Journal of Natural Resources and Environmental Management
http://dx.doi.org/10.29244/jpsl.15.2.234

RESEARCH ARTICLE

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Spatial Distribution of Local Sustainability Index in the Ciletuh-Palabuhanratu UNESCO Global Geopark Using Spatial Autocorrelation

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Article History
Received 15 June 2023
Revised 21 January 2024
Accepted 24 July 2024

Keywords
local moran index, local sustainability index, spatial autocorrelation

ABSTRACT

The Ciletuh-Palabuhanratu UNESCO Global Geopark (CPUGG) is a geopark area that is also a tourist destination in Sukabumi, West Java, Indonesia. CPUGG is experiencing rapid regional development, which can be seen from the increase in tourist visitors, changes in land use from agricultural land to built-up areas, the rapid growth of infrastructure and facilities, and the emergence of various economic activities. This study aims to determine local sustainability performance based on the spatial distribution pattern of the local sustainability index (LSI) in CPUGG using a spatial autocorrelation approach. The results show that the CPUGG development is not evenly distributed yet. The spatial distribution pattern of the local sustainability index in economic, social, and environmental are clustered. Each clustering shows that each village influences the surrounding villages. So, increasing the economic, social, and environmental sustainability index in several villages with a low sustainability index is necessary. Good cooperation is needed between the government, society, and several stakeholders to improve economic, social, and environmental development in The Ciletuh-Palabuhanratu UNESCO Global Geopark, West Java, Indonesia.

Introduction

The Ciletuh-Palabuhanratu UNESCO Global Geopark (CPUGG) is a tourist destination in Sukabumi District, West Java, Indonesia. Geographically, CPUGG is advantageous because it is located in a district close to the metropolitan cities of Jakarta, Bogor, Depok, and Bekasi (*Jabodebek* in bahasa). This supports the rapid development of the Sukabumi District area. Road access, which continues to be built, supports the growth of foreign and domestic visitors. In this case, the high number of visitors may cause environmental issues [1]. In addition, rapid regional development in the CPUGG area can be observed from changes in land use from agricultural land to built-up areas, the rapid development of infrastructure and facilities, and the emergence of various economic activities. If left unchecked, this will result in sustainable development that is difficult to achieve.

In line with the results of Fauzi and Oktavianus [2], economic development tends to sacrifice the environment if development implementation is not comparable across dimensions. Over the last few decades, humanity's overall development has negatively impacted the environment and socio-economic instability, endangering the survival of the Earth and future generations [3]. Therefore, tourist destinations are expected to implement a long-term sustainable tourism strategy by considering economic, social, and environmental factors [4,5]. According to data from the Regional Development Agency (BAPPEDA) Sukabumi regency [6], there are several strategic issues regarding CPUGG management: an increase in the number of visitors and its correlation with ecosystem sustainability, unclear management systems, and a lack of development policy synergy.

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The government must overcome this regional transformation phenomenon in the CPUGG area. Geopark development to benefit geo-tourism must follow sustainable development standards, as directed at the 30th International Geological Congress in Beijing in 1966 [7]. There are several definitions of sustainable development. One well-known definition was provided by the Brundtland Commission in 1987 [8,9]. There are three pillars of sustainable development: economy, society, and ecology [10–12]. Conceptually, the achievement of sustainable development is the magnificence between those primarily concerned with nature and the environment, those who value economic development, and those dedicated to improving human living conditions [13,14]. The concept of the development approach is known as sustainable development, which is a development concept that can meet the needs of the current generation without compromising future generations [15,16].

An assessment of sustainable development must be determined as a measure of sustainability. Research on sustainable development has been frequently discussed at the regional, national, and global levels [17] but has rarely been discussed at the local level [18]. Specifically, the spatial dependency between locales is greater locally than at the national or global level. The sustainability performance of a site is influenced by its surroundings [19]. The law on village autonomy in Indonesia requires the creation of development indicators at the village level [20,21]. These indicators serve as measurement tools and recommendations for local government authorities while conducting development projects.

This indicates that an analysis of sustainable development at a local level is required. The government should recognize the significance of village development. Consequently, village development must be well planned and based on the findings of a thorough study of all the potential as well as the issues encountered by the village to meet the true requirements of the village community. Against this background, this study aims to determine the local sustainability performance based on the spatial distribution pattern of the local sustainability index (LSI) in CPUGG using a spatial autocorrelation approach. Although several studies have been conducted to measure sustainable tourism in Indonesia, in contrast to this study, the indicators focus on a sustainable development approach.

Materials and Methods

Study Area

This study was conducted in the CPUGG area, Sukabumi Regency, West Java Province, Indonesia, which consists of eight sub-districts and 74 villages with borders with Banten Province in the North, Jampang Kulon, Lengkong, Bantargadung, and Cikidang in the East, the Indian Ocean in the South and West, as shown in Figure 1.

