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# Analyzing Farmers' Engagement with Sustainable Agricultural Policies: Insights from Indonesia's LP2B Initiatives

Dewi Gafuraningtyas, Hafid Setiadi, Masita Dwi Mandini Manessa

Department of Geography, Faculty of Mathematics and Natural Science, University of Indonesia, Depok, 16424, Indonesia

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## ABSTRACT

The agricultural sector in Indonesia is experiencing a growing trend of converting land for non-agricultural purposes owing to economic and demographic growth. The government implemented Law No. 41 of 2009, which specifically addresses *Perlindungan Lahan Pertanian Pangan Berkelanjutan* (PLP2B). Sukabumi Regency in West Java proactively addressed the issue by implementing Regional Regulation Number 08 of 2014, specifically designed to manage *Lahan Pertanian Pangan Berkelanjutan* (LP2B). This study aims to analyze farmers' responses to the implementation of LP2B in seven villages in the Sukabumi Regency. Information was collected through interviews with the 36 farmers. These farmers were divided into six clusters based on the distribution of LP2B. The cluster assignment was chosen based on the close physical proximity of the places. Farmers were selected randomly in rice field locations during the researcher's field visits to the LP2B site. Subsequently, the data were subjected to descriptive analyses. The findings indicate that farmers residing in lowland regions near densely populated areas frequently engage in sharecropping arrangements and have a poor comprehension of LP2B. Conversely, farmers residing in distant highland areas exhibited a superior understanding. The specific physiographic characteristics of the area and the existence of farmer groups shaped the variation in knowledge. To improve future implementation, policymakers should ensure uniform distribution of policies throughout all regions and strengthen farmer groups. This strategic approach not only promotes awareness, but also fosters sustainable agricultural practices, ensuring the effectiveness of LP2B in preserving Indonesia's agricultural landscape.

## Introduction

Food security is being discussed in every country. This is the second goal of the Sustainable Development Goals (SDGs), aimed at eradicating hunger, achieving food security, and improving nutrition by 2030 on a global scale [1]. However, disruptions in the system, such as earthquakes [2], COVID-19 pandemic [3], and population explosions [4], often lead to significant challenges in maintaining food security. Urbanization and demographic changes, notably in developing countries, present unprecedented challenges related to hunger, food insecurity, and malnutrition [4]. The increasing global population has caused changes in land use [5]. Changes in land use depend on anthropogenic activities aimed at meeting human needs, which in turn significantly impact food production due to the decline in agricultural land [6]. It is crucial to comprehend the fundamental technological, institutional, and economic factors that contribute to changes in land use and how these factors manifest differently within diverse environmental, socioeconomic, and cultural settings [7]. The complexities surrounding land use highlight the ongoing challenges and implications associated with evolving patterns of global land utilization.

**Corresponding Author:** Dewi Gafuraningtyas dewigafura@gmail.com Department of Geography, Faculty of Mathematics and Natural Science, University of Indonesia, Depok, Indonesia.

The need for built-up areas ultimately reduces the availability of other land use types. The demand for land due to population expansion, urbanization, and industrialization has particularly adverse effects on agriculture [8], especially in developing countries, such as Africa and Asia, where agriculture holds significant importance in the economy [4]. Many developing countries, especially those located in Southeast Asia, depend heavily on the agricultural industry as a fundamental pillar of their economies. The agricultural sector in Thailand has long been recognized as a crucial driver of development, historically playing a pivotal role in the nation's economy [9]. In Malaysia, the agricultural sector continues to play a significant role in the country's economy, contributing nearly 16% of employment, and is a notable factor in the national GDP [10]. With abundant natural resources spanning varied topography and ecological zones within its 676,575 $km^2$ land area, Myanmar's agriculture sector becomes pivotal for driving economic growth and providing a primary income source for most of its population [11].

This rapid transformation of agricultural land is fundamentally tied to development planning that prioritizes economic growth and infrastructure, often neglecting essential considerations for preserving vital agricultural areas, particularly fertile expanses dedicated to agricultural cultivation [12]. This skewed focus on developmental priorities has led to a significant decline in agricultural land ownership, exemplified by a drastic decrease to only 0.89 hectares per household in 2013 [13]. Concurrently, the global challenge of land degradation compounds is impacting diverse terrestrial biomes and agroecologies in both low-income and highly industrialized countries [14]. This widespread problem affects an estimated 1.5 billion people and encompasses a quarter of the total land area in all agroecological zones worldwide [15]. Annually, approximately 5 to 8 million hectares of previously productive land fall out of global cultivation due to degradation [16]. Therefore, emphasizing the critical importance of sustainable land use and soil protection is crucial not only for agricultural productivity, but also for addressing broader concerns related to food security, climate resilience, and human well-being [17]. Despite this urgency, the current imbalance in developmental priorities persists, highlighting the need to rectify this trajectory and promote harmonious integration of economic growth with sustainable land management practices.

Furthermore, this diminishment intensifies in specific regions, such as Java, where ownership drops even further to less than 0.5 hectares [18]. Given the prevailing farming technology in developing nations such as Indonesia, where the emphasis is more on extension than intensification or advanced technology, land plays a crucial role in rice production [19]. However, Indonesia faces a considerable challenge concerning the conversion of agricultural land, marked by an estimated annual decline of 120 thousand hectares (ha) in paddy field areas, as reported by the Ministry of Agriculture [20]. To safeguard the future of agricultural sustainability and food security in Indonesia, a holistic approach that addresses both economic development and responsible land-use practices is imperative.

