
Y_{2007} dummy	0.43 (0.48)
Y_{2008} dummy	1.80*** (0.45)
Y_{2009} dummy	1.05** (0.54)
Y_{2010} dummy	1.68*** (0.49)
Y_{2011} dummy	0.87* (0.49)
Y_{2012} dummy	1.34** (0.54)
Y_{2013} dummy	1.58*** (0.54)
Y_{2014} dummy	1.59*** (0.49)
Y_{2015} dummy	2.47*** (0.52)
Y_{2016} dummy	1.66*** (0.49)
Y_{2017} dummy	1.61*** (0.49)
Y_{2018} dummy	1.72*** (0.63)
Constant	7.71*** (0.76)
Spatial autocorrelation coefficient	-0.97** (0.45)
R^2	0.46
Wald test of spatial terms:	
χ^2	5.03
$Prob > \chi^2$	0.08

Notes:

1. All coefficients are exponentiated.
2. Robust standard errors are in parenthesis.
3. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Source: Authors' estimates.

24. We draw four key observations. First, easier access is correlated with higher land value. This is expected with use of an integrated approach to infrastructure development under a land pooling scheme. In Thimphu's four LAPs, the UIDP delivered a comprehensive set of four basic services that include secondary and tertiary road and drainage networks connecting the LAPs to major service roads (33.7 km), secondary and tertiary water distribution network (31.9 km), and sewerage collection pipes (28.5 km), including 819 manhole chambers and 1,411 water and sewer inspection chambers and associated structures, and ducting for power and telecommunication supply (25.7 km) (ADB 2017). For each plot-level observation, this variable has a value between zero (no access to infrastructure) and four (full access to all infrastructure services).

25. We expect to see a positive relationship between land value and total available infrastructure services that land parcels have access to (as derived from questions in household survey). This means that a parcel with access to all infrastructure services is expected to have a higher value than a plot with partial access. Results confirm a positive total effect, with 37% increase in the average land price that can be attributed to access to services.

26. It is common for a serviced parcel to have access to more than one basic infrastructure and service, with 88% of respondents claiming to have access to at least one service (Table 4). In fact, within a UIDP LAP area, landowners may have had access to the same level of infrastructure services at the same time. Hence, the problem of multi-collinearity is eliminated (individual service variables are highly correlated) by taking the combined number of available services as the explanatory variable. Note that in the robustness checks, we examined how price responds to a change in every infrastructure variable to determine how a service individually affects land value. It was found that access to a drainage is a top determinant of land value, followed by water supply, road, and sewerage.³² Cumulatively, the availability of, and access to, basic infrastructure and services leads to an appreciation of land value even in the absence of additional investment efforts from the landowners who pooled their land.

27. The impact of the distance to the city center on land prices is, as expected, negative and highly statistically significant at 1%. The results further suggest that about 12% increase in plot price is expected when driving distance to the city center reduces by 10%. A priori, plots which are nearer to the city center tend to be more expensive compared to those farther away and in the periphery due to increased accessibility to a range of urban amenities (para. 18). The results confirm the high premium that people place on living nearer to the city center and the most highly valued land is within a very short distance of the city center, with all else being the same.

Table 4: Plot Access to Basic Infrastructure Services, by Local Area Plan

Infrastructure	Babesa	Changbangdu	Lungtenphu	Simtokha	Total by Services
Up to one service	6	–	4	6	16
Two services	5	1	4	4	14
Three services	14	2	3	9	28
Four services	17	9	31	20	77
Total by LAP	42	12	42	39	135

LAP = local area plan.

Note: Dash (–) refers to zero observations.

Source: Authors' estimates based on household survey data.

³² The LAP buildings are currently connected to individual septic tanks. Sewerage may be the weakest determinant of value in this case because the variable is based on the availability of infrastructure for future connections rather than a current actual connection to a sewerage network.

28. Second, results suggest that having an existing structure has had a positive impact on plot value compared with a completely undeveloped plot. We can expect about 200% increase in the value of a plot with an existing structure built on it. In Thimphu, the typical structure types are family homes, multihousehold residential or mixed-use apartment blocks and hotels. We expect higher potential incomes for multihousehold residential, or mixed-use blocks compared to single housing units. Based on spatial analysis, it can be approximated that 87%, out of 1,739 developable parcels, are designated for residential and commercial uses in the four LAPs.

29. Third, the control variable on credit is negative, but not statistically significant. This dummy is equal to one if a landowner specified any outstanding loan that is linked with land purchased or building constructed, and if the year in which the loan was taken out is either before or after the credit moratorium (2012–2014), otherwise, zero. Favorable mortgage conditions bring about optimism for landowners and builders. A landowner with a reported dummy variable “1” is coded as not having experienced financing constraints. A positive coefficient is expected as the demand shifts upward, but an unexpected negative sign is likely suggesting that the model may be capturing the initial market-stabilizing effect of an increase in residential and mixed-use construction in service-ready parcels. This sentiment seems to be supported by a surge in building construction that grew by 12% (a total of 518 new buildings) during the 3-year credit moratorium; this period has outnumbered building activities pre-ban (2009–2011) and post-ban (2016–2018), suggesting that it had to respond to latent demand (Figure 8).

Figure 8: Building Activity in the Four Local Area Plans During Credit Moratorium, 2012–2014

Source: Authors' estimates based on data from National Land Commission Secretariat, Bhutan.

30. Thimphu's housing financial sector is dominated by small-scale individual developers, who rely largely on private savings and home equity loans for residential construction, renovation, and purchase. Notwithstanding this is Bhutan's overall residential mortgage, which recorded an increase in housing lending portfolio in 2007–2017 (comprising about 14% of gross domestic product in 2017) (Affordable Housing Institute [AHI] 2018). But one key concern is the high incidence of loan default in this sector. In 2016, housing loans represented the largest credit exposure at 24% of total loan portfolios of eight financial institutions (AHI 2018) and in fiscal year (FY) 2019, it was reported that 11.4% of total nonperforming loans originated from this sector (Royal Monetary Authority [RMA] 2019). Bhutan's highly selective and inherently prohibitive housing finance system (high collateral requirements, limited credit guarantees) is negatively impacting the sector's productive potential in the broader economy as it relates to sustainable urban planning (AHI 2017; RMA 2019).

31. Fourth, the results suggest a spillover effect of land attributes in the value of neighboring parcels. However, its impact is small (Figure 9). For example, a spillover impact of public infrastructure development on the value of nearby parcels is only 1%. To illustrate this, consider two hypothetical parcels with the same value of \$30 per square meter (m^2) before a land pooling scheme. Plot 1 gained access to all infrastructure services as a result of land pooling and its value increased by 36% or \$10.80 per m^2 ; the direct effect in plot 1 is an increase in value from \$30 per m^2 to \$40.80 per m^2 . Because of this land appreciation, plot 2, a nearby plot (which may or may not have services), can benefit indirectly through an increase of 1% or \$0.30 per m^2 in its own value; the indirect effect in plot 2 is an appreciation in value from \$30 per m^2 to \$30.30 per m^2 . In this example, the total effect on land value attributable to neighborhood characteristics (access to infrastructure services) is 37% or \$11.1 per m^2 . Therefore, land pooling scheme is welfare improving for landowners, particularly those whose plots are directly serviced by road, water, sewerage, and drainage. Landowners whose plots are located nearby the ADB serviced parcels may also benefit, with all else the same. The evidence of spillover effect in the attributes is negligent and marginally significant, even though regression residuals suggest high spatial autocorrelation. One possible reason behind this result is that the highly variable and complex terrain in Thimphu may be giving each plot highly unique sets of attributes.

Figure 9: Spillover Impact of Land Pooling

Note: The sum of spillover and direct effects is the total effect presented in Table 3.

Source: Authors' estimates.

32. Overall, empirical results imply that land pooling and corresponding integrated basic services provision positively affect the value of serviced plots in the four LAPs. In particular, neighborhood and location characteristics are driving market values up, even in the absence of additional investment efforts from landowners. But results from spatial analysis suggest a seemingly counterproductive effect associated with land appreciation, in which high prices may be encouraging speculative behavior among landowners (for example, delaying building development and construction) even though plots are shovel-ready with infrastructure systems completed since 2012. Figure 10 and Table 5 corroborate this observation, where we find that 31% of land parcels in the four LAPs are vacant and undeveloped (based on building activity in 2019). In Simtokha, 24% of developable parcels are yet to be infilled. Lungtenphu, the closest LAP to the city center, has capacity for infill for 31% of its developable parcels. While Babesa, the farthest LAP from the city, has to infill 34% of the existing plots. In Changbangdu, 40% of its developable parcels are yet to be built on (based on building activity in 2019).³³ With almost one-third of the plots remaining idle, the four UIDP LAP areas may have not yet reached their full potential for residential and other mixed-use development. Notwithstanding that, the UIDP has likely surpassed its housing absorption target of 11,000 people, with the construction of 640 houses that can accommodate 25,000 people (ADB 2017)—and an FAR that is fully utilized in the developed parcels. From ground-truthing, it is apparent that most of these housing structures are multihome units (buildings with several rental units) and there is still scope to accommodate additional structures on vacant parcels.

³³ These figures refer to mixed-use development areas only (not institutional). The parcel numbers are from 2019 spatial analysis. Plot numbers may change later if plots are further divided or consolidated for sale.