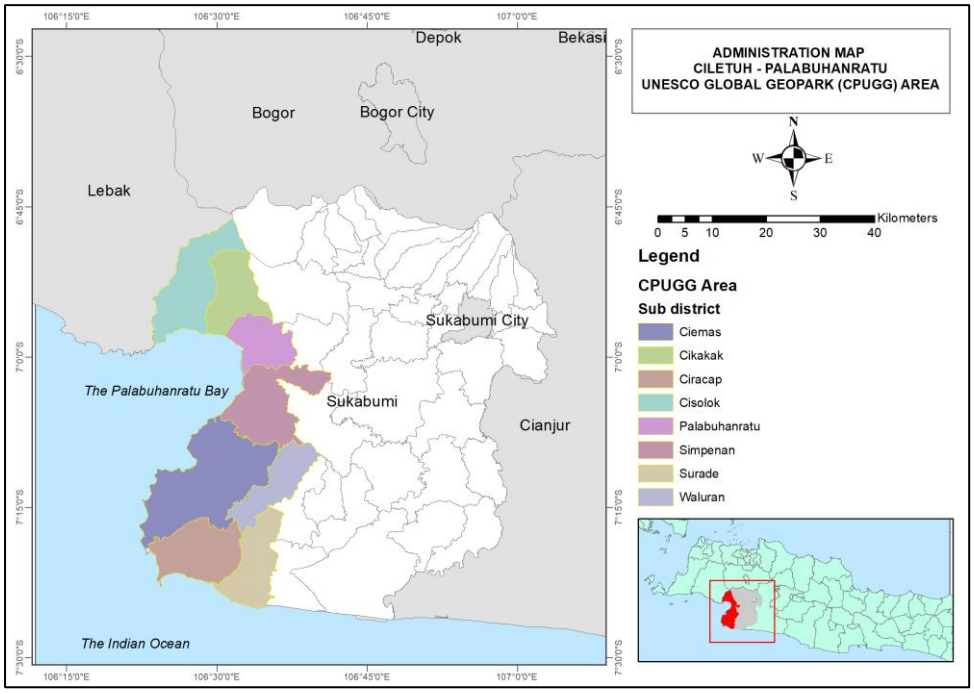

Figure 1. Study area.

The total area of CPUGG is approximately 126,000 ha, which is 30.3% of the Sukabumi District. The population of the CPUGG area in 2020 reached 502,019, with an average density of 412 people/km^2. Ciletuh Geopark was designated as a national geopark by the *Komite Nasional Geopark Indonesia* (KNGI) and the Indonesian National Committee for UNESCO on December 22, 2015. The geopark area was expanded, and its name was changed to Ciletuh-Palabuhanratu, inaugurated by the same committee on June 21, 2016, and designated as a UNESCO Global Geopark on April 17, 2018, with the geopark theme "Subduction Fossil, Plato Jampang, Magmatic Path Shift". The CPUGG offers several advantages regarding geology, biology, and cultural diversity. The geological diversity includes subduction fossils, Jampang plateau, and shifting magmatic pathways. Biodiversity was found in the Cikongga Wildlife Reserve, Cibanteng Nature Reserve, Turtle conservation, and Halimun Salak National Park. The cultural diversity in this area extends from the megalithic era to the modern era, including megalithic sites in Cengkuk, Kasepuhan Banten Kidul, and historical heritage buildings preserved today. In addition, there is a diversity of intangible cultures, such as dances, songs, and stories.

Data Collection

In this study, we used secondary data. There are two secondary data sources: village potential data (2019) sourced from the *Badan Pusat Statistik* (BPS) and CPUGG land-use and administration maps sourced from BAPPEDA. Village potential data were processed to develop indicators (variables) to measure LSI. Land use and administration maps were then processed to identify the spatial distribution patterns of the LSI.

Data Analysis

The LSI is a local-level development sustainability index created by the author in 2016 for the research region in the Greater Jakarta Metropolitan region (*Jabodetabek* in Bahasa), with a unit of analysis per village. After evaluation in the Jabodetabek metropolitan region, this index is now being tested in several other places with distinct features and units of analysis, employing a variety of modified variables or indicators. The LSI was calculated using factor analysis (FA) to select the most notable variables / indicators [22–25]. Table 1 presents the variables used. FA is a statistical technique used to describe the variability of observed correlated variables in terms of a potentially small number of unobserved variables called factors [26]. The FA model used in this study is expressed as follows:

$$LSIki = \sum_{m=1}^{nk} Ekm.Skmi \quad (1)$$

where LSIki = LSI for k to n dimensions in village i to n; k = dimension (k = 1: economy; k = 2: social; k = 3: environment); Ekm = eigen value for the k to n dimension in the m to n factor; Skmi is the factor score for the k to n dimension (factor score from the results of the STATISTICA7 calculation, factor m to n in village i to n; i = 1,2,3, ..., n. To standardize the LSI value (LSIki (std)) on a scale of 0–100, we used the following formulation:

$$LSIki(std) = (LSIki - LSIki(min)) * \frac{100}{LSIki\ (max) - LSIki\ (min)} \quad (2)$$

where LSIki(std) is the LSI standardization for k to n dimensions in villages i to n; LSIki = LSI for the k to n dimensions in the i to n villages; LSIki(min) is the value minimum LSI for k to n dimensions in i to n villages; and LSIki(max) = value the maximum LSI for the k to n dimensions in villages i to n [19].