To suppress the conversion of agricultural land, particularly food crops, the government enacted Law Number 41 of 2009, known as the *Perlindungan Lahan Pertanian Pangan Berkelanjutan* (PLP2B) meaning the Protection of Sustainable Food Agricultural Land. This law aims to reduce the high conversion rate of paddy fields and preserve their ecological function [21]. Policy plays a crucial role in land protection, particularly in rural areas, and serves to identify and designate locations for agricultural purposes [22]. Aligned with the Central Government's support for National Food Security, every region, whether regency or city, is required to maintain and preserve productive agricultural land [23]. According to data from the Ministry of Agriculture [20], 112 of Indonesia's 514 districts and cities have adopted regional legislation on manage *Lahan Pertanian Pangan Berkelanjutan* (LP2B), meaning Sustainable Food Agricultural Land, accounting for approximately 21% of the total land. Pelabuhan Ratu District within Sukabumi Regency is one of the Indonesian districts where rice field areas have recently decreased.

According to research conducted by Putra and Akbar [24], the paddy fields in Pelabuhan Ratu District measured 1,100.41 ha in 2002, decreased to 1,023.71 ha in 2010, and further declined to 891.69 ha by 2017. This reduction contrasted with the expansion of built-up areas during the same period, indicating an annual increase in the conversion of rice fields into developed areas. Consequently, the designation of LP2B has emerged as an urgent concern addressed by the Regional Government of Sukabumi Regency. The Regional Regulation related to LP2B is Regional Regulation Number 8 of 2014, which focuses on the Determination of Sustainable Food Farming Land. As per *Rencana Tata Ruang Wilayah* (RTRW), meaning the Local Spatial Plan of Sukabumi Regency for 2012–2032, defined in Regional Regulation 22 of 2012, the designated LP2B area in the Sukabumi Regency covers 64,077 ha. However, the available data on the determined LP2B area are still presented in a tabular format, and the relevant agencies are still implementing the determination to achieve

the set target. The determination of LP2B, based on the 2016–2019 village regulations in the Sukabumi Regency recommended by the Department of Agriculture, suggests an area of 13,185.92 ha.

Several critical matters of concern in this policy include: 1) criteria for designating land as LP2B, requiring approval from the landowner and/or workers through consensus deliberation; 2) administrative penalties or even criminal punishment for individuals or corporations (business entities) converting agricultural land to non-agricultural use (excluding public use) or engaging in land abandonment; and 3) farmers adhering to maintaining agricultural land without conversion to built-up areas receiving incentives and rewards, subject to further regulation by a Regent's Regulation and adjusted to the regional financial capacity. Hence, the successful implementation of LP2B policy hinges on stakeholder commitment. In line with this, the primary objective of this research is to analyze farmers' responses to the implementation of LP2B in seven villages within the Sukabumi Regency. Farmers constitute a vital segment of various stakeholders in agricultural policy and land-use planning. Their pivotal role stems from being primary landholders, with decisions impacting agricultural sustainability and future food security. Therefore, understanding farmers' perspectives and readiness is pivotal to the effectiveness of agricultural policies, including LP2B.

## Material and Methods

### Study Area

The capital of the Sukabumi Regency is Palabuhanratu District, known as Pelabuhan Ratu District, situated approximately 153 km from the Capital of West Java Province, Bandung City, and approximately 60 km from the City of Sukabumi. Pelabuhan Ratu District comprises ten villages: Jayanti, Pelabuhan Ratu, Citarik, Tonjong, Pasirsuren, Cikadu, Buniwangi, Cimanggu, Cibodas, and Citepus. This research focuses on seven villages within the Pelabuhan Ratu District, excluding Tonjong, Pasirsuren, and Cikadu. Based on the spatial data of LP2B determined by the Department of Agriculture for 2021, the total area of LP2B in Sukabumi Regency is 13,185.92 ha, with the area of Pelabuhan Ratu District covering 168 ha. In this study, the combined area of the seven villages amounts to 120.44 ha (Figure 1).