Figure 10: Scope for Development Infill in Babesa, Changbangdu, Lungtenphu, and Simtokha Local Area Plans

LAP = local area plan.

Notes:

1. The analysis grouped land uses into three types of uses: (i) "Urban Development", (ii) "Institutional/Service/Industrial" and (iii) "Environmental/Agriculture". The land use classes that composed each of these categories are:

(i) UV2-I_Residential, UV2-II_Residential, UV2-LD_Residential and Low Density, UV2-MD_Residential Medium Density, NN_Neighbourhood Node, UC_Urban Core, UH_Urban Hub, UV1_Commercial;

(ii) Institutional/Service/Industrial: D_Dzong, H_Heritage, K_Knowledge City, R_Royal Use, RBG_RBG Area, SP_Public Use and Service Areas, TV_Traditional Village; and

(iii) E1_Environment Conservation, E2_Forest Environment, E3_Agriculture Environment, E4_Agri-based Environment, EN_Endowment, G1_National Open Green Space, G2_Green Space System, RC_Restrictions Corridor.

2. Land uses were drawn from two different sources; the first was parcel level classifications which was one of the attributes in the parcels shapefile that NLCS provided; the second was digitized off the Thimphu Structure Plan's proposed land use map.

Source: Authors' illustrations based on data from National Land Commission Secretariat, Bhutan.

Table 5: Scope for Infill, by Land Use

Land Use by LAP	Total	Developable Parcels with Building Structure in 2019		Developable Parcels without Building Structure in 2019	
		Number	%	Number	%
Changbangdu					
Mixed-use development	237	142	60	95	40
Institutional/sservice/industry	1	–	–	1	100
Environment/agriculture	–	–	–	–	–
Lungtenphu					
Mixed-use development	436	301	69	135	31
Institutional/service/industry	5	2	40	3	60
Environment/agriculture	3	–	–	3	100
Simtokha					
Mixed-use development	388	295	76	93	24
Institutional/service/industry	37	22	59	15	41
Environment/agriculture	173	88	51	85	49
Babesa					
Mixed-use development	445	293	66	152	34
Institutional/service/industry	7	7	100	–	–
Environment/agriculture	8	3	38	5	63
Mixed-use development	1,505	1,031	69	474	31
Institutional/service/industry	50	32	64	18	36
Environment/agriculture	184	91	49	93	51
Total	1,739	1,154	66	585	34

Notes: Dash (–) refers to zero value. For Simtokha, it was not possible to differentiate originally planned parcels from new parcels because the AutoCad files for Simtokha were not sufficiently compatible with the ArcGIS shapefiles of existing 2019 parcels to accurately conduct this analysis (i.e., original plans could not be georeferenced to overlay smoothly enough over 2019 parcels to allow for visual interpretation of planned vis-a-vis existing parcels). Land use classification is simplified for analysis purposes and does not exactly correspond with the multitude of land use classifications from the latest *TSP and LAPs since 2002–An Update* report (Urban Planning Division 2015). For example, public use, service areas, and institutional use areas were combined into a single category for ease of analysis.

Source: Authors' estimates based on data from National Land Commission Secretariat, Bhutan.

B. Private Asset Returns to Land Pooling Households

33. Based on a simple price simulations exercise, this paper further estimates the average waiting time it takes for landowners to become economically better-off in a land pooling scheme, under different economic conditions.

34. There are opportunity costs and associated risks in using capital for investment (value in use) other than land ownership. Initially, in a land acquisition (LA), landowners are compensated for the exchange value of land acquired by government through purchase (α_{LA}). This implies less risks

associated with waiting and uncertainty if it were under land pooling (LP), but that landowners must forego the opportunity to develop it and maximize potential incomes that can be derived from its rent and other uses (γ_{LA}). Whereas, in a land pooling scheme, landowners must forego some of their land without compensation in exchange for infrastructure services. At some point over the project's lifetime, landowners receive some portion of their land back (depending on the applicable contribution ratio) with potentially higher value associated with services and infrastructure provision (α_{LP}). Additionally, landowners are likely to have an adequate opportunity to recoup losses from land pooling participation by maximizing the value in use of the returned portion of their land (γ_{LP}). For this price simulation exercise, a 6.5%–8.5% asset value growth is assumed for land pooling to reflect that although risks associated with it are higher, it can potentially yield greater asset value depending on market conditions. To reflect a landowner's high degree of risk aversion (with a decision to forego a potential higher-than-average return in a land pooling scheme), we assume a conservative asset value growth of 3% in a land acquisition scheme. Price growth difference also reflects a lost opportunity associated with the potential value in use, which will, otherwise, not be the case had the landowner chose to participate in a land acquisition scheme. With all else equal, we assume that economic benefits in land pooling depend on the portion of land contributed since asset value growth rates only apply to a portion of land which is returned for mixed-use development. Table 6 summarizes our assumptions.

35. For this analysis, eight combinations based on land pooling contribution level and asset price growth rate difference were considered to generate asset value growth over a 35-year hypothetical period. Land pooling contributions at 20%, 30%, 45%, and 60% were examined. A 30%-land contribution represents the current ceiling contribution for Bhutan, 45%-contribution is representative of state-level land pooling practice in some states in India (for example, landowners in Delhi get 55% of their land parcels back after infrastructure development and 45% is retained for public use), 20%-contribution and a much higher 60%-contribution to check the breakeven point for contributions below Bhutan's land pooling contribution ceiling and above the threshold that can be seen in some states in India. Under the UIDP, about 118.04 ha of private plots are pooled from landowners (Table 1). Of this total, 71.67% (84.59 ha) of private land is returned to landowners for mixed-use development. The average land pooling contribution for infrastructure service provision is 27.5%–29.0%.

36. We find that in a low-price growth difference scenario, landowners with lower percentage of land pooled have shorter waiting time from the start of the project until breakeven point, in which land pooling asset starts to out value land acquisition asset (Figure 11). Landowners that contribute 20% must wait for 7 years for breakeven period. In a 30%-contribution, landowners must wait for 11 years. At higher contributions of 45%–60%, landowners must wait between 18 and 28 years before becoming economically better-off.

Table 6: Asset Value Growth Rates for Pricing Analysis

Asset Value Growth	Land Acquisition	Land Pooling (Low-Price Growth)	Land Pooling (High-Price Growth)
Exchange value (α)	3%	4.5%	6.5%
Potential use value (γ)	0%	2%	2%
$\gamma + \alpha$	3.0%	6.5%	8.5%

Source: Authors' estimates.

Figure 11: Projected Asset Returns in a Low-Price Growth Difference Scenario, 2005–2040

LA = land acquisition, LP = land pooling.

Note: 6.5% price growth rate is used for all levels of land pooling contribution and 3% price growth is used for land acquisition to emphasize a low-price growth difference scenario of 3.5 percentage points.

Source: Authors' estimates.

37. In more favorable conditions, the same observation applies, but with much shorter return period for all four levels of land pooling contribution. Figure 12 shows that landowners that contribute 20%–30% of their parcels must wait 5–7 years, compared with 7–11 years in less favorable conditions; these are 2–4 years shorter. If the Government of Bhutan were to implement ceiling contributions of 45%–60%, landowners can expect a more reasonable return period of 12–18 years, compared with 18–28 years in less favorable conditions. However, one caveat is that a minimum parcel of developable land in Bhutan needs to be 10 decimals (405 m²) and many landowners in urban area may not have sufficient land to begin with to enable a high contribution of 45% of their original land parcel. The Land Pooling Rules and Regulations allow such landowners to purchase additional land at the government-set rates to enable them to participate in the LP scheme.

Figure 12: Projected Asset Returns in High-Price Growth Difference Scenario, 2005–2040

LA = land acquisition, LP = land pooling.

Note: 8.5% price growth rate is used for all levels of land pooling contribution and 3% price growth is used for land acquisition to emphasize a high-price growth difference scenario of 5.5 percentage points.

Source: Authors' estimates.

38. At any level of contribution, land pooling households become economically better-off than those whose lands were acquired. Higher private returns are expected for owners who pooled their land as opposed to owners who received a one-time payout at the time of land acquisition. From a private returns perspective, households that pool their land envision retaining the bulk of their land, and contributions made at the lowest level can generate higher returns. For example, results imply that landowners are better off in a land pooling contribution of 20% than 30%, for two reasons: (i) breakeven even period is shorter and (ii) asset values are higher. But at the same time, such a low level of contribution is not necessarily economically welfare improving (from a social returns perspective) as it is usually not sufficient to provide space for common urban infrastructure (roads, drains, water supply, sewerage pipes, and others), let alone additional communal amenities such as parks and recreational facilities. In practice, the acceptable benchmark for land that is needed to put common urban infrastructure is 30% of the overall development.³⁴ From a pareto efficiency perspective, this ratio may only be optimal if both private and public returns have improved as a result of the scheme (para. 12). In Section IV, we explore if it is possible to generate pareto efficiency for contributions exceeding the ceiling ratio based on the realities on the ground.

³⁴ Collier, P. and A. J. Venables. 2016. Urban Infrastructure for Development. *Oxford Review of Economic Policy*. 32 (3). pp. 391–409.