Table 1. List of variables of LSI.

Code of variables	
Economy (k=1)	
X1	Percentage of households using electricity (%)
X2	Number of Base Transceiver Station (BTS) tower
X3	Number of communication service operator
X4	Distance to the closest market (km)
X5	Distance to the closest central business district (CBD) (km)
X6	Number of industries per 1,000 population
X7	Number of markets, mini markets, shops per 1,000 population
X8	Number of hotels, hostels, motels, and inns per 1,000 population
X9	Number of restaurants or food stalls
X10	Percentage of developed or urban land per total area (%)

X11	Distance to the closest bank (km)
Social (k=2)	
X12	Number of formal education facilities (kindergarten to university) per 1,000 population
X13	Number of informal education facilities (kindergarten to university) per 1,000 population
X14	Distance to the closest education facility (kindergarten to university) (km)
X15	Number of health facilities (hospitals, clinics, health centers, pharmacies) per 1,000 population
X16	Number of medical workers per 1,000 population
X17	Number of places of worship per 1,000 population
X18	Number of non-profit organizations per 1,000 population
X19	Distance to the closest health facility (hospital, clinic, health center, pharmacy) (km)
Environment (k=3)	
X20	Percentage of households living along the river (riparian area) (%)
X21	Percentage of households living in the slum area (%)
X22	Percentage of water bodies per total area (%)
X23	Percentage of forest area per total area (%)
X24	Percentage of plantation area per total area (%)
X25	Percentage of paddy fields per total area (%)
X26	Percentage of other agricultural land per total area (%)

Source: [20] (modified).

The results of the LSI were subsequently analyzed for spatial autocorrelation, both globally and locally, using the GeoDa Software. The global spatial autocorrelation estimation for spatial information can be calculated using global Moran's index method. The Moran Index is a measure of the correlation between observations in an area and other neighboring areas. A positive spatial autocorrelation indicates similar values from locations that are close together and tend to cluster. An autocorrelation negative spatial distribution indicates that adjacent locations have different values and tend to spread [27]. The range of values of the Moran Index is $-1 \leq I \leq 1$, and a value of $-1 \leq I < 0$ indicates a negative spatial correlation, whereas a value of $0 < I \leq 1$ indicates the presence of positive spatial autocorrelation. The Moran's Index Value is zero (0), indicating no autocorrelation and that it tends to be random.

The local Moran's index method, also known as the local indicator of spatial autocorrelation (LISA) approach, can be used to evaluate local spatial autocorrelation in spatial data [28]. A positive spatial autocorrelation occurs when a high value correlates with a high neighbor or a low value correlates with a low neighbor. Negative spatial autocorrelation occurs when high values correlate with low neighbors or low values correlate with high neighbors [28]. Identifying the relationship or spatial association of LSI is also important because there is a spatial interdependency between locations at the local level [19,20,29]. The relationships between a local observation location and another observation location were determined using LISA. There are several ways to calculate spatial autocorrelation using the local Moran's index [30].

$$I_i = \frac{yi - \bar{y}}{std} \sum_j W_{ij} \frac{yj - \bar{y}}{std} \quad (3)$$

Where:

I_i : LISA Index

y_j : value at j-locations

std : standard deviations value

w_{ij} : spatial weighted matrix

y_i : value at i-locations

Results

The FA produced the LSI to demonstrate sustainability performance in each village and dimension. There were 26 variables in the 74 villages grouped by three dimensions: economy (LSI1), social (LSI2), and environment (LSI3). The distributions of LSI1, LSI2, and LS3 are shown in Figure 2. The color gradation shows that a dark color indicates a village with a high sustainability index value. Black circles on the maps focus on villages in the Palabuhanratu Sub-district. The Palabuhanratu Sub-district is the capital of the Sukabumi Regency and the leading tourist center in the CPUGG.