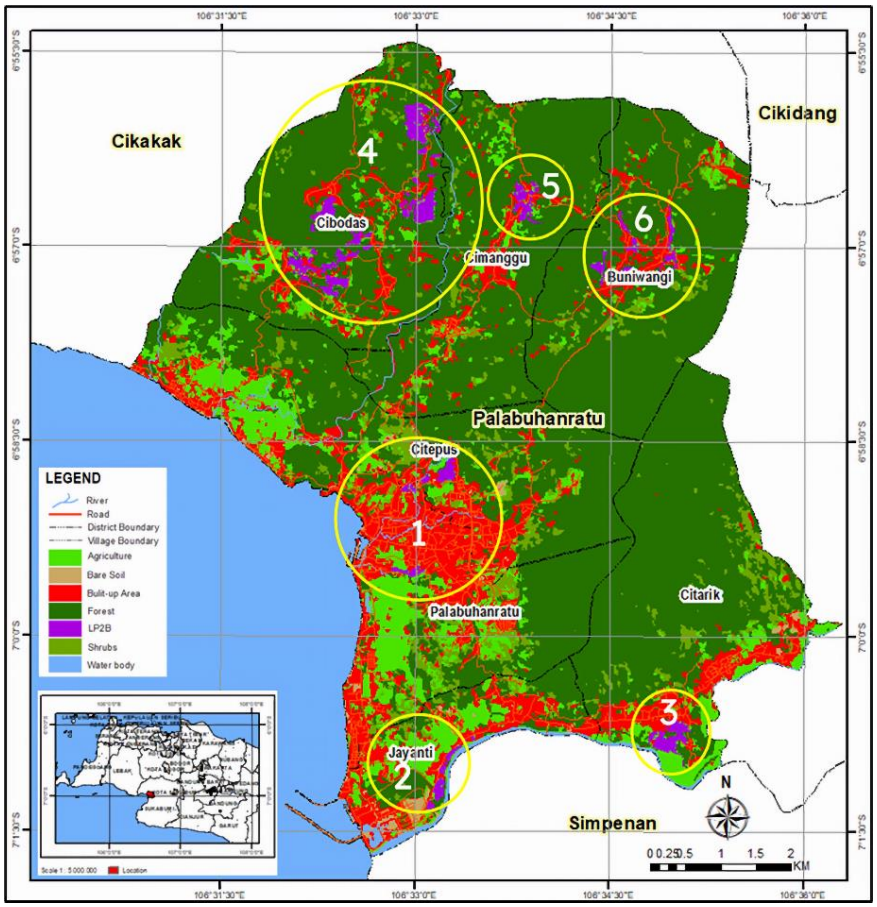


**Figure 1.** Map of the study area.

**Data Collection**

Data collection in this study utilized both primary and secondary data. Secondary data, consisting of LP2B spatial data, were acquired from the Department of Agriculture to identify study locations. The primary data collection process involved the use of semi-structured questions, which provided farmers with the opportunity to offer detailed responses while still being guided by predetermined answer alternatives. The interviews included questions covering various variables, including the understanding of LP2B, assessment of the policy's effectiveness, and farmers' commitment to preserving their agricultural land. These variables were designed to assess farmers' comprehension of the policy and potential resilience of agricultural land in the future. Quota sampling was employed to determine the sample because of the unknown total population of farmers within the clusters of the LP2B areas. The clusters were determined based on the proximity between polygons and the similarity of physiographic conditions, specifically dividing into regions in lowland areas (Jayanti, Pelabuhan Ratu, Citepus, Citarik) and highland areas (Cibodas, Cimanggu, Buniwangi) as depicted in Figure 1. The overall sample for the study consisted of 36 farmers distributed across six clusters, with each cluster comprising six farmers. Each respondent in the study was exclusively engaged in full-time farming and relied on agriculture as their primary means of livelihood. Data collection occurred over one week, from 6 a.m. to 12 p.m., to ensure active participation from farmers during their active work hours in the fields.

**Data Analysis**

The analysis of semi-structured questions involved transcribing, coding, and categorizing responses to understand farmers' views on the LP2B policy. It begins by converting responses into written texts and identifying emerging patterns. Classifying responses into themes allowed for systematic grouping, aiding further analysis. Thematic analysis identifies common patterns and offers a deeper understanding of variations in perspectives. Data grouping facilitates exploration of diverse types of information. The final step involved interpreting the findings to formulate conclusions from various viewpoints. Overall, the analysis of semi-structured questions provides in-depth insights into farmers' diverse perspectives on LP2B policy.

## Results and Discussion

**Results**

To determine the location of LP2B, it is essential to ensure the availability of farmers who are willing to allocate their land for this purpose. Therefore, a critical factor being examined pertains to the level of farmers' knowledge of LP2B and their awareness of their property being employed as LP2B. The interview results with respondents indicated a general categorization of farmers in the study area into two groups: 14% of the respondents demonstrated a clear understanding of LP2B policies, while the remaining 86% lacked awareness about LP2B. Diversity in physiographic conditions and the presence of farmer groups within different locations play a significant role in influencing variations in farmers' knowledge levels. Approximately 40% of the respondents were part of farmer groups, primarily concentrated in highland regions. The farmers in the study area can be classified into three types based on land ownership: landowner farmers, sharecroppers, and tenant farmers (Table 1).

**Table 1.** Farmer's profile.

| No | Characteristics | Description (number of farmers) |
|---|---|---|
| 1 | Sex | Male (30) |
| | | Female (6) |
| 2 | Ages | Productive ages [15 to 64 years old] (29) |
| | | Non productive ages [>64 years old] (7) |
| 3 | Land ownership | Ownership (25) |
| | | Profit sharing (9) |
| | | Rented land (2) |
| 4 | Farmer's Group | Joined Farmer's group (14) |
| | | Not joined Farmer's group (22) |
| 5 | Farmers' awareness of LP2B | Unaware of LP2B (31) |
| | | Aware of LP2B (5) |

Landowner farmers constitute the majority within the study area, accounting for 80% of the respondents. Sharecroppers and tenant farmers, who are more prevalent in lowland regions and densely populated areas, tend to have limited awareness of LP2B policy. By contrast, those residing in remote mountainous areas are predominantly landowners. A noteworthy observation is that some of these landowners are not only aware of LP2B policies but also express a willingness to preserve their agricultural land, preventing its conversion into built-up areas. However, an exception exists in Buniwangi Village (cluster 6, as illustrated in Figure 1), where despite its mountainous location, farmers lack knowledge about the LP2B policy, and the majority of them are unwilling to sustain their agricultural land. This unique situation can be attributed to challenges with water availability and farmers' limited engagement with farmer groups. For a more comprehensive understanding, the subsequent subchapters provide a more detailed description of these conditions.