III. REVIEW OF LAND POOLING SCHEME UNDER URBAN INFRASTRUCTURE DEVELOPMENT PROJECT

39. **Planning and implementation process.** The concept of land pooling in South Asian cities is not new. For this scheme to take off, implementation experience points to the need of adequate legislation. Planning can be carried out with support of incidental provisions in other laws, but it risks facing complications in the absence of appropriate legislations, especially in cases of rapid urban growth. In Thimphu, one of the challenges faced during the early stages of implementation was that without a legal framework for land pooling, some landowners perceived this exercise to be unlawful and a group of eight landowners filed a public interest litigation. The absence of more specific and clearly defined legal implementation guidelines at the time the UIDP was starting in 2005, including the minimum number of landowners that should be in agreement with land pooling, necessitated ADB to require a 100% agreement with landowners prior to the commencement of infrastructure work in UIDP LAP areas. Figure 13 illustrates the envisaged land pooling process under the UIDP.

Figure 13: Land Pooling Process in Urban Infrastructure Development Project

GLD = Guided Land Development.

Source: Department of Urban Development and Engineering Services (DUDES). 2006. Bhutan: Urban Infrastructure Development Project. *Resettlement Planning Document (Draft for Consultation)*. June.

Box 1: Perspective from an Urban Planner

“The introduction of Land Pooling in Thimphu began as a classic experiment of learning by doing. To begin with, all those who were directly or indirectly involved, including the landowners, shot their arrows in the dark, without an example to look at and learn from. Fortunately, after a hurly-burly affair of 10 years (2001 to 2010), this experiment became a real success, with the physical implementation of twelve Land Pooling projects. As of today, about 2,900 landowners had contributed more than 260 acres of their land holdings for public benefit—roads, footpaths, open spaces, neighborhood nodes, and other public amenities. The experiment has now become a very successful social entrepreneurship/trust or relationship building program (so to say) which is widely adopted, scaled-up, and mainstreamed in most of urban areas of Bhutan.

Moving forward, I feel a dire need to address issues related to: participation and engagement of non-landowners, renters and residents; capacity building of local governments; and a detailed guideline that will guide the Land Pooling process.”

– Geley Norbu, former Chief Urban Planner in Thimphu Municipality (Currently Director at National Land Commission Secretariat)

Source: Personal interview from a story-gathering fieldwork for ADB. October 2019.

40. The government later approved the Land Pooling Rules and Regulations of the Local Government Act (2009), which mandates that agreement of only two-thirds or 67% of the landowners is required for proceeding with any land pooling scheme, with provisions for acquiring the rest of the land through eminent domain. The Act also outlines the process and the maximum permissible contribution ratio from private landholders—Rule 61(b) and sets a ceiling of 30% contribution for land pooling or land donation.³⁵ In addition, it allows for land acquisition to reduce land pooling contribution ratio (Rule 40).³⁶

41. For ADB to invest in piloting a nearly greenfield urban development project for which land was made available through pooling, securing 100% landowner agreement was a prerequisite for commencing infrastructure development in the four LAP areas. A small area in Lungtenphu LAP was selected as pilot area for demonstration purposes because it already secured 100% consensus for land pooling. This resulted in a 2-year delay of the project in starting with the other three LAPs, but such requirement was crucial to ensure that landowners have a huge ownership stake in making the land pooling process work and grievances are minimized. When landowners in Babesa, Changbangdu, and Simtokha LAPs saw that this was working well in the pilot area, it dispelled their fears and eventually paved the way for 100% agreement (ADB 2017). Although it should be noted that a demonstration effect was not anticipated as required during project processing, it was a solution that ADB came up with during the implementation so that the landowners could agree to the proposed scheme. In cases where it was not possible to contact an absentee owner, escrow accounts were set up with the thromde for lost income associated with losing assets (for example, fruit-bearing trees) and a grievance redress mechanism was set up by the project. This helped to enhance transparency and trust through the process.

³⁵ There were no specific guidelines for implementation in Land Act 2007 and the Local Government Act 2009.

³⁶ The land pooling rules and regulations was approved in March 2009.

42. Thimphu thromde's proactive stance in undertaking numerous public consultations was instrumental in building trust for the land pooling implementation. A total of 39 public consultations were held during UIDP implementation, in addition to adoption of various outreach methods such as publishing of notices, announcements, and plans in newspapers and printed and online media, announcements, and broadcasts. Amendments were made to the layouts and plans to reflect feedback from landowners. For example, some of the landowners were unhappy with their reconfigured plots located on steep slopes. The Thimphu municipality factored all relevant feedback from the consultation process to come up with an acceptable plot reorganization layout for the LAPs. The extensive consultations also helped in the tedious process of verifying cadastral maps with land records, which were not matching in several cases. If we base it on household survey responses, we find a consistent pattern: 12.5% indicated they were not satisfied with the initial LAP plan (Figure 14, perceived satisfaction) and about the same percentage of respondents asked for a change in the land that was initially reallocated to them (Figure 14, landowners that requested a change). In addition to the consultations, ADB policies required a household-level socioeconomic assessment of affected people to be conducted (those who would lose assets in the process), preparation of resettlement plans and environmental assessments, and payment of compensation to the affected persons. This included the identification of vulnerable and non-titled affected persons and payment of compensation to the same. A total of 116 landowners (in Babesa, Changbangdu, Lungtenphu, and Simtokha) lost assets such as fruit-bearing trees and structures. In Simtokha, specifically, there was an additional house which required compensation at replacement cost, because it was in a plot which would be rendered inefficient (less than 4,000 square feet) and the plot had to be consolidated with another plot to achieve minimum permitted size. The lost assets were compensated at replacement cost as per the entitlement matrix in the resettlement plans. None of the affected persons were identified to be vulnerable (i.e., below poverty line, female-headed, or disabled-headed household). This arrangement was generally acceptable as the Property Assessment and Valuation Agency (PAVA) rates are established and revised every 3 years.

Figure 14: Perceived Level of Landowner Satisfaction with Land Pooling Planning Process

43. Land pooled was reconfigured based on appropriate distribution and 29.08% came from private land contributions for services provision and protected zones (Table 1). Plots of single ownership smaller than 10 decimal (approximately 405 m²) were combined to form a buildable plot and owners

had to pay for the additional land at rates established by the PAVA, Department of National Properties of the Ministry of Finance (which may not necessarily reflect the market rates in bigger cities such as Thimphu) (Norbu 2015).³⁷ In some cases, the returned portion of land pooled plots had to be moved to regularize shapes (ADB 2017) (Figure 2). Compensations were provided for asset loss such as trees and structures in accordance with ADB's resettlement policies (para. 42). In cases where the landowners retained more than 70.92% of the original plot area, they paid a development tax (betterment charges) to bring their amount of contribution to the standard level to ensure equity (ADB 2017). If the returned portion was less than 70.92% of the original plot, landowners were compensated in cash at the established PAVA rate.

44. Overall, 58% of surveyed landowners expressed their satisfaction with the consultation process and 54% of the same in the building process (Figure 15). One reason for landowners' average general sentiment points to a mismatch in expectations associated with the landowners getting access to all facilities after land pooling, with 26.3% of survey respondents claiming that not all facilities which they expected were built (Figure 16). Of this total, Changbangdu is at 41.5%, followed by Simtokha at 28.6%, Babesa at 22.9%, and Lungtenphu at 20.2%. Respondents cited recreational area (47.3%), drainage (46%), sewerage (40.5%), hospital or clinic (32.4%), and public transportation stops (31.1%) as some of the key services and amenities they claim to have no or limited access to. Land provision was made for these additional amenities which were supposed to be financed later on by the thromde. In hindsight, these communal facilities could have been added in the UIDP as externally financed component and monitored by ADB to help ensure their delivery (para. 67).

Figure 15: Perceived Level of Landowner Satisfaction with Consultation and Building Process

Note: 281 surveyed landowners responded.

Source: Authors' estimates based on household survey data.

³⁷ The PAVA was created under Land Act 2007 with a mandate to establish official estimates for land value.

Figure 16: Perceived versus Received (Landowners' Views)

Note: 281 surveyed landowners responded to the survey question: "Were all of the facilities built that you thought you would get access to as part of land pooling?"

Source: Authors' estimates based on household survey data.

45. **Perceived satisfaction of household users with infrastructure services and communal amenities.** As shown in Figure 17, respondents gave a score of between 6 to 7 in terms of overall satisfaction with infrastructure services, with 10 being the highest score. Of the four infrastructure facilities, they are most satisfied with sewerage (6.8), followed by paved roads (6.44) and water (6.43); they were least satisfied with drainage facility (6.01). The level of satisfaction is likely tied to the value that landowners place on infrastructure individually, as can be implied in the reverse order of services affecting land value (para. 26). The survey results seem to be correlated to the experience people had with service qualities for the various services, although without UIDP-supported LAP development, there would have been housing shortages and unplanned urban growth in the southern part of Thimphu. The poor satisfaction with quality of roads and drainage infrastructure stems from the extensive damage incurred to these services during the build-out of the LAPs due to the passing of trucks carrying heavy construction materials. The roads, drainage, and footpaths were later upgraded under ADB's Thimphu Road Improvement Project (TRIP) (2017–2020). One contributing issue for water supply is reported in a recent ADB technical diagnostic study in Lungtenphu, which shows an estimated 50.59% nonrevenue water (NRW) due to a lack of repair and maintenance in the water pipe system.³⁸ The report further finds that NRW is likely to increase without leak detection and regular repair. The overall satisfaction with sewerage services is due to all properties currently relying on individual septic tanks for sewage collection. The sewer networks were provided under UIDP (BHU:2258) and will be connected to the wastewater treatment plant in Babesa, which is nearing completion under the ensuing ADB project (Urban Infrastructure Project, BHU:2816).