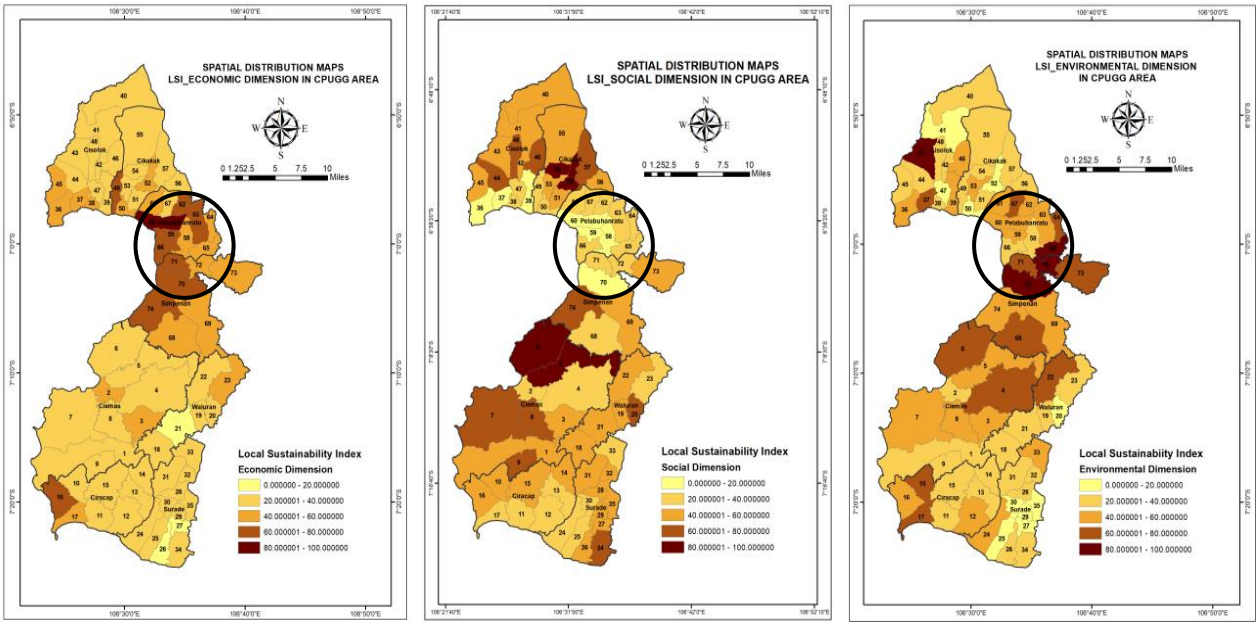

Figure 2. Spatial distribution maps; (a) LSI1, (b) LSI2, (c) LSI3.

The villages with high LSI1 values are located in the Palabuhanratu Sub-district (in the black circle area). The Palabuhanratu Sub-district is the capital of the Sukabumi Regency. This area is a strategic and developing economic area compared with other regions. The number of infrastructure and economic facilities in the area is greater than in other areas because the Palabuhanratu Sub-district is one of the main points of the CPUGG tourism area. Compared to LSI2 (social dimension), the villages surrounding the Palabuhanratu Sub-district have a low LSI value, with the fewest formal education institutions. Villages with high LSI2 values were located outside the district capital. Education is a concern because it has a positive effect on sustainable tourism. LSI3 is LSI in the environmental dimension. The villages in the Palabuhanratu Sub-district have a high LSI3 value, with visible stretches of rice fields and farmland. Based on the results, the villages with the highest LSI3 values were generally concentrated in villages with large forests, plantations, and farmland.

In this study, we employed spatial autocorrelation analysis using the global and local Moran index / LISA to analyze the spatial distribution pattern of LSI in the CPUGG area. The results of global Moran's index analysis are shown in Figure 3. Based on the analysis, LSI1, LSI2, and LSI3 are 0.476, 0.279, and 0.269 of the Global Moran's I, respectively, which shows that the spatial distribution patterns of LSI1, LSI2, and LSI3 are clustered.