***LP2B in Lowland Areas (Cluster 1,2,3)***

In lowland areas (with slopes below 15%), there are three distinct clusters of LP2B locations, denoted as Cluster 1, Cluster 2, and Cluster 3. The characteristics of agricultural land within these lowland regions encompass reliance on rainwater as the primary water source, thereby lacking irrigation facilities. These areas exhibit convenient accessibility because of their proximity to main roads and are characterized by densely populated settlements. One respondent from Cluster 2 highlighted that water was extracted from the river during the dry season using a water pump. However, this practice escalated farming production costs owing to the use of diesel to power the equipment. Notably, within this cluster, most farmers function as sharecroppers, whereas landowners are engaged in other sectors and often reside outside the village. In some instances, landowners have residences outside the district. Conversely, farmers in Clusters 1 and 3 adopt a profit-sharing scheme, predominantly sharing rice yields in a 50:50 ratio. This arrangement is feasible because landowners are in the same district and are near paddy fields. The fact that the landowners are located outside the district, however, forces tenant farmers in cluster 2 to operate under a rent-land scheme. This setup requires rental payments through monetary transfers. Notably, some farmers in cluster 2 relied on intermediary loans to cover their farming expenses. These individuals subsequently surrender their rice yields to intermediaries for processing, primarily because of a lack of adequate equipment for rice management, such as drying and storage facilities. Meanwhile, farmers in Clusters 1 and 3 manage their finances autonomously without borrowing money from intermediaries.

According to Regional Regulation Number 08 of 2014 concerning Sustainable Agricultural Land for Food (LP2B), specifically Article 7, Paragraph 4, there are specific criteria for land designation as LP2B. These criteria require obtaining consent from the landowner and/or cultivator through a consensus-based deliberation process, as outlined in the letter (g). However, the outcomes of interviews conducted with farmers in lowland areas revealed that none of the farmers, whether sharecroppers or landowners, possessed any awareness of LP2B. Furthermore, it came to light that they were entirely unaware of their land being categorized as LP2B because of a complete lack of information or communication from relevant institutions, particularly the Department of Agriculture. Consequently, this indicates an evident absence of mutual understanding and agreement from farmers concerning the classification of their land as LP2B.

LP2B policy stipulates that any individual or corporate entity that modifies the functions of agricultural land or abandons it could potentially face administrative or criminal penalties. While the farmers acknowledged the significance of the LP2B policy in upholding Indonesia's food security, every respondent in the study area expressed disagreement with the penalties and punitive measures enforced on the landowners. They contended that agricultural land inherently belongs to farmers, and there could arise circumstances in the future where they might need to vend or convert it into built-up areas. The farmers articulated that such penalties should exclusively pertain to government-owned cultivated land and should not extend to privately owned agricultural land. One of the farmers, Mr. U (63 years old), articulated this sentiment, conveying, "*I disagree. The penalties are extremely stringent. This is personal property, not leased land. If it were cultivated land (government property), sanctions could be deemed appropriate*."

Farmers' participation in preserving their agricultural land plays a pivotal role in determining the success of the LP2B program. As a result, farmers who choose to uphold and refrain from converting their agricultural land will be eligible for incentives, the parameters of which will be established by a Regent's Regulation and aligned with the financial capacity of the region. According to information from the Department of Agriculture in the Sukabumi Regency, the allocation of incentives to farmers is presently a subject of deliberation with the local government. To date, respondents have not benefited from any agricultural aid to support their farming activities, as such assistance is exclusively extended to farmers affiliated with farmer groups. Across

clusters 1, 2, and 3, most farmers were not members of these groups. Should incentives ultimately be introduced, respondents would prefer receiving production inputs (namely seeds, fertilizers, and pesticides) at reduced prices, which would facilitate their agricultural endeavors.

Among the three distinct clusters of lowland areas, cluster 2 emerged as a particularly susceptible zone for land conversion, primarily characterized by factories and warehouses. Intriguingly, one of the polygons designated as LP2B coincides with a section of the warehouse area (Figure 2). The warehouse keeper verified that the land earmarked for future transformation into built-up zones to cater to the requirements of the warehouse itself (Figure 2a) was currently cultivated vacant land (Figure 2b). Insight from tenant farmers reveals that the proprietors of paddy fields within this cluster reside outside the regency (in Jakarta and other locales) and intend to sell their lands. Similarly, land-owning farmers living near paddy field locations are contemplating the sale of their land because of the many offers received (surpassing ten requests) for the construction of factories, warehouses, and other establishments. These farmers await higher offers. The relatively small land area is another factor that influences their choice to not sustain their agricultural land. Many of these farmers possess agricultural plots in remote locales, far from settlements, where they are inclined to conserve for farming purposes.