³⁸ This is based from the recorded water flow pattern for May 2019 in Lungtenphu (one of the four LAPs) and Olakha, as reported in an ADB technical study on Thimphu water supply. Korea Water Resources Corporation. 2019. Technical Diagnosis Report for Thimphu Water Supply. Prepared for ADB TA-9048: *Smart Drinking Water Management in South Asian Cities*. Unpublished manuscript.

Figure 17: Average Overall Satisfaction Scores for Services

Note: number of respondents varies (416 for recreational area–1069 for paved roads).

Ratings score is between 0–10, 10 being the highest.

Source: Authors' estimates based on household survey data.

46. Our data suggests that the majority of residents in the serviced LAPs are renters, who reported much lower monthly wages than landowners. Across all ADB LAP areas, renters reported an average monthly income of Nu41,654 (range of Nu33,483–Nu57,935), compared with new landowners at Nu191,532 (range of Nu77,721–Nu114,201) and original landowners at Nu148,541 (range of Nu91,565–Nu173,701) (Table 7). There is also evidence of huge income disparities between LAPs, with renter-respondents in Changbangdu and Lungtenphu reporting lower monthly incomes than those in Babesa and Simtokha. In this context, LAP residents, majority of whom are renters (Table A1.1), face a growing rent burden. Estimates in an ADB study on Bhutan's housing sector (2017) indicate the same trend.³⁹ The study finds that across the city, for all income quintile groups (except the highest income quintile), renters are moderately to severely burdened by housing stress—spending 40% or more of their monthly incomes on an average housing unit.⁴⁰ Further compounding this is a perceived deteriorating quality of infrastructure services (para. 45). The narrow wage-rent gap, with rent taking up a significant share of incomes, suggests that the housing situation prevents them from fully benefitting in the land pooling scheme (and enjoying urban public services afforded through the scheme). To further enhance the welfare of LAP residents, the operation and maintenance of basic infrastructure services should be improved in the four UIDP LAP areas.

³⁹ Affordable Housing Institute (AHI). 2017. Bhutan: Housing Finance Feasibility Study. *Final Report prepared for ADB*. Unpublished manuscript.

⁴⁰ Different income quintiles occupy different housing categories, as constrained by incomes.

Table 7: Average Monthly Wage by Local Area Plan (Nu)

Type of Tenancy	Babesa	Changbangdu	Lungtenphu	Simtokha	Average by Tenancy Type
New landowner	114,201 (n=69)	290,014 (n=39)	283,811 (n=68)	77,721 (n=42)	191,532 (n=218)
Original landowner	145,369 (n=105)	91,565 (n=41)	148,561 (n=101)	173,701 (n=106)	148,541 (n=353)
Renter	38,876 (n=172)	33,483 (n=92)	34,899 (n=153)	57,935 (n=139)	41,654 (n=556)
Average by LAP	86,215 (n=346)	105,495 (n=172)	123,116 (n=322)	103,587 (n=287)	n=1,127

LAP = local area plan.

Note: n refers to the number of observations with reported nonzero incomes.

Source: Authors' estimates based on 2018 survey data.

47. The planned urban infrastructure development achieved with land pooling is already being replicated in other parts of the country. For the Thimphu land pooling component, the EIRR was evaluated to be 14.27% at project completion (compared with zero at appraisal),⁴¹ owing to new value streams that can be derived from land pooling such as rental incomes, tax revenues from building and land, and increase in property value from new building structures. Indirect social benefits and project externalities were not quantified in the PCR. Box 2 presents anecdotal interviews on the impact of land pooling in Thimphu.

Box 2: Beneficiaries' Perceptions of the Importance of Urban Planning

"Thimphu being the capital city, we have all the offices of ten ministries, many corporations, and headquarters. We have the tourism industry, with many hotels that are being built. As the service industry is booming, there has been employment generation. So with the migration happening, we need to look at doubling up our facilities and amenities. ADB came to support all the infrastructure development works in the Southern part of the city."

– Kinlay Dorjee, Mayor of Thimphu

"By then the value of land was increasing in Thimphu, so obviously people would not want to part with their land. Without contributing land, there was no way that the city could develop in a proper way. And we have plenty of examples in Bhutan where towns are not planned properly. We build buildings first, and then we start building access roads and laying sewage and drains. This was a problem. I think more than the individual benefits, the community and the city, as a whole, are benefitting because of this initiative."

– Ugyen Penjor, resident of Babesa local area plan

Source: Personal interviews during story-gathering fieldwork for Department of Communications, ADB (2018).

⁴¹ No incremental benefits were expected to be derived from the land pooled, but the zero EIRR at appraisal can be justified as substantial benefits were to be expected after urban services are put in place.

48. **Spatial Analysis of the ADB LAPs.**⁴² Our spatial analysis of the project areas suggests that at the time the LAPs were planned, Babesa, Changbangdu, Lungtenphu, and Simtokha were predominantly agricultural or forested land, with no notable urban development to their south. The spatial analysis shows that the LAPs in the north and south of the city experienced the most rapid development over this period. The number of buildings in Thimphu nearly tripled in the last decade, from 3,590 in 2009 to 9,606 in 2019. The UIDP (BHU:2258) LAP areas experienced a collective increase in buildings of 550% between 2009 and 2019. Disaggregated by LAP, these figures are Babesa at 515%, Changbangdu at 925%, Lungtenphu at 281%, and Simtokha at 476%, as compared to 62% in the city's Core LAP which is the city's historic urban center and had limited space for infill (Figure 5).

49. Our analysis also finds that plots changed over time due to consolidation, subdivision, introduction of new plots in the boundary, or changes in shape and/or size (Figure 18, Table 8). Babesa was found to have a high degree of consistency with the original plot layout, with 78% of originally planned parcels retaining the same shape and size (2019) as they were planned. Changbangdu and Lungtenphu were found to have a lower degree of consistency with plans, with less than half of originally planned parcels having a size and shape in 2019 consistent with the way they were planned. In each of these two LAPs, more than 30% of the planned parcels were subsequently subdivided into smaller parcels.⁴³

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⁴² Note that the spatial analysis is based on secondary mapping and land use data, and further ground truthing may help to improve the accuracy of the analysis. See Appendix 2 for additional details of the spatial mapping analysis.

⁴³ The AutoCad files which show plans for Simtokha were not sufficiently compatible with the ArcGIS shapefiles of existing 2019 parcels to accurately conduct this analysis (i.e., the plans could not be georeferenced to overlay smoothly enough over 2019 parcels to allow for visual interpretation of planned vis-a-vis existing parcels).

Figure 18: Planned versus Existing Parcels in Babesa, Changbangdu, and Lungtenphu Local Area Plans

a. Babesa

Original plan

Existing parcels in 2019

continued on the next page

Figure 18 continued

continued on next page

Figure 18 continued

Table 8: Analysis of Consistency of Planned Parcels with 2019 Actual Parcels

	Babesa	Changbangdu	Lungtenphu
Consistent (parcel in 2019 is as it was planned)	78%	48%	38%
Subdivided (planned parcel was subdivided into two or more parcels by 2019)	6%	36%	37%
Consolidated (planned parcel was consolidated with another planned parcel, creating a larger 2019 parcel)	7%	10%	15%
Inconsistent (existing parcel is of an entirely different shape and/or size than was planned)	5%	–	3%
Not Present (planned but not present in 2019, i.e., plans showed that a parcel should be present, but there was no parcel in this location in the 2019 parcel shapefile)	3%	6%	7%
Total	100%	100%	100%

Note: Dash (–) represents zero value.

Source: Authors' estimates based on data from National Land Commission Secretariat, Bhutan.

50. We further find that the degree to which new parcels, which had not been included in original plans, were present in 2019 varies between the LAPs. Babesa experienced only an 8% increase in total parcel numbers because of the addition of entirely new parcels (Table 9). In contrast, the number of parcels in Changbangdu and Lungtenphu nearly doubled in just 8 years (2011–2019), increasing by 73% (Changbangdu) and 79% (Lungtenphu) above the number of parcels originally planned. It is likely that the high subdivision of parcels occurs as a response to pressures for greater housing demand and more affordable housing options. The majority of parcels outside the originally planned UIDP areas (project area), but within the wider Babesa, Changbangdu, Lungtenphu, and Simtokha LAPs are classified as agricultural or environmental uses, but it appears that a large proportion of parcels classified under such uses may in reality be hosting residential and commercial development (Figure 19). Furthermore, spatial analysis suggests that new parcels outside the UIDP LAP areas in Babesa and Changbangdu LAPs are located in areas that had been designated as “forest” in original plans, with several parcels spilling into the slopes.⁴⁴ Figures 20 and 21 show building activity occurring within these LAPs (outside the project area) on steep slopes and on land designated for agriculture and environmental areas under the TSP.⁴⁵ The TSP prescribes that terrains classified as very steep (above 30%), such as agro-environment, are not suitable for development to avoid adverse environmental impacts, including soil erosion and landslides, which they attribute to land cutting and vegetation clearing. The high number of buildings located on plots that are assigned for “environmental” uses raises some questions about whether the actual land uses of these plots are consistent with their planned land uses.

⁴⁴ The area of Lungtenphu parcelized by 2019, but not parcelized in original plans, was also not labeled in the AutoCad files, so the originally intended land use for this area is not known.