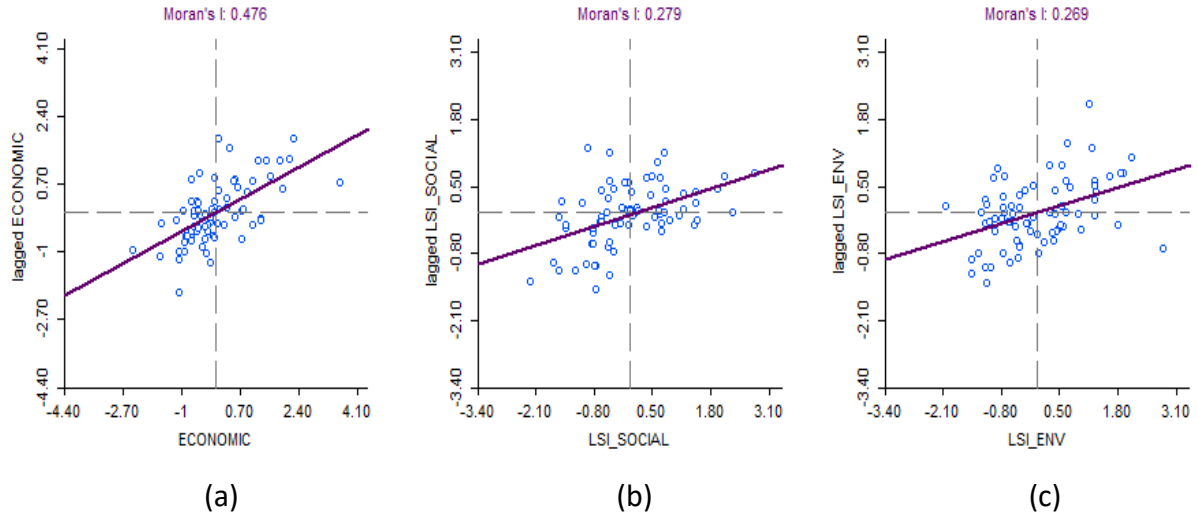

Figure 3. Global Moran Index of (a) LSI1, (b) LSI2, and (c) LSI3.

In this study, we used GeoDA software to identify the spatial distribution pattern of the LSI using the Local Moran Index. The spatial distribution pattern of LSI appears when the spatial association (SA) of its data is positive (High-High or Low-Low type) or negative (High-Low or Low-High type). A positive SA occurs when a high value correlates with a high neighbor, or a low value correlates with a low neighbor. The results are shown in Figure 4.

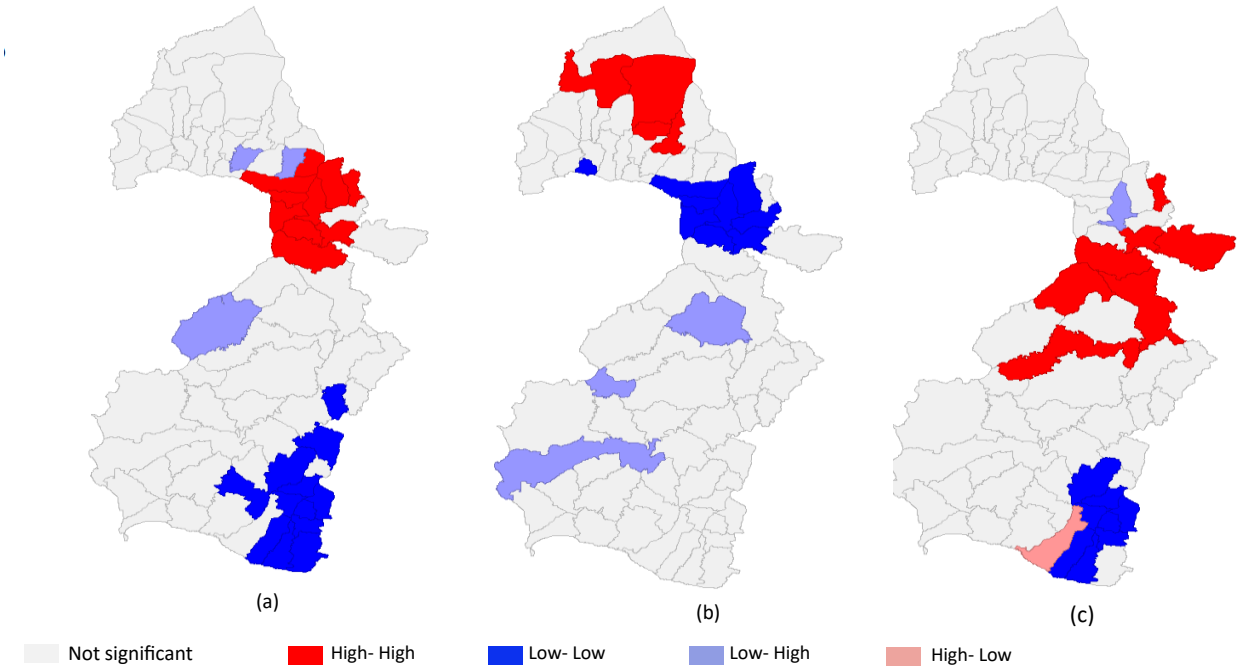

Figure 4. Local Moran Index (a) LSI1, (b) LSI2, and (c) LSI3.

The LISA analysis results in Figure 4 show that the LSI values in the economic dimension have a positive spatial autocorrelation (high-high), specifically in the village around the district capital of the Sukabumi Regency (Palabuhanratu Sub-district). Palabuhanratu is the leading tourist centre in CPUGG, with the highest concentration of tourism and hospitality facilities and infrastructure. This HH-type value indicates that the LSI1 value in the village is high and surrounded by villages with high LSI1 values. Compared to LSI2 (social dimension), the villages surrounding the Palabuhanratu Sub-district have a positive spatial autocorrelation (low-low). This LL-type value indicates that the LSI2 value in the village is low and surrounded by villages with low LSI2 values. Villages in this area have a lower number of social facilities compared to other villages. The LSI3 values in the villages surrounding the Palabuhanratu Sub-district had a positive spatial autocorrelation (high-high). This HH-type value indicates that the LSI3 value in the village is high and surrounded by villages with high LSI3 values. LH-type village have more potential to increase their sustainability index compared to villages with HL-type. Villages with a low sustainability index can be encouraged and influenced by villages with a high sustainability index around them.

