

SPATIAL-BASED ASSESSMENT OF VILLAGE DEVELOPMENT LEVELS USING REGIONAL POTENTIAL INDICATORS IN IV KOTO AUR MALINTANG, WEST SUMATRA

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ABSTRACT: Village-level development is an essential component of regional planning that emphasizes the sustainable utilization of local potentials. This study aims to assess the level of development across five Nagari in IV Koto Aur Malintang Subdistrict, Padang Pariaman Regency, based on regional potential indicators outlined in the Indonesian Ministry of Home Affairs Regulation No. 12 of 2007. Using a quantitative descriptive approach, the research analyzes secondary data covering natural resources, human resources, institutional capacity, as well as infrastructure and public facilities. Each indicator was scored according to the official village profiling guidelines to categorize the development potential of each Nagari. The results indicate that the highest natural resource potential lies in the plantation and livestock sectors, particularly in Nagari III Koto Aur Malintang Selatan and Nagari III Koto Aur Malintang Utara. Agricultural potential tends to fall within the moderate-to-low range in most Nagari. In terms of human resources, population density and livelihood diversity vary significantly, influencing disparities in development outcomes. Institutional strength and infrastructure availability also differ across Nagari, with some exhibiting limitations in transportation and health facilities. Overall, development potential is categorized into three groups: high potential (Nagari III Koto Aur Malintang Selatan and Nagari III Koto Aur Malintang Timur), medium potential (Nagari III Koto Aur Malintang Utara and Balai Baiak Malai III Koto), and low potential (Nagari III Koto Aur Malintang). The study highlights the importance of adopting a place-based development approach to reduce inter-Nagari disparities. These findings are expected to inform more contextual, targeted, and sustainable village development planning.

Keywords: Institutional Capacity, Natural Resources, Regional Potential, Village Development in IV Koto Aur Malintang

1. INTRODUCTION

Regional development in the current era of decentralization positions villages and *Nagari* as key actors in achieving national and global development goals. The Government of Indonesia strengthens village capacity through decentralization, fiscal transfers, and community-based development policies, allowing *Nagari* to play a strategic role in improving community welfare [1].

Over time, the paradigm of rural development has undergone a substantial transformation. While earlier development focused primarily on physical infrastructure, the strengthening of the Village SDGs framework has become the main instrument ensuring that development is more holistic, inclusive, and sustainable. The Village SDGs program introduced by the Ministry of Villages in

2020 also functions as an evaluative framework for measuring village/*Nagari* progress across economic, social, institutional, and ecological dimensions, forming part of Indonesia's commitment to the 2030 SDGs [2].

In this context, the need for comprehensive *Nagari* development data has become increasingly important. The village/*Nagari* profiling system regulated in the Ministry of Home Affairs Regulation No. 12 of 2007 remains a foundational reference for identifying regional potential, including natural resources, human resources, infrastructure, institutions, and local economic activities. However, recent evaluations emphasize that the traditional village profile system must be updated with SDGs-based indicators to reflect more dynamic development needs [3].

Moreover, recent studies highlight various challenges in the implementation of the Village

SDGs. In several villages, program dissemination remains limited, local government capacity is still inadequate, and data utilization for planning and budgeting has not been optimized (Ulfah et al., 2024). From an institutional perspective, the legitimacy of Village Regulations (Perdes) on SDGs is a crucial factor in ensuring the sustainability of program implementation. [4] show that SDGs-based village regulations can strengthen village governance to become more systematic and accountable [5].

In addition, integrating the SDGs into the Village Medium-Term Development Plan (RPJM Desa) has become a growing practice across regions in Indonesia, ensuring that local development strategies align with both national and global SDGs targets [6]. This approach aligns with the theory of place-based development, which emphasizes that development strategies must be relevant to local characteristics, including geographical conditions, community capacity, institutional strength, and unique economic potentials [7]. This theory rejects uniform development approaches, arguing that each region possesses distinct strengths, limitations, and development needs [8].

In the context of *Nagari* development, regional potential indicators include agriculture, plantations, livestock, fisheries, mineral resources, education, health, basic infrastructure, and occupational structures. Recent studies show that disparities in regional potentials often lead to unequal development outcomes among villages/*Nagari*, including in rural areas of West Sumatra [9-12].