Likewise, within Cluster 1, the owners of paddy fields have not planned to preserve their agricultural land, as they harbor intentions to bequeath it to their offspring, who reside beyond the confines of the regency. They foresee the potential for land to be converted into residential property or sold. Furthermore, a solitary landowner has contemplated the prospect of selling their land; however, this transaction hinges upon finding a buyer inclined to acquire the entire expanse of land (measuring 2,500 meters). Until now, only individual parcels of land (approximately 200–400 m) have garnered interest.

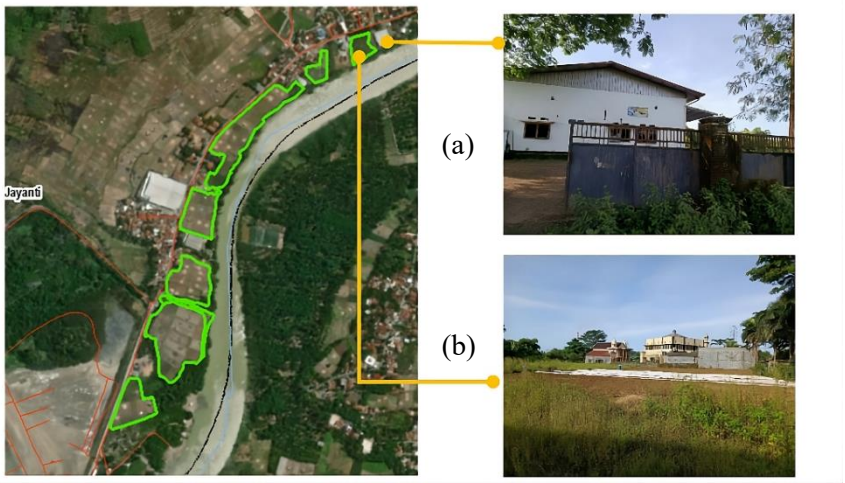


**Figure 2.** One of the LP2B locations in the warehouse area.

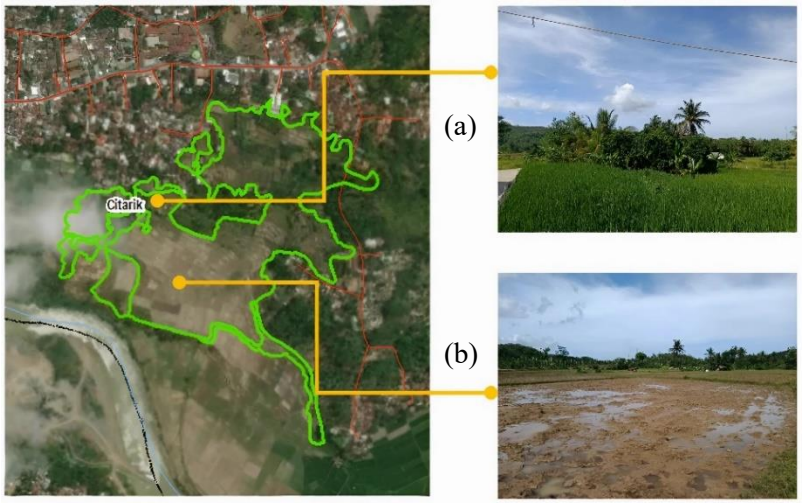


**Figure 3.** LP2B locations in cluster 3.

In contrast to the circumstances observed in Clusters 1 and 2, Cluster 3 presents a distinct scenario wherein certain farmers are inclined to sustain their land's agricultural status for forthcoming years, viewing it as their livelihood. In particular, there are impending road-widening initiatives near paddy fields in the northern part of the polygon (Figure 3a). Many landowners with properties near the road have outlined strategies for transforming their land into residential properties. Nevertheless, in the southern section of the polygon (Figure 3b), which lies far from the road, a significant proportion of farmers have yet to formulate intentions to sell their land, expressing a preference to pass it down to their progeny. Consequently, an escalation in land prices along the road corridor is anticipated, potentially leading to intensified settlements and amplifying the conversion rate of agricultural land into developed zones. Many farmers whose land is close to the road expansion project acknowledge the feasibility of either selling their land or erecting residential structures.

***LP2B in Mountainous Areas (Cluster 4,5)***

The LP2B-designated areas within Clusters 4 and 5 were located in regions characterized by steep slopes. The characteristics of agricultural land within these mountainous terrains are delineated as follows: water provisioning is accomplished through irrigation systems; accessibility to these zones is challenging because of their considerable distance from the main road; and the land is geographically remote from densely populated settlements (Figure 4). In direct contrast to the profiles of farmers in lowland regions, clusters 4 and 5 are notably inhabited by land-owning farmers. Among the respondents, no leased land within this region, and farmers who lack land ownership partake in a profit-sharing arrangement (predominantly in a 50:50 ratio of the rice yield) with the landowner, as these landowners reside within the same village.

