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Spatial Planning for Sustainable Rural-Urban Integration: Assessing the National Rurban Mission in Khamdong Cluster, Sikkim, India

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Abstract

This paper examines the spatial, infrastructural, and economic potential of the Khamdong Cluster in Sikkim using the National Rurban Mission (NRuM) as the conceptual frame. The main aim is to examine the facilities that are presently available, to identify spatial gaps and to develop long-term plans that will accommodate demographic growth up to 2041. For the study, a mixed-methods approach consisting of primary household surveys, Geographic Information Systems (GIS) mapping, and deficiency analysis against NRuM statutory guidelines was used. Findings point out a mostly farming economy that is being strangled by the lack of a localised agro-processing facility. Furthermore, water supply scarcity is noticed, which is currently being met only at 50 per cent of the 70 litres per capita per day national standard. Social infrastructure mapping has revealed substantial geographic accessibility challenges caused by mountainous areas, thus the introduction of mobile healthcare immediately has been suggested. Keeping in view the 2041 scenario of sustainable rural-urban integration, the research work has come up with spatial measures such as decentralization of cold-storage facilities, implementation of integrated rainwater harvesting systems, and provision of health care services at the primary level. In the final analysis, the article makes a case for inclusive rural growth, which can be attained through the adaptation of inflexible national policy frameworks to specific geomorphological realities of the Himalayan landscape.

Keywords: Spatial Planning, National Rurban Mission, Rural-Urban Integration, Himalayan Region.

Introduction

India's development trajectory is often linked with the increasing disparity in infrastructure and basic service provision, where the rural regions continuously lag behind the urban areas. Although the majority of the population (69 per cent) still lives in rural areas (Census of India, 2011; Bhagat, 2013). This uneven distribution of the population presents a significant policy challenge, as there is still a high disparity in terms of essential infrastructures, which remain in the urban areas, and the developmental process overshadows the rural areas.

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Despite the strong policies, plans and welfare programmes in India, it failed to curb the rural-urban disparity (Kulashri & Negi, 2017).

Studies have shown that the peri-urban regions around expanding cities like Kolkata have poor infrastructure and deteriorating living conditions despite rapid population growth, showcasing a "degenerated periphery" where basic civic amenities lag behind urban standards (Mondal, 2021). The unequal distribution of the basic services and infrastructure is often linked to the complex socio-political dynamics in the city-building process that favours the urban centres over rural areas, leading to the spatial inequality in basic service accessibility (Roy, 2021).

In general, rural India faces problems like health, poverty, smallholding agricultural land, water supply system, electrification, etc. (Chintakula, 2020). While looking upon the rural area issues and problems, the issues and problems in hill areas are different from those in the plain areas of the country, like vast undulated terrain, less extensive connectivity, improper communication facilities, improper transport infrastructure, less trained human resources in various services, etc (Pandey, Bahuguna, & Soodan, 2016).

To address these challenges and to bridge the rural-urban divide, the Government of India launched the Shyama Prasad Mukherji Rurban Mission (SPMRM) in 2016 as a cluster-based approach to rural development (PIB, 2016). This mission aims at creating a cluster of villages and providing urban basic amenities to the population living within that cluster while preserving and nurturing the essence of rural community life (Barodawala, Shah, & Desai, 2018; Ramesh,2018). Therefore, this mission seeks to reduce the disparities and improve the quality of life in rural areas.

Recent empirical studies in the National Rurban Mission (SPMRM) in India show mixed outcomes regarding its impact in bridging the rural-urban disparity. Ramesh (2022) shows that though the mission leads to stimulate local economic growth and improve basic services in Tamil Nadu and Kerala, there remain implementation challenges, and the study suggests a large-scale evaluation for better outcomes of the mission. Similarly, another case study from Gujarat and Rajasthan shows the progress in physical and economic infrastructure, but the findings of the study show uneven development across phases and regions (Malpani & Sharma, 2020; Bhutoria & Patel, 2024).

Therefore, the present study aims to examine the spatial, infrastructural, and economic potential of the Khamdong Cluster in Sikkim through the lens of the NRuM guidelines. The primary objective of this paper is to analyze the existing socio-economic and physical infrastructure, identify spatial deficits, and formulate long-term spatial strategies and land-use proposals accommodated for projected growth through the year 2041.