Discussion

Based on the Local Sustainability Index analysis, the villages surrounding the Palabuhanratu Sub-District have a high economic and environmental sustainability index but a low social sustainability index. The high number of economic facilities in the main points of the CPUGG tourism area is essential because it can accelerate economic circulation, increase and equalize the actors' income, create job opportunities, and increase business opportunities or job diversification [31]. Unfortunately, the number of formal education surrounding the Palabuhanratu Sub-district is low. So, increasing the number of educational facilities in the area is essential. However, education is a concern because it positively affects sustainable tourism. Education is necessary because it can produce high-quality human resources and has good knowledge and understanding of sustainable tourism [32]. The high quality of the local community has become an essential component of sustainable tourism because local communities play a crucial role in developing tourist villages as they depend on their level of acceptance and support [33,34].

This study employed spatial autocorrelation analysis using the global and local Moran index / LISA. The results show that the spatial distribution pattern of the local sustainability index in economic, social, and environmental are clustered. Each clustering shows that each village influences the surrounding villages. The results align with the spatial distribution of LSI discussed previously [29]. However, using the local Moran index analysis, we can find how the spatial association of LSI in the CPUGG is more specific and more clearly defined because the sustainability index in a particular location is affected by the sustainability condition in its surrounding areas [29]. Overall, the CPUGG development is not evenly distributed yet. So, increasing the economic, social, and environmental sustainability index in several villages with a low sustainability index is necessary. Good cooperation is needed between the government, society, and several stakeholders to create sustainable CPUGG development for the present and future.

An interesting finding in this research is that the environmental sustainability index in the surrounding Palabuhanratu Sub-district is high. Economic growth in the region does not interfere with environmental sustainability. The extensive forests, plantations, and farmland are beneficial because they provide landscape services essential for ecosystem survival [35]. A sustainable environment can be seen in the region's preserved vegetation while the economic and social sectors are growing. Sustainability is the concept of development that improves the well-being of people (people and interests) without harming the environment (earth) and supports the lives of future generations [36]. This phenomenon differs from previous research [20], which shows a trade-off between economic and environmental dimensions. The statement in their research states that economic development will be able to increase the growth of a region very well, but this also has negative impacts, one of which is the high demand for land. However, this research shows that economic progress in the Palabuhanratu area, a tourist center, still maintains the environment well.

The analysis of local sustainability index in this study can be used not only for tourist areas. However, it can also be used to see the local sustainability index in other areas, both urban and rural because the methods and variables used are very adaptive, so they can be adjusted to certain regional / local conditions. This study calculates the local sustainability index based on village potential data without considering its status or condition; it would be better if, in the future, the calculation of the number of economic and social facilities is carried out, taking into account the feasibility conditions of the facilities. So that the study results will be more precise and government recommendations or policies will be more appropriate.

Conclusions

This study detected the sustainability performance in the CPUGG area at the local and village levels. Thus, we assessed the differences in each village's economic, social, and environmental conditions in the CPUGG area. The LSI in the CPUGG area was still not evenly distributed based on the results of the global and local Moran index analyses. The spatial autocorrelation results show that based on the global Moran index, the spatial distribution patterns of LSI1, LSI2, and LSI3 are clustered. The local Moran index shows that spatial interdependency of local sustainability performance exists between local-scale spatial units and that the sustainability state of the surrounding areas influences the LSI of a village. An interesting finding of this research is that the villages around Palabuhanratu, which have a high economic index, have a high environmental index value compared to other villages. This shows that economic progress in the Palabuhanratu area, a tourist center, is carried out while still paying attention to environmental aspects.

Author Contributions

SS: Conception, and Design of study, Acquisition of data, Analysis and/or interpretation of data, Drafting the manuscript, Critical review - revision; **IS**: Analysis - Interpretation of data, Critical review - revision; **ES**: Analysis - Interpretation of data, Critical review - revision; and **AEP**: Conception, Design of study, Analysis - Interpretation of data, Critical review - revision.

Conflicts of Interest

There are no conflicts to declare.

Acknowledgements

The authors are sincerely grateful to IPB University and Kyoto University for supporting the research in the Double Master's Degree Program and would like to thank the BAPPEDA Sukabumi regency for providing the data.