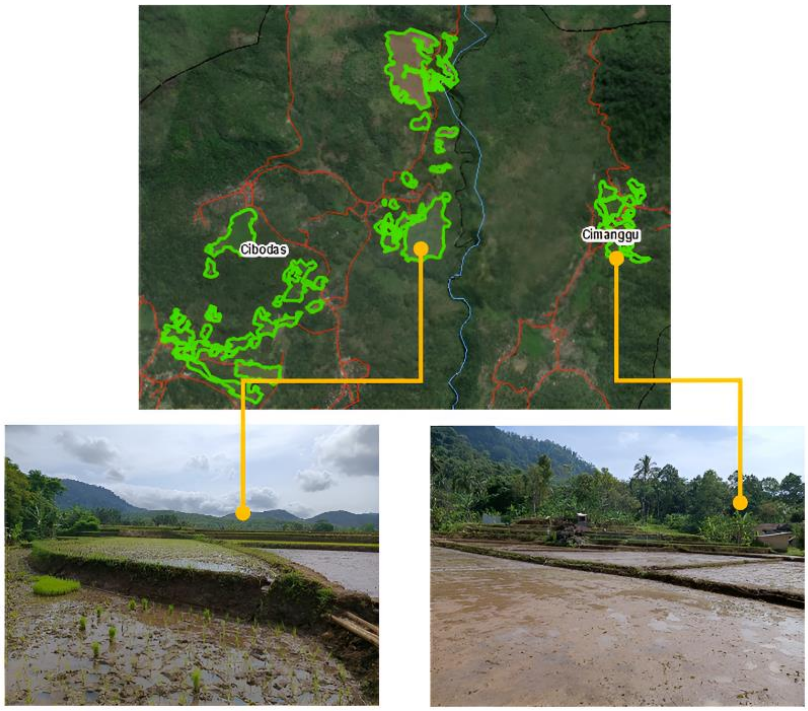


**Figure 4.** LP2B locations in mountanious area (Cibodas and Cimanggu Villages).

In contrast to the lowland areas, some farmers in LP2B locations in the mountainous regions are aware of LP2B, particularly members of farmer groups. Notably, both Cibodas Village (Cluster 4) and Cimanggu Village (Cluster 5) house many active farming groups that are diligently striving to enhance and advance the agricultural endeavors of their members. In this context, some farmers affiliated with farming groups have received assistance from the Department of Agriculture in production facilities, including seeds, fertilizers, pesticides, and tractors. It is important to note that even though this assistance does not fall under the LP2B Regional Regulations list of incentives, the Department of Agriculture still provides it on a regular basis. Moreover, as reported by a respondent who serves as the leader of a farming group in Cibodas Village, the Department of Agriculture has conducted outreach initiatives regarding LP2B. As part of this socialization, the department provided information and guidance to farmers, advising against converting their agricultural land into built-up areas, and stressing the significance of preserving their role in supporting food security and agricultural sustainability in the area.

Some farming groups, nurtured by Agricultural Field Extension Officers (known as *Penyuluh Pertanian Lapang*/PPL), actively participate in Agricultural Schools (*Sekolah Pertanian*) across various locations in Cibodas and Cimanggu Villages. These weekly instructional sessions covered diverse activities, including planting methodologies, the introduction of innovative agricultural techniques (such as the *Legowo* method, an innovative planting approach optimizing spacing), addressing pest management strategies, and covering other pertinent subjects. In addition to providing agricultural training, PPLs actively guide farmers to utilize their land for agricultural purposes, while discouraging any inclination towards converting their land into built-up areas. While some farmer groups underwent comprehensive socialization regarding LP2B, others did not, resulting in disparate awareness among farmers regarding this policy.

According to the information provided by one of the respondents, who was also part of the village staff in Cimanggu Village, during a district-level meeting that convened Village Heads in Sukabumi Regency, an overwhelming majority voiced reservation about the contents of the Regional Regulation, deeming it unduly burdensome. Numerous Village Heads raised objections concerning the penalties and punishments that bound farmers, citing the significant conversion of agricultural land into settlements to meet farmers' needs. Despite concerted socialization efforts, farmers have reported the absence of any written confirmation attesting to their consent for their land to be designated LP2B. Furthermore, farmers highlighted the lack of follow-up pertaining to the implementation of LP2B, including ongoing guidance and the provision of incentives.

In both Cibodas and Cimanggu Villages, settlements have yet to reach a high population density, and substantial forested and shrub-covered expanses persist, as shown in Figure 1. Consequently, the local community prefers to establish new residential areas within forested regions rather than convert their agricultural land, primarily because farming constitutes their principal livelihood. In villages such as Cikurutug and Ciogong (where paddy fields are relatively isolated and distant from main roads), farmers have yet to alter their land into built-up areas. Instead, they intend to pass it down to the future generations. Even during such transfers of land rights, the land continues to be dedicated to agricultural pursuits, and most purchasers hail from settlements encompassing these agricultural regions. Farmers residing near roadways only consider converting their agricultural land for public undertakings, such as road widening. Hence, clusters 4 and 5 demonstrate suitability for designation as LP2B locations, given that farmers within these areas are inclined to sustain their agricultural land use over an extended period.

***LP2B in Mountainous Areas (Cluster 6)***

In Buniwangi Village, the designated LP2B area is near the main road (Figure 5a); however, accessing water for several agricultural lands presents a formidable challenge. The water stored within the village primarily caters to the needs of the settlements, leading some farmers to abandon their agricultural land, leaving it overgrown with shrubs (Figure 5b). Farmers in Buniwangi Village have expressed that local climatic circumstances present considerable challenges for agricultural endeavors, mainly because of their unpredictable nature. Mornings are often characterized by intense heat, whereas afternoons frequently witness abrupt rainfall, culminating in crop damage. Consequently, farmers can only reap their crops on two occasions annually, owing to the suboptimal conditions for paddy cultivation in Buniwangi Village compared to other locations. These farmers frequently resort to implementing intercropping strategies with alternate crops, because of the need for planting intervals. Unlike in other regions, the challenge of harvesting paddy up to three times a year persists within Buniwangi Village.