⁴⁵ The Thimphu Structure Plan (TSP) classifies areas with slopes 20%–30% as “steep” and areas with slopes greater than 30% as “very steep”. Ministry of Works and Human Settlement (MOWHS). 2018. *Strategic Environmental Assessment for the Thimphu Structure Plan*. June.

Table 9: Analysis of New versus Planned Parcels

	Babesa	Changbangdu	Lungtenphu
Total planned parcels	519	160	340
Total actual parcels, 2019	551	276	608
New (present in 2019, but not planned, excluding parcels added as a result of subdivision)	41	116	268
% increase in total parcels as a result of new parcels (Number of parcels present in 2019, but not planned; number of total parcels in original plans)	8%	73%	79%

Note: The number of new parcels is not simply the number of actual parcels in 2019 minus the number of planned parcels. The reason for this is that between the year when the original plans were drawn and 2019, some planned parcels were subdivided into two or more parcels, while in other cases, two or more parcels were consolidated into a single parcel.

Source: Authors' estimates based on data from National Land Commission Secretariat, Bhutan.

Figure 19: Existing Parcels Outside Originally Planned Local Area Plans (Project Area), but within the Boundary of Babesa, Changbangdu, Lungtenphu, and Simtokha Local Area Plans

LAP = local area plan.

Notes: This analysis aggregated land use classifications found in the precinct_e attribute of the shapefiles for Babesa, Changbangdu, Lungtenphu, and Simtokha, which were contained in an e-mail titled "Shape files of the CURRENT land configuration" shared with ADB by National Land Commission on 28 October 2019. Land use aggregations were made as follows: (i) Developable Land consisting of classifications Urban Hubs, Urban Village core, Urban Village Medium Density, Urban Village Periphery Sub I, Urban Village Periphery Sub II, Urban Village(UV-1); (ii) Environmental or Agriculture consisting of Agri-based Environments, Endowment for the Future, Forest Environments, Green Space System, and National Open Green Spaces; and (iii) Institutional consisting of classifications Institutional, Institutional (I-2), Neighborhood Nodes, Satellite Service, and Industrial Centers.

Source: Authors' illustrations based on data from National Land Commission Secretariat, Bhutan.

Figure 20: Building Activity along Terrains with Steep Slopes

TSP = Thimphu Structure Plan.

Notes: A “steep slope” base map was taken from the TSP and overlaid with the building footprint and parcels shapefiles. It should be noted that there is overlap between (i) the originally planned area for which infrastructure was financed by ADB and (ii) steep slopes as defined in the TSP. A likely explanation for this overlap is that areas defined as steep in the TSP were determined to be safe for development during the land use planning process for these land pooling initiatives for these local area plans (LAPs).

Sources: Authors’ illustrations based on data from Bhutan’s National Land Commission Secretariat and Ministry of Works and Human Settlements; Ministry of Works and Human Settlements. 2018. Strategic Environmental Assessment for the Thimphu Structure Plan. June.

Figure 21: Mixed-Use Development on Nondesignated Construction Areas

LAP = local area plan, RBG = Royal Body Guards of Bhutan.

Note: "Undevelopable" land refers to areas which are not designated for building construction and mixed-use development. This includes areas planned for environmental or agriculture uses and correspond closely to steep slopes. The land uses were derived by digitizing the 2017 land use map found in the Strategic Environmental Assessment for the Thimphu Structure Plan.

Source: Authors' illustrations based on overlaid data from National Land Commission Secretariat and Ministry of Works and Human Settlements, Bhutan.

51. Further complicating the trend is the stark contrast between the nature and pace of development within the UIDP area and areas outside Thimphu municipal boundary. That despite the high degree of subdivision of parcels in the UIDP area, 31% of shovel-ready parcels are still for infill. While, just outside the boundaries of Thimphu, toward the southwest border of Babesa LAP (and outside Serbithang LAP), mixed-use development is rapidly occurring (Figure 22).⁴⁶ It is observed that the number of buildings increased from 6 buildings in 2003 to 154 buildings in 2019. Its pace of growth is more than twice that of Changbangdu, which was the fastest growing UIDP LAP within Thimphu's municipal boundary. The spread of development has been occurring in land which is currently in the district boundary and classified as rural, does not have centralized service provision, and, hence, has lower land and taxation values. However, the close proximity to the city has led to an exponential growth of this settlement.

Figure 22: Rapid Growth in the South of Babesa Local Area Plan (Outside Thimphu Boundary), 2003–2019

⁴⁶ This trend is also apparent in the north of Thimphu city but was excluded from the spatial analysis.

52. The spatial analysis confirms that the urbanization pressure on the city is forcing people to move into areas not originally intended for urban development uses (within the LAPs on steep slopes and also outside the thromde boundary). In total, this represents about 37.3%⁴⁷ of building footprints in 2019 in the project area and is located on land which the TSP has designated for agriculture, forest, and open space. It is likely that some building footprints visible in satellite imagery are consistent with planned land uses (for example, these may be housing uses which are compatible with agricultural land uses). From ground-truthing, it appears that majority of these new buildings are multi-apartment housing structures, suggesting that development pressure is causing a rapid conversion of lands for housing and commercial use. This is corroborated in the strategic environmental assessment of the TSP, which notes that “*areas classified as agri-based environment (E4) and located in slopes greater than 30% have been changed substantially to residential use (urban village medium density or low density precincts), exposing pressure to rationalize due to the general lack of space for planned housing expansion areas*” (MOWHS 2018). It is likely that land prices are cheaper in general in such areas as parcels may have no (or limited) service provisions. For example, Serbithang, where rapid building activity is evident, does not have a centralized treated water supply and distribution system in place.

53. We also find that at least 74 buildings were built on plots designated for mixed-use development despite being located on steep slopes that are outside the UIDP LAP areas (Table 10). In our view, these 74 mixed-use structures could have been partly or fully accommodated (para. 51) if supported (Section IV).

Table 10: Mixed-Use Development in Parcels Located on Steep Slopes Outside Originally Planned Area

	Total (m ²)	Total Number of Parcels	With Structure	% with Structure (%)
Plots assigned in environmental uses	1,290,659	344	286	83
Plots assigned in institutional uses	30,920	1	1	100
Plots assigned in mixed-use development	55,248	79	74	94

Note: This excludes those steep slopes that were located within the originally planned area.

Source: Authors' estimates based on data from National Land Commission Secretariat, Bhutan.

IV. ENTRY POINTS FOR SUSTAINABLE URBAN EXPANSION

54. Spatial-economic results reveal that local benefits linked with land pooling scheme in UIDP LAP areas largely accrue to private landowners. But this leads to one further conclusion: land value appreciation has had varied and interlinked effects. Foremost is a stalled mixed-use development in the wider LAP areas (para. 51), but rapid expansion outside planned project areas and in steep and agro-environmental areas (para. 52). The counterproductive effect of land value appreciation linked with land pooling scheme can be explained by several factors that are not unique to a nascent real estate

⁴⁷ 37.3% is computed as 879 structures outside the project area divided by 2,352 total buildings inside the project areas in the four LAPs of Babesa, Changbangdu, Lungtenphu, and Simtokha.

industry but are proving difficult for Thimphu to navigate. One key factor is economic. Landowners tend to speculate, and this happens when they find it more attractive to delay construction activities and “wait it out” for future alternative uses. Limited capital resources can also impact construction of mixed-use buildings due to the general high cost of construction that can be attributed to Bhutan’s high import dependence on India for construction materials and labor. Even in cases where buildings are constructed and rented out, landowners tend to face longer payback period than desired as rents can only go as high as people can afford to pay. Landowners and housing investors may be drawn to shifting mixed-use construction activities from service-ready, but high-value parcels in the planned portion of the LAPs to unplanned (unserviceable), but cheaper areas for more manageable overall cost associated with acquisition, construction, and enhancement. Another factor is absentee ownership as this can hamper sound and timely land management decisions.

55. Introducing a mix of urban policy measures and fiscal incentives can help address both the inefficiencies in serviced areas and haphazard growth in unserviced areas. To improve the long-term outcomes further on urban expansion, the Thimphu thromde should respond through property tax reforms under which ad valorem taxation is intended. Although this is notwithstanding that landowners’ investment-use decisions are bound to be influenced only, to the extent that such policies are not prohibitive. We provide five recommendations as follows.

56. **Implementing property tax reforms through market-based valuation.** Shifting from unit-based to ad valorem taxation can address fiscal issues that are often interlocked with land use. This can include land speculation, perception of a dual land price system, and a distressed housing market condition from delays in infilling serviced parcels.