References

1. Yakti, S.W.; Sriwana, I.K.; Rumanti, A.A. System Dynamics Modelling for Tourism Carrying Capacity in Saba Budaya Baduy. *Jurnal Kepariwisataan Indonesia: Jurnal Penelitian dan Pengembangan Kepariwisataan Indonesia* **2024**, *18*, 17–40, doi:10.47608/jki.v18i12024.17-40.
2. Fauzi, A.; Oxtavianus, A. Pengukuran Pembangunan Berkelanjutan di Indonesia. *Jurnal Sosial dan Pembangunan* **2014,** *30,* 42–52, doi:10.29313/mimbar.v30i1.445.
3. Klarin, T. The Concept of Sustainable Development: From Its Beginning to the Contemporary Issues. *Zagreb International Review of Economics and Business* **2018**, *21*, 67–94, doi:10.2478/zireb-2018-0005.
4. Noor, A.A.; Pratiwi, D.R. Konsep Pengembangan Pariwisata Berkelanjutan Di Kampung Buyut Cipageran (Kabuci) Kota Cimahi. Proceeding of The 7th Indsutrial Research and National Seminar, Politeknik Negeri Bandung, Indonesia, 28 July 2016; pp. 178–183.
5. Haribudiman, I.; Berliandaldo, M.; Wijaya, A.; Fasa, H.; Pariwisata, K.; Kreatif, E.; Pariwisata, B.; Letjen, J. Implications of The Role of Tourism Carrying Capacity In The Development of Sustainable Tourism Destinations. *Jurnal Penelitian dan Pengembangan Kepariwisataan Indonesia* **2023**, 17, 272–292, doi:10.47608/jki.v17i22023.272-292.
6. BAPPEDA (Badan Perencanaan Pembangunan Daerah) Kabupaten Sukabumi. *Pengembangan Ciletuh Palabuhanratu Unesco Global Geopark Sebagai Destinasi Wisata Berkelas Dunia*; BAPPEDA Kabupaten Sukabumi: Sukabumi, ID, 2017;
7. Han, J.; Wu, F.; Tian, M.; Li, W. From Geopark to Sustainable Development: Heritage Conservation and Geotourism Promotion in the Huangshan UNESCO Global Geopark (China). *Geoheritage* **2018**, *10*, 79–91, doi:10.1007/s12371-017-0227-2.
8. Holden, E.; Linnerud, K.; Banister, D. Sustainable Development: Our Common Future Revisited. *Global Environmental Change* **2014**, *26*, 130–139, doi:10.1016/j.gloenvcha.2014.04.006.
9. Wall, G. Beyond Sustainable Development. *Tourism Recreation Research* **2018**, *43*, 390–399, doi:10.1080/02508281.2018.1475880.
10. Barbier, E.B. The Concept of Sustainable Economic Development. *Environ Conserv* **1987**, *14*, 101–110, doi:10.1017/S0376892900011449.
11. Mensah, J. Sustainable Development: Meaning, History, Principles, Pillars, and Implications for Human Action: Literature Review. *Cogent Soc Sci* **2019**, *5*, 1653531, doi:10.1080/23311886.2019.1653531.
12. Asara, V.; Otero, I.; Demaria, F.; Corbera, E. Socially Sustainable Degrowth as a Social–Ecological Transformation: Repoliticizing Sustainability. *Sustain Sci.* **2015**, *10*, 375–384.
13. Pérez-Gladish, B.; Ferreira, F.A.F.; Zopounidis, C. MCDM/A Studies for Economic Development, Social Cohesion and Environmental Sustainability: Introduction. *International Journal of Sustainable Development and World Ecology* **2021**, *28*, 1–3, doi:10.1080/13504509.2020.1821257.
14. Haenn, N.; Wilk, R.; Harnish, A. *The Environment in Anthropology (Second Edition): A Reader in Ecology, Culture, and Sustainable Living*, 2nd ed.; NYU Press: New York City, USA, 2016; ISBN 978-147-987-676-1.
15. Emas, R. The Concept of Sustainable Development: Definition and Defining Principles. 2015. Available online: https://sdgs.un.org/documents/brief-gsdr-2015-concept-sustainable-d-20603 (accessed on 17 March 2024).
16. Schaltegger, S.; Hansen, E.G.; Lüdeke-Freund, F. Business Models for Sustainability: Origins, Present Research, and Future Avenues. *Organ. Environ.* **2016**, *29*, 3–10.
17. Kwatra, S.; Kumar, A.; Sharma, P. A Critical Review of Studies Related to Construction and Computation of Sustainable Development Indices. *Ecol. Indic.* **2020**, *112*, 106061.