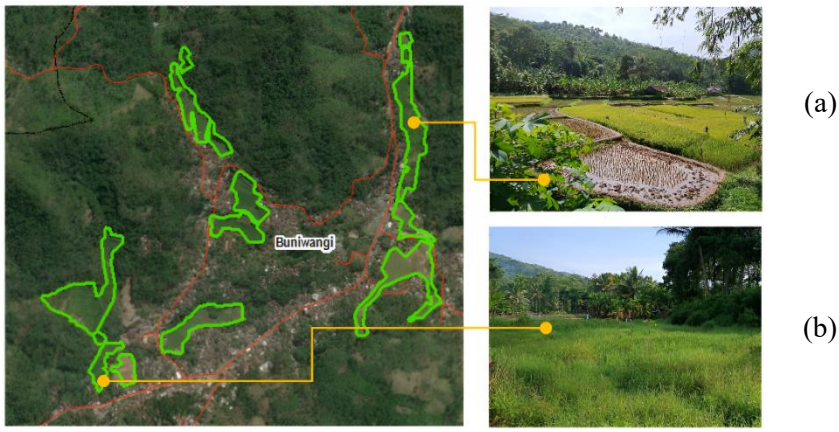


**Figure 5.** (a) Paddy fields near road and (b) location of LP2B which is a shrub area.

Despite being in a mountainous region, Cluster 6 exhibited distinct conditions compared to Clusters 4 and 5. Most farmers in this area are not members of farming groups and remain uninformed about LP2B. In contrast to the lowland areas, farmers in Cluster 6 had not previously received aid for their agricultural production needs. This lack of support has contributed to their hesitance in maintaining agricultural land. Should the scarcity of water for farming intensify, there is a likelihood that farmers will opt to convert their land for construction purposes or sell it. This observation underscores the significant impact of agricultural production assistance on farmers' decisions to sustain farming practices.

**Discussion**

The implementation of LP2B in the Sukabumi Regency, particularly in the Pelabuhan Ratu District, still faces numerous obstacles. One of the most significant challenges regarding this policy is the lack of socialization by relevant agencies for farmers. The findings of this study indicate that only 14% of respondents clearly understood LP2B policies, while a more significant proportion (86%) of respondents lacked comprehension of LP2B. Inopianti's [25] recent investigation found a lack of satisfactory awareness and familiarity among farmers in Sukabumi City concerning LP2B. The study found that a significant majority of the respondents (approximately 73%) lacked knowledge of LP2B. A similar issue occurred in Tasikmalaya, where numerous farmers were unfamiliar with LP2B because of the absence of direct outreach [26]. Interviews with stakeholders in West Java Province also revealed that specific activities for protecting sustainable agricultural land have never been conducted [27]. Despite these challenges, issues related to LP2B have been presented to the public through various outreach events in villages. However, the recurring emphasis on these issues within these contexts suggests that the dissemination of information remains somewhat limited, indicating that top-down communication approaches have not yet achieved comprehensive outreach for both society and farmers. Therefore, addressing these barriers and enhancing communication strategies are pivotal for effectively implementing LP2B and fostering sustainable agricultural practices in the region.

Addressing the issue of farmers' willingness to designate their land as LP2B presents a complex challenge for Indonesia. This reluctance is influenced by several factors, including landowners' strong attachment to the regulations outlined in LP2B policy. A study by Laksana [28] in Tasikmalaya Regency, West Java Province, highlighted a cultural perspective embedded in the region's Sundanese community. The adage, "*sawah dewek kumaha dewek*," which translates to "that my rice field is up to me," reflects a deep-rooted belief among farmers. This sentiment is akin to that in Pelabuhan Ratu District, where many landowners perceive their land as a personal possession, entitling them to exercise discretion over its use. This outlook is intertwined with the concept of land ownership prevalent in Indonesia, in which the state acknowledges and upholds individual rights. Consequently, designating land for LP2B encounters complex challenges, because the thoughts and judgments of landowners are crucial in ensuring the effective execution of LP2B programs. In sharp contrast, China operates under a distinct land tenure system wherein villages collectively own land, facilitating a more streamlined and manageable administrative process [29]. China's collective ownership model reduces the challenges of individual land ownership, leading to cohesive land use planning. This foster organized land administration, enhancing resource efficiency and sustainability. Therefore, the land ownership system plays a crucial role in shaping the dynamics of LP2B implementation in Indonesia.