Literature Review

Rurban (Rural + urban) is a geographical territory that has the economic character of an urban area while retaining its essential rural area features. The evolution of the concept from its theoretical roots began in 1966 when Kingsley coined the term “rurban” to define developed villages dispersed in a vast rurality (Banerjee, Prasad, & Lata, 2019).

The rural development approach in India has undergone a significant paradigm change over the last two decades. Historically, the spatial planning framework has been dominated by the urban areas, whereas the rural areas have been left behind to develop organically without structured infrastructural support. The initial programme, which focuses on bridging the gap between rural and urban areas, was the Provision of Urban Amenities in Rural Areas (PURA) scheme, which focuses on delivering key infrastructure and livelihood opportunities in rural areas. This program was later expanded by the "Smart Village" initiative, which aimed to create economically and socially sustainable spaces to curb distress migration to cities (Ministry of Rural Development, 2010).

The objective of the National Rurban Mission, or commonly known as NRuM, is to promote local economic development while enhancing basic services and creating well-planned Rurban clusters. To bridge the rural-urban division with respect to the economy, technology and any divisions based on facilities and services. To promote local economic development while actively reducing poverty and unemployment in such rural areas. To spread and promote development in all aspects of such regions. To attract investments in these rural areas (Singh, 2018).

Table 1: Core Components and Themes of the National Rurban Mission

Themes	Activities under the rurban mission
Livelihoods	• Skill development training linked to economic activities • Agro- processing, agro-services, storage and warehouses
Services	• Mobile health unit • Sanitation • Provision of piped water supply • Solid and liquid waste management Vii. Public transport • LPG connections Ix. Digital literacy • Citizen service centres- for electronic delivery of citizen-centric
Infrastructure	• Upgrading school/higher education facilities Xii. Village streets and drains • Streets lights • Inter-village road connectivity

With the purpose of enhancing the livelihoods of the rural individuals, there is a need to increase the participation of the individuals in rural development programs, decentralisation of planning, better enforcement of land reforms and larger access to credit. Working on these aspects will a bridge the gap between rural and urban divide and upgrade the standards of living of rural communities. The rural development involves the development of number of aspects, these include, irrigation facilities, expansion of electricity, improvements in the techniques of

cultivation, enhancements in the system of education, health care and medical centres and so forth (Agarwal, 2018).

Though these national policies provide a strong foundation for rural transformation. However, the standard spatial planning models are mainly designed for plains and flatland regions. There remains a critical gap in understanding how these Rurban guidelines perform across different geographies and dispersed settlement patterns in mountainous terrain. Therefore, applying these standardised metrics to evaluate the rural development potential of hilly regions, such as Sikkim, forms the core focus of this study.

Study Area and Methodology

Cluster Selection and Study Area

As per the National Rurban Mission, the selection of clusters for analysis is based on comparing two clusters of the same type. For the study purposes, two clusters have been identified and ranked according to the selection criteria for cluster delineation.

Selection of clusters for the study has been done by following the guidelines of the National Rurban Mission. They are as follows:

i. Population of 5000 to 15000 in desert, hilly or tribal areas.