57. ADB provided earlier support in this area through the implementation of the first and second tranches of the *Strengthening Economic Management Program* (SEMP I and SEMF II) in 2013–2017.⁴⁸ SEMF I involved the design and piloting phase of property valuation methodology (PVM), including a determination of new tax rates and demonstration phase in Phuentsholing thromde. Under its revenue management component, the Thimphu thromde completed the development and pilot implementation of a modified revenue administration and management information system that integrates PVM based on objective valuation of land and buildings. Capacity development on administrative, legal, and institutional requirements were additionally provided to relevant government staff at the Department of Revenue and Customs (DRC). Later, SEMF II provided additional technical assistance support to ensure that the requirements for parliament approval are fully met by Thimphu thromde.⁴⁹

58. At present, the tax structure for land and buildings is still based on unit rates. Even though the land tax rates for Thimphu thromde were revised in 2011 (except for green area and E4), the prescribed rate of Nu0.25–Nu0.50 per ft² on net unit area of the property is quite low. In January 2020, the government, through the third Session of the Third Parliament brought down the property transfer taxes (land and building) from 5% to 3% and made it applicable retrospectively from 16 January 2020. Under PVM, on the other hand, new tax rates are required to be applied on the market value of land and buildings. This proposed tax system reforms includes the introduction of four new tax rates.⁵⁰ First, a tax rate of 0.2% is to be applied on the value of land based on the most recent PAVA rate. The current PAVA rate is based on weighted averages of land transaction values, where 70% of weight is applied on the old PAVA rate

⁴⁸ ADB. 2015b. *Completion Report Strengthening Economic Management Program in Bhutan*. Manila (L2994/G0338-BHU); ADB. 2015c. *Report and Recommendation of the President to the Board of Directors: Proposed Policy-Based Loan, Grant and Technical Assistance to the Kingdom of Bhutan for the Strengthening Economic Management Program II*. Manila (L3258/G0431-BHU).

⁴⁹ ADB. 2018. *Completion Report: Strengthening Economic Management Program II in Bhutan*. Manila.

⁵⁰ Department of Revenue and Customs (DRC). 2017. *Report on Preparation of Policies, Systems and Processes for Collection of Property Valuation Methodology (PVM)-based Property Taxes in Thimphu Thromde*. March. Unpublished manuscript.

and 30% of weight is applied on transaction records from financial institutions and insurance companies, official values from government agencies, and primary data collected from interaction with buyers and sellers.⁵¹ This implies the considerable differences that ensued from planned area development between asset price information from official land transaction data and consumer valuation.

59. What emerges from this is that Thimphu's existing tax policy climate is not able to capture any land value appreciation linked to land pooling and planned area development. This is a welfare loss to Thimphu thromde, which is expected to be of sizable value depending on market conditions and the prevailing asset price growth. The thromde can only recoup a portion of the incremental increase in land tax revenues by shifting from unit-based to ad valorem (market-based) taxation. In fact, DRC (2017) stated that between land use types alone, there is already a huge variance in current PAVA rates, and this leads to variations in land tax liability. We provide a simple illustration of the fiscal advantage of revenue collection based on ad valorem using 135 plot-level serviced parcels from land pooling data (Figure 23). The estimated fiscal impact is additional land tax revenue of Nu67,487 (or 20% increase from revenue based on unit taxation) in the UIDP-planned LAP areas. We anticipate a much higher foregone land tax revenue from the land pooling scheme, as 135 parcels make up only a small proportion of the total parcels returned to landowners for private development.

Figure 23: Land Tax Revenues in 135 Serviced Parcels of ADB Local Area Plan Areas

Notes: For land tax revenue based on ad valorem, an average of applicable Property Assessment and Valuation Agency rate for land uses UV1 (commercial), UV2-MD (residential medium density), and UV2-1 (residential) is computed, equivalent to Nu258.43 per square foot, for four Urban Infrastructure Development Project planned local area plan areas.

Source: Authors' estimates.

⁵¹ Current land base rate is calculated using weighted averages of the old PAVA rate and other land prices from three other sources of information: (i) average rate used by financial institutions and insurance companies like Bhutan Development Bank Ltd., Royal Insurance Corporation of Bhutan, and National Pension and Provident Fund; (ii) official land transaction records with National Land Commission Secretariat and Thromdes; and (iii) average rate per unit area from primary data from interaction with buyers and sellers.

60. Second, the tax proposal also includes a building tax rate of 0.03% to be applied on the value of buildings using the Bhutan Schedule of Rates.⁵² The building's value is to be derived based on important economic parameters such as cost of construction, number of floors, floor-to-ceiling height, average room size factor, and type of materials used for construction, among others. Third is vacant land tax at 25% of the land tax value for expediting planned housing and other use supply in LAPs. A vacant land tax may only be levied on a land parcel that remains undeveloped 3 years after basic infrastructure and utility services had been installed in the LAP (DRC 2017). This penalizes idle shovel-ready plots and, therefore, can help hasten infill for 31% of vacant parcels in the ADB LAP areas. Fourth is a property transfer tax of 5% on the sales value of property (DRC 2017).

61. The full scope of unrealized tax revenue for Thimphu thromde is an estimated 300%–450% upward shift in current property taxes from an ADB fiscal impact study conducted under SEMP in 2017.⁵³ This is equivalent to Nu5.72 million for new land tax rates, which accounts for 95% of increase, and Nu0.29 million for building tax rates (or an increase in total tax revenues by 36.9%, from Nu16.25 million to Nu22.25 million for fiscal year 2016). A stepwise approach can be implemented to help cushion any adverse impact on landowners.

62. To redistribute welfare associated with a land pooling scheme, the additional revenue generated through value-based taxation can be “redistributed” in the form of (i) additional source of funding for operations and maintenance expenditures, with a goal to improve maintenance inefficiencies and service quality; (ii) funding for the provision of essential urban and social infrastructures in the city such as public transportation, hospitals, schools, and parks; and (iii) fiscal incentives such as tax relief on imported housing construction materials (para. 54), income tax credit for upgrading of substandard dwelling units for low- and moderate-income tenants, or housing subsidy for vulnerable households. In addition, value-based taxation in land can arrest inflation brought by speculative factors and prevent asset price differences in urban land markets. The final tax proposal has not yet been approved since its third submission to the Cabinet in 2017.⁵⁴ Considering its fiscal impact and potential as vehicle to redistribute welfare, there is a need to take further action to institutionalize it.

63. **Rationalizing valuation process to minimize asset price information differences in the real estate market.** At present, valuation and appraisal practice as it relates to housing and urban planning development is highly fragmented. There is a strong perception of a dual land price system, in which the rate for acquiring land for public urban development is below the market rate, as can be implied from the varied nature of data sources for transaction and appraisal (footnote 51). Despite its nascent status, Thimphu's real estate market has high potential and, therefore, stands to benefit from the establishment of an agency with a streamlined mandate to regulate and harmonize the valuation practice for land and buildings. This will help ensure an efficient and transparent implementation of valuation standards based on PVM. Another is in requiring private appraisers and public assessors to adopt internationally accepted valuation standards and this can be regulated through the agency's issuance of a certification to practice.

⁵² The Schedule is published by the Department of Engineering Services, MOWHS. Building tax is based on per-unit basis (for example, if the building is used for a commercial or residential purpose) and the type of unit and unit class. Using PVM, it is recommended that the building's value is based on the Quick Cost Guide that is published by the Department of Engineering Services.

⁵³ This was conducted using a representative sample of 1,254 land parcels (out of 8,000) and 1,255 buildings (out of 5,000), selected based on various construction and land characteristics, and residential and commercial use in different municipal zones.

⁵⁴ The tax proposal was first presented by the task force (comprising representatives from all thromdes, NLCS, MOWHS, DRC, and Ministry of Finance) in March 2015, and then in March 2016, to seek parliament approval. It was not approved initially on the basis of the provisions of the Local Government Act, because tax proposals should emanate from local governments. For this reason and the constitutional writ issued by the Supreme Court to other participating Thromdes, a final tax proposal for Thimphu Thromde only was submitted to the National Assembly in February 2017 and has yet to be approved.

This is especially useful to enhance Thimphu's real estate market credibility, with credit agencies and financial sector better able to provide accurate assessments of financial indicators such as rates for housing loans or for insurance and mortgage purposes—based on prudent land and building tax revenue assessments. Market price distortions linked to speculation and underreporting (or overreporting) may be minimized in this case. Another benefit is that by providing a good ground for the establishment of value of the property, landowners that intend to use their land for collateral in housing equity (or other) loans may be better protected.

64. Introducing fiscal incentives to address housing supply inefficiencies and LAP build out.

Assuming growth trends over the coming decade remain consistent with past trends, the undeveloped parcels in the UIDP LAP areas (para. 51) are expected to be fully built out in 4 years' time or less, with Simtokha in 2022, Babesa in 2023, and Lungtenphu and Changbangdu in 2024 (Figure 24). This can help generate additional rental housing options in the medium term. If a more favorable tax policy climate and well-developed housing finance system (supported by proper housing regulatory and prudential standards) were available, only 5% of developable parcels in the UIDP LAPs would have remained for infill by 2019 (compared with 31%, para. 51), and Babesa and Changbandu LAPs would have built out fully by 2021. Fiscal incentives targeted at supply of housing may be considered as stopgap measures to address affordability gaps and financing challenges (para. 46). For example, housing tax credits for landowners or private developers can help offset the high costs of development associated with imported construction materials, labor, and transport (para. 54). This can be in the form of tax relief for construction inputs generally and in preferential inputs such as building materials with low carbon footprint. Another option is to provide income tax credits for the construction of affordable rental housing or upgrading of substandard dwelling units for low and lower middle-income tenants. Funding for these incentives can come from an increased tax revenue base associated with the value-based method (para. 61). This paper does not determine whether local resources should be invested almost exclusively on supply-side fiscal measures—such as those mentioned here and other means of supply-side incentives for housing development—or through already existing measures in which low-income and middle-income tenants are subsidized directly in the form of reduced rental (e.g., housing for civil servants, and demand measures such as subsidies and vouchers for renters). Careful consideration is necessary for determining the underlying requirements of supply-side and demand-oriented fiscal programs and social conditions for each that can be most effective. In general, these measures should be supported with regulatory mechanisms for rent determination and control.