Land conversion to non-agricultural land in Pelabuhan Ratu is particularly susceptible, especially near roads and rural areas. Current patterns indicate a linear alignment of settlements along transportation routes, resulting in minimal gaps between residential spaces [30]. Modifications in land use within a specific area can intricately affect the surrounding regions. Human activities, tightly interwoven with alterations in land use and changes in land cover, have a profound influence on ecological and environmental transformation [31]. Findings from interviews with farmers across six clusters reveal that neighboring farmers exhibit similar inclinations. Farmers in lowland areas are inclined to sell or convert their land into built-up areas because of the ongoing alterations in the surrounding agricultural landscapes. The proximity of farmland to roads can influence its market demand, potentially enhancing its desirability for sale because road development often leads to agricultural land becoming closely situated in urban and industrial zones [19]. Conversely, farmers in mountainous regions express a desire to safeguard their agricultural lands. This intention stems from the sparser distribution of settlements and the lesser extent of land conversion among fellow farmers.

Globally, agriculture and climate change are linked, and weather patterns play a central role in determining plant growth and agricultural outcomes. Climate change affects agriculture in various ways, affecting crop quantity, quality, water use, and soil health. They also influence land use, pest populations, and organismal competitiveness [10]. In Buniwangi Village (Cluster 6), farmers are willing to maintain their land if they receive agricultural assistance and have convenient access to water. Without such assistance, and as the complexity

of agricultural management increases, farmers may choose to sell or convert their land into built-up areas. The impact of water on agricultural practices is significant, as seen in southern Mediterranean countries, which have a long history of being trapped in a feudal system [8]. This system has emerged because of the combination of land ownership structures and constrained agricultural potential resulting from inadequate water resources. Furthermore, inconsistent and uncertain weather in Buniwangi has led many farmers to stop working in agriculture. This is because changing weather, such as irregular rainfall, long dry periods, and unexpected storms, make it harder to grow crops and increase the risks for farmers. Consequently, they find it difficult to depend only on farming for a living and may look for other jobs or opportunities in more stable industries.

In addition to geographical factors, another critical determinant affecting farmers' choice to retain their agricultural land is the presence of incentives or support systems in agricultural production. Incentives include financial aid, technical guidance, access to modern farming techniques, and market opportunities. The availability of such support plays a crucial role in motivating farmers to continue cultivating their land, as it helps mitigate challenges, enhances productivity, and fosters sustainable agricultural practices. Farmers in the study area who have never received assistance, primarily because of their non-participation in farmer groups, expect incentives to help them manage their agricultural land effectively. A study in the Pandaan Subdistrict, Pasuruan Regency, revealed that most farmers preferred to maintain their agricultural land when given incentives [20]. Another study in Purbaratu District, Tasikmalaya City, reported that 99.51% of farmers would continue to maintain agricultural land if provided with incentives, as this would help reduce their farming costs [32]. These findings underscore the substantial influence of well-structured incentives on farmers' decisions to continue cultivating land, highlighting a potential avenue for promoting and supporting agricultural continuity.

In addition to their influence on the distribution of incentives, farmer groups also play a significant role in enhancing farmers' resilience to safeguarding their land, as these groups facilitate the dissemination of various agricultural programs and knowledge to farmers. Sukayat et al. [33] conducted a study on sustainable agriculture and found that the degree of involvement of farmers in farmer groups is a crucial factor influencing the sustainability of agricultural practices. Our findings reveal that farmers residing in mountainous regions and participating in farming groups are more inclined to preserve their agricultural activities. This is consistent with the research by Makbul et al. [19], who discovered a correlation between farmers' propensity to sell their land and their level of participation in farmer groups. These interlinked research outcomes collectively emphasize the critical role that farmer groups play in shaping farmers' decisions on land preservation and agricultural sustainability.

The implications derived from this study offer a robust evaluative framework for the selection of suitable locations for LP2B. This underscores the notion that the optimal sites are those situated at a significant distance from densely populated areas. Moreover, it accentuates the criticality of bolstering farmer groups, which serve as pivotal facilitators in disseminating a diverse array of agricultural programs and knowledge among the agricultural community. Strengthening these groups not only aids in knowledge dissemination, but also fosters a more cohesive and empowered farming community, ensuring the effective implementation of agricultural strategies for sustainable development. Moreover, beyond providing agricultural training, the pivotal role of PPL extends to actively guiding and encouraging farmers to persist in utilizing their land for agricultural purposes. This guidance serves to dissuade any inclination towards converting their land into developed regions, underlining the crucial role that PPL plays in preserving agricultural activities.

## Conclusion

Agricultural land far from densely populated settlements and main roads, often referred to as isolated locations, is more suitable for designation as LP2B. Farmers in such areas prioritize maintaining their agricultural land because agriculture is the primary source of livelihood for residents. However, agricultural land situated close to densely populated settlements and main roads is highly vulnerable to land conversion and may not be ideal for LP2B locations. Providing assistance and incentives to farmers is crucial to promote the preservation of agricultural land. Such support can significantly enhance farmers' motivation to continue cultivating their agricultural land and dissuade them from selling or converting it into built-up areas. Additionally, ensuring equitable dissemination of the LP2B policy and strengthening farmer groups can further contribute to its successful implementation. This study has several limitations that should be acknowledged. One of these limitations is the small number of respondents included in the sample. The time constraints of this study limited the number of participants involved. It is anticipated that future research will

address this limitation by incorporating a larger number of respondents. Additionally, further studies could delve more deeply into the socioeconomic aspects of farmers for a more comprehensive understanding. By adopting these measures, a more robust framework can be established to safeguard sustainable agricultural land and ensure food security for the future generations.

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