ii. Decadal growth rate in rural population

iii. Decadal increase in non-farm work force participation

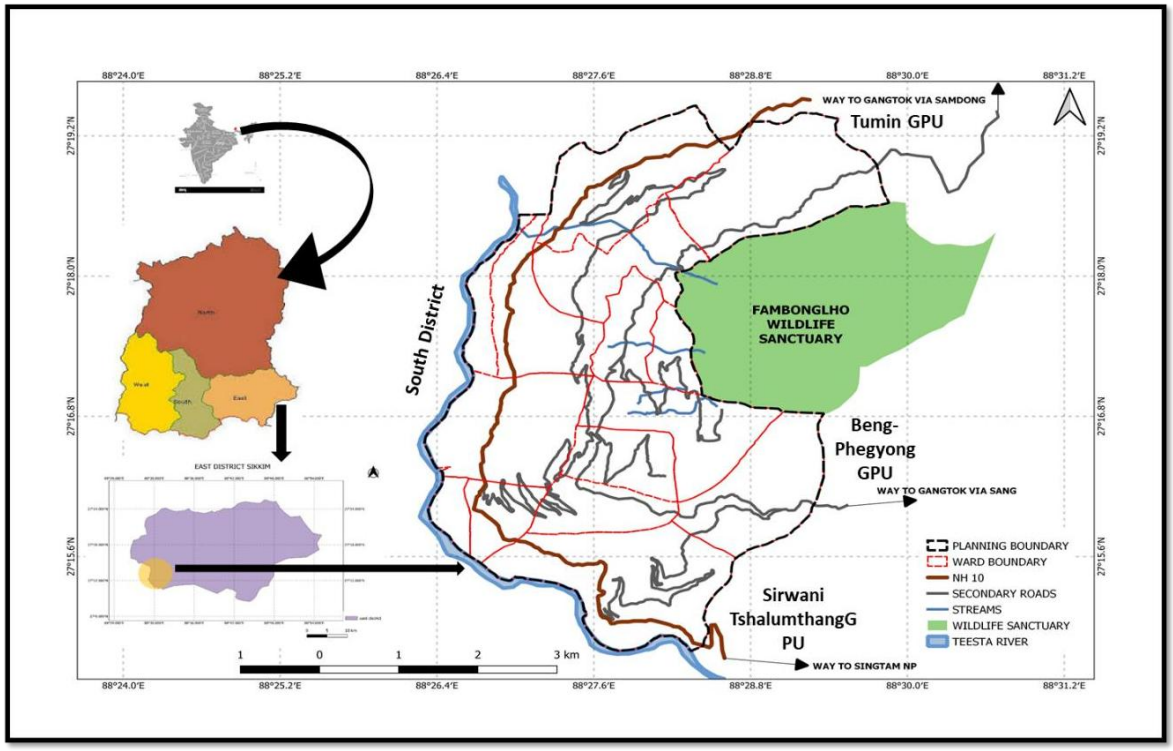
Ranking	Parameters			Decadal Rural Population Growth of Cluster			Decadal Increase in Proportion of Non-Farm Work Force			Rise in Land Values			% Enrollment of Girls in Secondary School			% Households with Bank Accounts under PMJDY			Perofrmance in SBM (G)			Good Governance Initiatives			Total Weighted Score	
	Name of Cluster	Sub-District	District	Decadal Rural Population Growth	Relative Score out of 100	Weighted Average Score	Increase in Proportion of Non-Farm work force growth	Relative Score out of 100	Weighted Average Score	Rise in Land Values	Relative Score out of 100	Weighted Average Score	% Enrollment	Relative Score out of 100	Weighted Average Score	% Households	Relative Score out of 100	Weighted Average Score	Perofrmance in SBM (G)	Relative Score out of 100	Weighted Average Score	Good Governance Initiatives	Relative Score out of 100	Weighted Average Score		Rank
	Max			*11.80%*			*2.27%*						*0.00%*			*0.00%*										
	weightages					*30%*			*30%*			*0%*			*20%*			*20%*								
				Weightage - 80%												*weightage - 20%*										
1	**Khamdong**	Gangtok	East District	11.80%	100.00	30.00	2.27%	100.00	30.00		0.00	0.00	0%	0.00	0.00	0%	0.00	0.00	99	0.00	0.00		0.00	0.00	**60.00**	I
2	**Samdong**	Gangtok	East District	1.05%	8.90	2.67	-1.16%	-51.10	-15.33		0.00	0.00	0.00%	0.00	0.00	0%	0.00	0.00	99	0.00	0.00		0.00	0.00	**-12.66**	II

Source: Rural Development Department, Government of Sikkim.

The ranking of the cluster has been done according to the rural mission cluster delineation, with weightage given to various parameters as given by the Ministry of Rural Development. The weightage has been given to parameters out of 100, with Khamdong having a score of 60 and Samdong a score of -12.44. Therefore, based on the Ranking parameters, Khamdong was systematically selected over the neighboring Samdong cluster using NRuM delineation criteria. As per the weightage, Khamdong had a significantly higher decadal population growth rate (11.8% vs. 1.05%) and a positive increase in its non-farm workforce (2.27% vs. -1.16%), making it highly suitable for Rurban infrastructural intervention.

The Khamdong cluster comprises 15 villages covering three Gram Panchayat Units (Simik-lingzey, Dung-dung Thasa, and Khamdong) covering 27.9 sq. Km. The Total

Population of the cluster, according to the 2011 census, is 10788, with 6552 in the rural workforce participation and 1890 engaged in non-farm work. With the decadal growth rate of 11.8% and 2.27% increase in non-farm work force participation from the 2001-2011 census year.