In the IV Koto Aur Malintang Subdistrict of Padang Pariaman Regency, variations in natural resources and institutional capacity across *Nagari* lead to significant differences in development levels. However, potential assessments are often not conducted systematically, resulting in development policies that are not data-driven and do not fully reflect the actual needs of local communities. The hilly geographical landscape, limited infrastructure, and low economic diversification further underscore the need for a scientific and measurable evaluation of regional potential.

Considering these challenges, research on *Nagari* development levels using both regional potential indicators and Village SDGs indicators is essential. Such research is expected to provide a more comprehensive understanding of current conditions in each *Nagari* and to serve as a strategic recommendation for local governments in formulating targeted, inclusive, and sustainable development policies.

2. RESEARCH METHODS

This study employed a quantitative descriptive approach to assess the level of village (*Nagari*)

development based on indicators of regional potential and the Village Sustainable Development Goals (Village SDGs) framework. The research was conducted in IV Koto Aur Malintang Subdistrict, Padang Pariaman Regency, and focused on five *Nagari* selected due to their varying characteristics of regional potential and development levels, allowing for a comparative analysis.

The data used in this study consisted primarily of secondary data obtained from official and authoritative sources, including *Nagari* Profiles, regional statistical reports, and administrative records provided by the subdistrict and *Nagari* governments. These data encompassed indicators of natural resources, human resources, infrastructure and public facilities, local economic activities, and institutional capacity. In addition, selected indicators from the Village SDGs framework—such as poverty reduction, education, health, economic diversification, environmental management, and governance—were integrated to provide a more comprehensive assessment of development conditions at the *Nagari* level.

The research process involved several stages, beginning with data collection and verification, followed by the identification and selection of relevant indicators in accordance with the research objectives. Each indicator was then measured using a scoring and weighting system based on the assessment guidelines outlined in the Ministry of Home Affairs Regulation No. 12 of 2007 and the Village SDGs indicator matrix developed by the Ministry of Villages. This procedure enabled the quantification and comparison of development potential across the five *Nagari*.

Data analysis was conducted through tabulation, normalization, and comparative evaluation of the weighted scores. The resulting scores were subsequently classified into three categories—low, medium, and high development potential—based on predetermined interval criteria. The analytical results were interpreted to identify spatial disparities in regional potential and development performance among the *Nagari*, to describe prevailing development patterns, and to formulate evidence-based recommendations to support future village-level development planning.

3. RESULTS AND DISCUSSION

Recent studies highlight that spatial analysis is essential for understanding local development potential. Demonstrate that geospatial techniques

3.1 Human Resource Potential

Human Resource Potential Viewed from Population Density

High population density in a *Nagari* might indicate more labor availability and better potential for community-based economic activities; however, it

The population density scoring reflects these variations: e.g., *Nagari* III Koto Aur Malintang has a density of 356 people/km², giving it a high score, whereas *Nagari* III Koto Aur Malintang Timur, with only 88 people/km², gets a much lower score. This uneven distribution of human resources suggests that some *Nagari* may have greater human capital potential than others, which could influence development dynamics. This scoring system helps highlight where human resource capacity is strong and where it may be underutilized. For policymakers, these insights are valuable: dense *Nagari* might need investments in social services and job creation, while less dense areas might

could also point to risks such as overcrowding or strain on local infrastructure and services. On the other hand, *Nagari* with low density might struggle with labor shortages or limited economies of scale, but could benefit from more available land per capita.

benefit more from programs that attract residents or stimulate economic activity.

Human Resources Potential Viewed from the Level of Education

Such educational characteristics can constrain local development: low formal education may limit employment opportunities, reduce productivity, and hinder innovation. On the other hand, these indicators also present an opportunity for development: by focusing on increasing school participation, reducing drop-out rates, and improving educational infrastructure, the *Nagari* can strengthen its human resource potential.

Table 1. Distribution of School Attendance and Educational Completion Indicators in *Nagari* of IV Koto Aur Malintang

No	<i>Nagari</i>	Age 7–18 Not in School	Age 12–56 Never Attended School	Age 12–56 Not Completed Primary (SD)	Age 18–56 Not Completed Junior High (SMP)	Age 18–56 Not Completed Senior High (SMA)	Special School (SLB)
1	III Koto Aur Malintang	1,070	570	713	1,427	2,854	71
2	III Koto Aur Malintang Selatan	2,296	2,649	1,501	883	618	88
3	III Koto Aur Malintang Timur	605	526	342	237	131	26
4	III Koto Aur Malintang Utara	3	10	290	372	383	40
5	Balai Baiak Malai III Koto	507	1,567	1,298	768	259	20

The data shows a significant variation in education levels across *Nagari*, particularly in the age groups and school attendance. For instance, a large number of individuals aged 7–18 years in several *Nagari* have never attended school. This highlights potential gaps in school enrollment for basic and intermediate education. Moreover, among the 12–56 year old population, many have not completed elementary (SD) or junior high (SMP) education, indicating that a sizable portion of the working-age population may lack foundational education credentials. The number of those who did not complete secondary education suggests limited human capital readiness for more advanced economic activities.