Figure 24: Existing Scenario versus High-Growth Projections for Local Area Plan Build-Out **Notes:**

1. The existing growth rate trajectory employs a starting parcel infill of 57 for Babesa, 23 for Changbangdu, 47 for Lungtenphu, and 97 for Simtokha. Average parcel infill is computed by dividing total parcel infill in 2019 by the number of years (from when it completes service infrastructure development to 2019).

2. High growth uses 50%, which is the recorded highest annual growth in building development across the four local area Plans.

3. Starting year of parcel infill reflects the year from when it completes service infrastructure development.

Source: Authors' estimates.

65. **Regional planning, coordination, and implementation guidelines to address urban sprawl spilling outside the municipal boundaries.** The Thimphu thromde had foresight rarely considered for city planning, insofar as the TSP had been designed strategically to map out future development directions for the city (para. 4). However, as we find, there is a need, in general, to reexamine growth dynamics and fragmented spatial pattern occurring in areas outside the TSP's (municipal) boundary and develop a "new generation" strategy that takes stock of a coherent approach to identify, plan, and manage haphazard growth and bring the services to these areas outside the original planned areas for development. At the implementation level, service provision must be extended to the steep slope areas and areas immediately outside the thromde, where urban sprawl is evidently occurring, and as long as such areas can be made suitable for housing in the first place. This is to encourage more orderly development, rather than a haphazard growth of new buildings. For example, managing urban development in areas such as the growing settlement observed in the south side of the city in the Dzongkhag's (district's) area (Figure 22), requires close coordination between Thimphu Dzongkhag and Thimphu thromde for improved planning and service provision so these become more livable human settlements. New LAPs may also be developed using a regional approach, informed by current growth patterns. From a fiscal perspective, it is more expensive to provide services when growth is dispersed and does not occur through concentrated, planned development and this applies especially in a city with a mountainous terrain such as Thimphu. Although urban growth is difficult to restrict, in general, sprawl reduction is possible through consolidation by means of providing basic utility and infrastructure services in a planned and coordinated manner through a regional planning approach. As can be seen from the experience of the externally financed development of Thimphu LAPs, a "plan first approach" ensures sustainable development, thereby limiting options for dispersed or haphazard sprawl both within the city boundary and outside.

66. **Expanding LAP services through an increase in land pooling contribution ratio.** Lower contribution ratios tend to favor private landowners more than the public (para. 38). Recognizing the general sentiment of residents toward LAP services, we examine whether it is possible to increase the statutory ceiling of 30% land pooling contribution in Bhutan and yield favorable returns to landowners by employing a simple pricing analysis (paras. 36–38). Figure 25 suggests that higher returns are expected in a 45% contribution ratio than the statutory ceiling in a mature, well-functioning housing sector. But Figure 26 reveals that exponential growth cannot continue indefinitely, and incremental returns eventually diminish even as the contribution ratio increases, and this is evident in the lower marginal ratios for a 60%-contribution at 9.5% asset growth rate as compared with a 55%-contribution for the same growth rate.

Figure 25: Projected Asset Value Growth in a 45%-Contribution Level at High-Price Growth versus 30%-Contribution Level at Low-Price Growth

LP = land pooling.

Note: Marginal ratio with respect to land pooled asset value growth is computed using two hypothetical scenarios: (i) 30% land pooling contribution in a low-price growth scenario of 6.5%, and (ii) 45% land pooling contribution in a high-price growth scenario of 8.5%.

Source: Authors' estimates.

Figure 26: Projected Asset Value Growth in High Contribution Levels and High-Price Growth Scenarios

67. Increasing the statutory ceiling of 30% can further enhance social returns through several channels. First, a greater percentage of land can be devoted to more accessible user-friendly amenities (such as green spaces) in the planned layouts, thereby increasing the welfare and satisfaction of LAP residents. Table 11 shows that less than 6% of the total planned area is designated as green space for all UIDP LAP areas (excluding Simtokha). Babesa has the least green space designated at 0.26% despite having the biggest total planned area. Changbangdu, with the smallest planned area, has designated 5.26% of open space. The World Health Organization (WHO) recommends a minimum of 9 m² of functional urban green space per capita for every city.⁵⁵ Considering the estimated population of the four LAPs, this amounts to 1,044.11 m² or 1.5% of the planned and developed area of the three UIDP LAP areas. The caveat here is that if the entire area of the LAPs (including steep slopes) is considered, then the green space per capita available increases drastically. However, these additional “green areas” are mountainous terrains and steep slopes where green space is not immediately accessible and usable by LAP residents. In comparison with other South Asian cities, Kathmandu Valley, in its current statute, requires 2.5%–5% of total land area as open space in the planned residential zones. At the municipal level (Kathmandu Municipal City), the current designated open space is 0.5% of total urban area.⁵⁶ Among other cities on the higher range are Chandigarh (with a current state of open space at 33.5%), Bangkok (39%), and Seoul (27.8%).⁵⁷ Although, the desk-based GIS

⁵⁵ World Health Organization. 2010. Urban Planning, Environment and Health: From Evidence to Policy Action. http://www.euro.who.int/data/assets/pdf_file/0004/114448/E93987.pdf?ua=1 (accessed 2 April 2020).

⁵⁶ Department of Urban Development and Building Construction. 2017. National Urban Development Strategy. Nepal.

⁵⁷ Faust, A. et al. 2020. Land Pooling in Nepal: From Planned Urban “Islands” to City Transformation. ADB South Asia Working Paper Series. Manuscript submitted for publication.

analysis also reveals that there has been no encroachment of planned green spaces in these LAPs showing strong anti-encroachment regulations in place (Figures 18, 27, and 28), the results of the household survey show a perceived lack of satisfaction with amenities with residents giving a low score of 6.5 (out of 10) for recreational areas (Figure 17). This implies that residents want greater proportion of green space. For greater livability and improved satisfaction outcomes with the urban environment, the financing of green spaces must be included in future development projects.

Table 11: Planned Green Space, by Local Area Plan

Local Area Plan	Planned Area (m ²)	Green Space (m ²)	Planned Area Designated as Green Space %
Babesa	840,107	2,215	0.26%
Changbangdu	288,656	15,204	5.27%
Lungtenphu	617,327	8,264	1.34%

LAP = local area plan, m² = square meter.

Note: This analysis uses AutoCad files of the original LAP plans.

Source: Authors' estimates based on data from National Housing Commission, Bhutan.

Figure 27: Example Neighborhood Node of Lungtenphu

Land uses planned in 2011

Existing situation in 2019

Note: Land use planned in 2011 is from AutoCad files from National Land Commission Secretariat.

2019 map is from a satellite image from the Environmental Systems Research Institute (ESRI).

Source: Authors' illustrations based on data from National Land Commission Secretariat and ESRI.

Figure 28: Example Neighborhood Node of Changbangdu

Land uses planned in 2011

Existing situation in 2019

Note: Land use planned in 2011 is from AutoCad files from National Land Commission Secretariat. 2019 map is from a satellite image from the Environmental Systems Research Institute (ESRI).

Source: Authors's illustrations based on data from National Land Commission Secretariat and ESRI.

68. Second, the excess portion may be used as “reserved” parcels for the thromde (or other developing entity) which can be sold for self-financing the scheme or to recover capital and operating expenditures such as the intended strategy in Nepal (footnote 57). However, this could not be done specifically during the UIDP so that the land pooling percentage contribution could be kept to the minimum requirement (under 30%). Third, it may be retained for providing much needed land for expansion of infrastructure services as the city grows (for example, future sites for wastewater treatment to add capacity as the population expands, new or temporary hospitals, additional housing, markets, or social service centers such as evacuation centers or one-stop shops for aiding socially vulnerable people).

69. Proposing a new land pooling contribution ceiling ratio is beyond the scope of this paper and we recommend leaving the policy window open for a potential upward revision in the future. A mature, well-functioning housing sector is a crucial factor in driving this process. However, the actual implementation will depend on the social conditions or acceptance on the ground. For greater social acceptance, the Thimphu thromde may consider continuing its strong tradition of engaging in community consultations and allowing a higher FAR than currently permissible to scheme participants to ensure they are not worse off in a higher-ceiling ratio. Higher FARs may be provided along major transport axes and commercial nodes with greater flexibility to change land uses to enable enhanced commercial development in such zones. There would be no magic number for the contribution ratio, and it would require more detailed research and consultation with all the stakeholders to find the public and private balanced and optimal solution. As noted in para. 65, a citywide and regional planning approach will be required to

better designate high FAR zones across the city to respond to spatial growth dynamics and demand. Infrastructure service capacities must be ramped up in such areas to enable higher density development.