Map 1: Khamdong Cluster

Methodology

The study used a mixed-methods approach by combining both primary and secondary data. Primary data was collected through household surveys, personal observations to assess local agricultural practices, sanitation, and tourism potential. Furthermore, the ancillary data was collected from Census of India and Rural Development Department. Likewise, the deficiency analysis was conducted by benchmarking existing facilities against NRuM statutory requirements (e.g., 70 Liters Per Capita per Day [LPCD] for water, 1 health centre per 3,000 persons).

Result and Findings

Demographic Profile and Land Use Dynamics

The Khamdong Cluster demographic profile broadly reflects the rural urban continuum of the Himalayas. The population was 10,788 persons with a moderately equal sex ratio (53% males, 47% females) and a literacy rate of 70.2%. The land use pattern of the 27.9 sq. km area totally dominated by agriculture and ecological sensitivity. At the moment, 33 per cent of the total area is under vegetation, 20 per cent is being used for farming, and 16 percent is dedicated to housing. Correspondingly, only 2 per cent of the land is reserved for commercial activities, which signifies that the area has very little non farm economic diversification.

The Agrarian Economy and Agro-Processing Gaps

The economy of the Khamdong cluster continues to be heavily dependent on traditional primary sectors. Around 60% of the labour force is involved in agriculture and allied activities, while only 17% are engaged in non-farm sectors. The area is producing rich organic products, such as approximately 9, 000 kg of cash crops (cardamom, ginger, and oranges) and 6, 180 liters of milk per year. Yet, space deficiency analysis brings to light a serious issue: the total lack of localized processing or storage facilities in the area. As a result, farmers have to travel about 15 km on average to the nearest urban market in Singtam Nagar Panchayat to sell their perishable goods, which leads to post harvest losses and low average incomes (generally between 10, 000 and 15, 000).

Physical Infrastructure Deficits: Water, Roads, and Sanitation

Water Supply: The cluster faces a critical water crisis. Currently, piped water networks partially cover only 42% of the settlements. The existing per capita water supply is a mere 35.52 Liters Per Capita per Day (LPCD), which is exactly half of the NRuM statutory requirement of 70 LPCD. Demographic forecasting models indicate that the current water deficit of 407.6 Kiloliters/Day (as of 2021) will escalate to a severe shortage of 593.06 Kiloliters/Day by 2041 due to the systemic drying of local water sources and pipeline destruction caused by landslides

Road Connectivity and Drainage: While the cluster is serviced by a network of 71.36 km of roads including a 14.7 km stretch of National Highway 10 primary surveys indicate that 70% of local and village roads suffer from severe deterioration and poor maintenance. Furthermore, drainage networks alongside these roads remain uncovered, violating basic NRuM sanitation guidelines.

Social Infrastructure and Spatial Accessibility

Spatial mapping of the social infrastructure reveals highly uneven accessibility. Currently, the finding from the field shows that to access basic healthcare, the people needs to travel the distances of 10 to 15 km across mountainous topography. Furthermore, none of these PHSCs in the cluster region are equipped with pharmacies or dedicated ambulance services. Applying the NRuM planning scale of 1 health centre per 3,000 persons to forecasted population reveals that the cluster will require two additional health infrastructure nodes by 2041 to maintain basic healthcare services. On the other hand, educational infrastructure in the cluster has relative strength. The cluster currently has four primary schools, three junior high schools, and two senior secondary schools.

Conclusion

The Khamdong Cluster in Sikkim presents a great opportunity to evolve into a self, sustaining "Rurban" center under the National Rurban Mission (NRuM) guidelines. Nevertheless, the area, despite being agriculturally strong, is experiencing a shortage of basic facilities which is the main reason behind the lack of development. In order to make the rural, urban integration in a sustainable way and prepare for the increasing population till 2041, the following measures should be taken:

Agro, Economic Support: Build cold storage and agro-processing units near farmers' locations for their convenience; also, provide veterinary services through dispensaries to protect the dairy sector. Infrastructure Upgrading: Extensive installation of rainwater harvesting mechanisms is needed to address the serious water shortage (currently providing only 35.52 LPCD compared to a 70 LPCD requirement), and existing paths need to be transformed into well-drained, non-mud roads. Health Care Accessibility: At least three mobile health units (ambulances) should be provided immediately to address the challenges posed by mountainous terrain, and new primary health centres should be constructed to accommodate future population growth.

In the end, developing the Khamdong cluster in a successful manner involves modifying the NRuM guidelines according to the specific geographical difficulties of the Himalayan region, and this will make sure that the area gets inclusive economic growth while at the same time its natural environment is preserved.

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