The presence of individuals who did not graduate from senior high school (SMA) and those attending special schools (SLB) also points to educational inequality and possible challenges in accessibility or quality of mainstream education.

This also implies that some segments of the population might require special interventions or tailored educational programs to improve their education levels. The spatial assessment of *Nagari*-level potential in IV Koto Aur Malintang Subdistrict indicates that all mapped areas fall within the medium potential category, with scores ranging from 25 to 28. This uniformity suggests that the biophysical characteristics, socio-economic conditions, and land-use patterns across the *Nagari* are relatively similar, resulting in no areas classified as low or high potential. Minor variations within the “medium –” to “medium +” subcategories are primarily influenced by factors such as accessibility, proximity to main transportation routes, and the availability of basic infrastructure. *Nagari* located closer to primary road networks tend to score higher (27–28), reflecting the critical role of accessibility in enhancing public service provision and supporting local economic activities.

This pattern aligns with the principles of spatially based rural development outlined in Minister of Home Affairs Regulation No. 12/2007 on Village/Urban Village Profile Data Utilization.

The findings are also consistent with national evidence that infrastructure quality and service accessibility significantly influence rural development capacity. Consequently, the map highlights the need for targeted development interventions focused on improving accessibility, strengthening local governance institutions, and optimizing leading local sectors. This approach aligns with the spatial-development framework promoted by Bappenas (Indonesia's National Development Planning Agency), which underscores connectivity and equitable service distribution as foundational elements for accelerating rural development. Based on the analysis of the volcano eruption disaster risk mitigation and policy model of adaptation of Sinabung volcano in Karo Regency, it can be seen from spatial planning, mitigation, and adaptation that alternative priorities for disaster risk reduction are 4 main priorities, i.e: 1) Relocation identifying, assessing, monitoring disaster risk, and implementing an early warning system; 2) Utilizing knowledge, innovation, and education to build a culture of safety and resilience at all levels; 3) Making "Disaster Risk Reduction/DRR" a national and regional priority implemented through strong institutions; and 4) Reducing factors fundamental causes of the emergence or increase of disaster risk. [26] stated one effort to reduce the impact of disaster risk by increasing the capacity of the society in dealing with disasters. [27-30] explained disaster education and increased socialization in disaster-prone zones as an indicator to increase society capacity in reducing disaster risk. Enhancement the society capacity to reduce the volcano eruption risk disaster of Sinabung in Karo Regency can be implemented by including disaster education in the school curriculum. With including disaster education curriculum to the society in disaster-prone regions is an effective effort to reduce the risk of disasters. [31-34] states that including disaster education in all elements of society can reduce 40-60% of losses due to disasters. In addition, [35-38] adds that one solution mitigates the vulnerability region of the volcanic eruption disaster by entering the element of disaster in the preparation of spatial planning. This is in accordance with the direction of disaster mitigation policies by including disaster-based spatial planning.

4. CONCLUSION

This study demonstrates that the development levels of Nagari in IV Koto Aur Malintang

Subdistrict vary across natural resources, human resources, institutional capacity, and infrastructure indicators. Spatial analysis reveals that most Nagari fall within the medium development category, indicating relatively similar biophysical and socio-economic characteristics but with notable disparities in accessibility, education levels, and land ownership structures. Nagari located closer to main transportation routes tend to achieve higher scores due to better infrastructure and stronger institutional performance, while more remote Nagari exhibit limitations in service availability and economic diversification. The findings highlight the importance of integrating regional potential indicators with Village SDGs metrics to obtain a more comprehensive and future-oriented evaluation of local development conditions. Strengthening accessibility, improving educational attainment, enhancing institutional governance, and optimizing key economic sectors such as agriculture, plantations, and livestock are crucial strategies for reducing inter-Nagari disparities. Overall, the study underscores the need for a place-based development approach to support targeted, inclusive, and sustainable village development planning

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