70. **Mobilizing the private sector.** Given the right conditions, a greater involvement of private investors to implement township projects using land pooling schemes may be explored. This may be premature given the nascent private sector in Bhutan (limited private equity capital), but is an option to substantially reduce the public sector's investment burden, considering that, currently, most urban development projects implemented through land pooling are implemented through external financing support. The most immediate potential benefit for bigger towns such as Thimphu is that it can relieve the pressure for heavy capital expenditures in the public sector. For example, the Delhi Development Authority recently rolled out a land pooling program allowing for the first time entry of private investors as both infrastructure developer, and utility and maintenance service provider in five zones.⁵⁸ The thromdes should also explore more innovative financing practices in further developing the LAPs by leveraging on public-private partnerships (PPPs), for example, in (i) outsourcing operations and maintenance (O&M) services of basic infrastructure; (ii) adding strategic infrastructure such as hospitals, clinics, schools, and interstate bus terminals that can improve public well-being and livability (for example, the proposed Thimphu Integrated Bus Terminal in Simtokha LAP for which ADB's Office of Public-Private Partnership is providing transaction advice to the Thimphu thromde); and (iii) development of affordable housing models. Another solution already being adopted by the government is the involvement of its financially independent state-owned enterprises for the development of new townships such as the ADB financed Phuentsholing Township Development Project being developed by Druk Holding and Investments. The project is developing a modern township in Phuentsholing by reclaiming riparian land, whilst simultaneously providing flood protection to the entire city. While not labeled as a LAP, the area is planned out meticulously (LAP style) with mixed land use categories, and parcels will be leased for the revenue stream. The developers are working closely with the Phuentsholing thromde to harmonize urban management processes, highlighting the importance of collaboration between private and public sectors for urban coordination and management. Altogether, harnessing private capital has the potential to reduce the public sector's burden and enhance the welfare of urban residents through the provision of increased urban developable land and possibly more efficient urban management.

V. CONCLUSION

71. Land pooling is a powerful urban development and economic tool that, in the case of Thimphu, has been used to guide sustainable development of the city. It is through both urban policies and economic measures that efficiencies in its implementation in Thimphu can be improved. From a private returns perspective, land pooling is expected to increase land values in line with a priori expectations, directly and through spillover effects. This is because the portion of the land returned for mixed-use development is expected to appreciate with access to infrastructure and services—and almost immediately, even in the absence of additional investment efforts from landowners. At the same time, landowners can exercise greater bargaining power over what can be done on the returned portion of their land, which can be viewed to be both a strength and a weakness associated with the scheme. That, and other economic factors such as asset price information differences, land speculation, and housing supply inefficiencies, further complicate the implementation of land pooling schemes. For example, results from spatial analysis reveal that 31% of serviced plots developed under UIDP (BHU:2258) remain idle. In stark contrast, we observe rapid development occurring within and outside Thimphu's planned areas and thromde boundary, including in areas that are classified as agro-environment and along steep

⁵⁸ Delhi Development Authority. 2018. Land Pooling Policy. *Pamphlet*. July.

slopes. Ongoing development in these areas seems to be driven by existing market conditions, as cheaper and unserviced land parcels may be available for purchase and construction. But with right policy instruments in place, haphazard growth in these areas can be better managed and remaining parcels in the four UIDP LAP areas can be infilled within 4 years or less.

72. Finding an optimal ceiling level of contribution that yields both private and social returns requires careful assessment and consideration. Although we do not propose a specific contribution value, the results find merit in land pooling contribution levels that exceed 30%. Increasing the ceiling contribution can provide benefits in terms of greater percentage of land devoted to green spaces and being able to keep reserve areas for social services and/or sites for future infrastructure expansion to cope with the city's growth. This can improve the city's livability and increase the welfare and satisfaction of both landowners and LAP residents in the long run. A mature, well-functioning housing sector is necessary to drive this process. The long-term, sustainable outcomes of land pooling in Thimphu can only be achieved if backed by a mix of policy actions, comprising: (i) implementation of property tax reforms through market-based valuation; (ii) rationalization of valuation process to minimize asset price information differences in the real estate market; (iii) introduction of proper fiscal incentives to address housing supply inefficiencies and LAP build-out (including addressing affordable housing); (iv) implementation of a regional urban plan with Thimphu thromde and Dzongkhag, and improvement in the coordination arrangement between them to address urban sprawl outside UIDP LAP areas; (v) employing urban planning tools such as enhanced FAR allocations to enable greater pooling contributions with provisions for enhanced service provision capacities; and (vi) private sector involvement in implementing and managing land pooling schemes.

APPENDIXES

APPENDIX 1: SURVEY ON LAND POOLING IN FOUR URBAN INFRASTRUCTURE DEVELOPMENT PROJECT LOCAL AREA PLAN AREAS

Target respondents to this survey comprised three categories: (i) original landowners (pre-2005) in the four local area plans (LAPs), (ii) new land owners who acquired their land some time after 2005 in the four LAPs, and (iii) renters of apartments in the four LAPs.

The final sample was derived after the project team met several challenges in completing the interviews with landowners, such as: (i) target respondent contact information was not updated; (ii) information on previous landowner or those owning vacant plots was not available to new tenants or neighbors and, therefore, could not be identified or validated by them, and absentee landowners were not available for interview; and (iii) tedious data cleaning process (for example, removing observation with partially completed responses or erroneous sale or land values which could not be verified by contacting respondents again). The survey took 26 days to complete, including interviews, which were conducted in person. The final survey comprises 1,202 observations. The split between the different LAPs is provided in Figure A1.1 below.

Figure A1.1: Composition of Survey Sample by Local Area Plan

Note. There are 1,202 observations.

Source: Data from household survey.

Of the 1,202 survey observations, 31% were from the original (pre-2005) landowners, 19% from new landowners after 2005, and 51% from renters in the four Urban Infrastructure Development Project (UIDP) LAP areas. An accurate listing of all owners or renters in the LAPs was not available. Sample observations were based on selected land records obtained during data collection. To validate information on the number of old and new landowners, ADB also obtained a list of mortgage records.

Table A1.1: Respondent Type by Local Area Plan

Local Area Plan	Renter	Original Landowner	New Landowner	Total
Babesa	175	111	69	355
Changbangdu	116	46	42	204
Lungtenphu	169	102	73	344
Simtokha	148	107	44	299
Total	608	366	228	1,202

Source: Data from household survey.

Figure A1.2: Respondent Type

Note: There are 1,202 observations.

Source: Data from household survey.

Table A1.2: Average Period of Residence in Current Location (mean number of years)

Type	Mean	Standard Deviation	Frequency
Renter	4.22	6.26	608
Original landowner	21.82	20.89	366
New landowner	8.84	10.7	228
Total	10.45	15.28	1,202

Source: Data from household survey.

Figure A1.3: Access to Services

Note: There are 1,202 observations.

Source: Data from household survey.

Figure A1.4: Survey Response: Were All the Facilities Built that You Thought You would Get Access to as Part of Land Pooling by Local Area Plan?

Note: 281 landowners have responded.

Source: Data from household survey.

Figure A1.5: Survey Response: Which Facilities were not Built that You were Expecting?

Note: 74 landowners responded.

Source: Data from household survey.

**APPENDIX 2: DETERMINANTS OF LAND PRICES IN ADB LOCAL AREA PLAN USING
HEDONIC PRICING MODEL BASED ON ORDINARY LEAST SQUARE ESTIMATION**

Variable	Ordinary Least Square
Neighborhood (infrastructure access), N	0.29*** (0.09)
Location (driving distance to city center), L	-1.08** (0.43)
Real estate (existing structure), dummy, R	1.16*** (0.30)
Credit supply, dummy, C	-0.19 (0.20)
Y_{2006} , dummy	0.55 (0.46)
Y_{2007} , dummy	0.44 (0.56)
Y_{2008} , dummy	1.67*** (0.43)
Y_{2009} , dummy	0.98** (0.48)
Y_{2010} , dummy	1.61*** (0.58)
Y_{2011} , dummy	0.73 (0.51)
Y_{2012} , dummy	1.33* (0.73)
Y_{2013} , dummy	1.55*** (0.49)
Y_{2014} , dummy	1.48** (0.59)
Y_{2015} , dummy	2.35*** (0.47)
Y_{2016} , dummy	1.66*** (0.47)
Y_{2017} , dummy	1.65*** (0.57)
Y_{2018} , dummy	1.54** (0.67)
Constant	7.756*** (0.94)
R^2	0.46

Notes: Dash (–) refers to not applicable.
Robust standard errors are in parenthesis.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Source: Authors' estimates.

APPENDIX 3: BEFORE AND AFTER LAND POOLING SCHEME

Figure A3.1: Before and After Land Pooling in Changbangdu Local Area Plan

Before

After

Source: ADB. 2017. Bhutan: Infrastructure Urban Development Project. *Project Completion Report*. Manila.

Figure A3.2: Before and After Land Pooling in Lungtenphu Local Area Plan

Before (pilot area)

After (pilot area)

Before (non-pilot area from Olakha side)

d. After (non-pilot area from Olakha side)

Source: ADB. 2017. Bhutan: Infrastructure Urban Development Project. *Project Completion Report*. Manila.

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Analyzing the Welfare-Improving Potential of Land Pooling in Thimphu City, Bhutan

Lessons Learned from ADB's Experience

This paper examines empirically and spatially how welfare gains are realized in a land pooling scheme in four ADB-financed Local Area Plans (LAPs) in Thimphu city, Bhutan. Increased government efforts are required to take advantage of the full range of benefits of land pooling for Thimphu residents. The paper recommends a mix of fiscal and urban policy levers to address inefficiencies associated with the existing build-out pattern and infrastructure service quality. It offers insights on how unplanned development occurring outside the serviced LAP areas, including along steep slopes and peri-urban areas outside the city boundary, can be addressed most effectively.

This paper is the second in a series of three working papers on the topic of land pooling produced by the Asian Development Bank's South Asia Urban Development and Water Division. The series takes a deeper look at aspects including land pooling's effectiveness, welfare-improving potential, relationship with safeguard policies, and its prospects as a land management tool in developing country cities.

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