18. Berardi, U. Sustainability Assessment of Urban Communities through Rating Systems. *Environ. Dev. Sustain.* **2013**, *15*, 1573–1591, doi:10.1007/s10668-013-9462-0.
19. Pravitasari, A.E.; Rustiadi, E.; Singer, J.; Fuadina, L.N. Developing Local Sustainability Index (LSI) at Village Level in Jambi Province. International Proceedings of 8th Rural Research and Planning Group International Conference, Indonesia, 16–17 May 2018.
20. Pravitasari, A.E.; Rustiadi, E.; Mulya, S.P.; Fuadina, L.N. Developing Regional Sustainability Index as a New Approach for Evaluating Sustainability Performance in Indonesia. *Environment and Ecology Research* **2018**, *6*, 157–168, doi:10.13189/eer.2018.060303.
21. Yudha, E.P.; Juanda, B.; Kolopaking, L.M.; Kinseng, R.A. Rural Development Policy and Strategy in the Rural Autonomy Era. Case Study of Pandeglang Regency-Indonesia. *Human Geogr.* **2020**, *14*, 125–147, doi:10.5719/hgeo.2020.141.8.
22. Rustiadi, E.; Pribadi, D.O.; Pravitasari, A.E.; Indraprahasta, G.S.; Iman, L.S. *Urban Development Challenges, Risks and Resilience in Asian Mega Cities*; Springer: Japan, 2015; pp. 421–335, doi:10.1007/978-4-431-55043-3_22.
23. Pravitasari, A.E.; Rustiadi, E.; Priatama, R.A.; Murtadho, A.; Kurnia, A.A.; Mulya, S.P.; Saizen, I.; Widodo, C.E.; Wulandari, S. Spatiotemporal Distribution Patterns and Local Driving Factors of Regional Development in Java. *ISPRS Int J Geoinf* **2021**, *10*, 1–13, doi:10.3390/ijgi10120812.
24. Pravitasari, A.E.; Rustiadi, E.; Mulya, S.P.; Widodo, C.E.; Indraprahasta, G.S.; Fuadina, L.N.; Karyati, N.E.; Murtadho, A. Measuring urban and regional sustainability performance in java: a comparison study between 6 metropolitan areas. *IOP Conference Series: Earth and Environmental Science* **2020**, *556*, 012004.
25. Rustiadi, E.; Pravitasari, A.E.; Setiawan, Y.; Mulya, S.P.; Pribadi, D.O.; Tsutsumida, N. Impact of Continuous Jakarta Megacity Urban Expansion on the Formation of the Jakarta-Bandung Conurbation over the Rice Farm Regions. *Cities* **2021**, *111*, 103000, doi:10.1016/j.cities.2020.103000.
26. Asra, A.; Utomo, A.P.; Asikin, M.; Pusponegoro, N.H. *Analisis Multivariabel: Suatu Pengantar*; In Media: Bogor,ID, 2017; ISBN 978-602-6469-09-0.
27. Dubé, J.; Legros, D. *Spatial Econometrics Using Microdata*; John Wiley & Sons, Inc.: Great Britain and the United States, 2014; ISBN 978-1-119-00876-7.
28. Anselin, L. An Introduction to Spatial Data Science with GeoDa. 2023. Available online: https://lanselin.github.io/introbook_vol1/CHglobalsa.html (accessed on 17 March 2024).
29. Pravitasari, A.E.; Saizen, I.; Rustiadi, E. Towards Resilience of Jabodetabek Megacity: Developing Local Sustainability Index with Considering Local Spatial Interdependency. *International Journal of Sustainable Future for Human Security* **2016**, *4*, 27–34, doi:10.24910/jsustain/4.1/2734.
30. Wong, D.W.S.; Lee, J. *Statistical Analysis of Geographic Information with ArcView GIS and ArcGIS*; John Wiley & Sons, Inc.: Great Britain and the United States, 2005; ISBN 978-0-471-46899-8.
31. Pratt, S. The Economic Impact of Tourism in SIDS. *Ann. Tour. Res.* **2015**, *52*, 148–160, doi:10.1016/j.annals.2015.03.005.
32. Pajriah, S. Peran Sumber Daya Manusia Dalam Pengembangan Pariwisata Budaya Di Kabupaten Ciamis. *Jurnal Artefak* **2018**, *5*, 25–34, doi:10.25157/ja.v5i1.1913.
33. Nazura, P.; Akbar, G.; Safira, A.M. Monitoring Evaluation Analysis of Tourist Village Development: A Case of Kemiren, Banyuwangi. *Jurnal Kepariwisataan Indonesia* **2023**, *17*, 12–22.
34. Martitah, M; Sumarto, S; Yudhanti, R; and Prabowo, M.S. 2022. Legal Aspects in the Development of Tourism Villages in Wonogiri Regency Based on Local Wisdom. *Indonesian Journal of Legal Community Engagement* **2022**, *5*, 275–203, doi:https://doi.org/10.15294/jphi.v5i2.58176.
35. Firnawati; Kaswanto, R.L.; Sjaf, S. Participatory Mapping of the Potential Landscape Services of Forest Village Area in Pattaneteang, Bantaeng Regency. *Jurnal Pengelolaan Sumberdaya Alam dan Lingkungan* **2021**, *11*, 189–203, doi:10.29244/jpsl.11.2.189-203.
36. Alisjahbana, A.S.; Murniningtyas, E. Tujuan Pembangunan Berkelanjutan di Indonesia: Konsep, Target dan Strategi Implementasi; UNPAD Press: Bandung, ID, 2018; ISBN 9786024393137.