



The Effectiveness of “Local Resource” in Community Development: Socio-ecological Dynamics of Landscape Management for Sustainable Resources of *Cimplung* Raw Materials in Banyumas, Indonesia

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ABSTRACT

Local resources, including raw materials and traditional knowledge, support sustainable development. This study focuses on *Cimplung* snack production in Banyumas, Central Java, Indonesia to explore how socio-ecological approaches enhance landscape management and community livelihoods. The process relies on sap from sugar palm (*Arenga pinnata*) and coconut (*Cocos nucifera*), managed through agricultural zoning: sugar palms are planted on sloped land to conserve water and ensure food security, while coconuts grow in mixed gardens in less irrigated areas. Using local and seasonal ingredients reduces transportation emissions, while sustainable practices like agroforestry and regenerative farming improve soil health and capture carbon. Efforts to minimize food waste through surplus crops and adopt biodegradable packaging further lower environmental impact. This study highlights the potential of local resources to advance sustainability and offers a model for broader application.

Keywords: Brown sugar, *cimplung*, local snack, traditional food, sustainable area management, indigenous knowledge.

INTRODUCTION

Community development is essential to fostering sustainable growth and improving the quality of life in many regions. Indonesia, a country renowned for its rich cultural and ecological diversity, increasingly emphasizes integrating local resources into development initiatives. The term “local resources” encompasses tangible assets, such as raw materials and natural landscapes, and intangible elements, such as traditional knowledge, cultural practices, and community networks (Wahyuningsih & Husnah, 2018). However, the effectiveness of this concept in fostering sustainable community development requires further investigation, particularly concerning socio-ecological dynamics.

Banyumas Regency is an area in Central Java that is an in-depth case study to examine these dynamics (Purwoko, 2016). This area is known for its traditional production of *Cimplung*, a unique food product deeply embedded in local culture and relies on sustainable natural landscape management. The raw materials for *Cimplung* come from local agricultural and forest resources, illustrating the complex interactions between ecological systems and community livelihoods (Ferdinanda et al., 2022). This study aimed to explore the socio-ecological dynamics involved in the management of these resources and to assess how the term “local resources” influences community development outcomes in Banyumas.

This paper investigated the effectiveness of “local resources” as a conceptual and practical tool for promoting sustainable development in Indonesia. Specifically, it examines how this terminology facilitates the integration of socio-ecological considerations into landscape management practices and community development strategies. Examining the *Cimplung* production process highlights the challenges and opportunities that arise from utilizing local resources to achieve sustainability goals.

The findings aimed to enhance our understanding of the role of local resource management in addressing broader socio-ecological challenges, fostering resilience, and promoting sustainable community development. Ultimately, it seeks to inform policymakers, practitioners, and academics about the implications of applying a “local resources” perspective to community-driven initiatives across Indonesia and beyond.

METHODS

This study was conducted observationally across five districts in Banyumas Regency, Central Java, Indonesia: Pekuncen, Ajibarang, Cilongok, Karanglewas, and Baturaden. The research comprised of two phases: an initial survey conducted in April 2024 and structured interviews in October 2024. A dual exploratory and descriptive approach was applied to analyze specific problems and gather field evidence comprehensively (Rizvi & Nabi, 2021).

The exploratory phase included literature reviews and initial surveys to identify key issues and contextual variables. Meanwhile, the descriptive phase involved structured interviews with key respondents, selected purposefully using the Snowball sampling technique (Etikan et al., 2015). Each district had one to three respondent groups, with five to thirteen participants totaling 70 respondents (see Table 1).

Table 1. Number of respondents in each district in each layer of snowball sampling

District	Number of groups	Number of layers	Number of respondents per layer
Pekuncen	1	2	Group 1, Layer 1, n = 2 Group 1, Layer 2, n = 3 Subtotal n = 5
Ajibarang	1	3	Group 1, Layer 1, n = 1 Group 1, Layer 2, n = 2 Group 1, Layer 3, n = 4 Subtotal n = 7
Cilongok	3	4	Group 1, Layer 1, n = 2 Group 1, Layer 2, n = 4 Group 1, Layer 3, n = 6 Group 1, Layer 4, n = 0 Subtotal n = 12 Group 2, Layer 1, n = 1 Group 2, Layer 2, n = 3 Group 2, Layer 3, n = 6 Group 2, Layer 4, n = 3 Subtotal n = 13 Group 3, Layer 1, n = 1 Group 3, Layer 2, n = 2 Group 3, Layer 3, n = 4 Group 3, Layer 4, n = 1 Subtotal n = 8

Karanglewas	2	4	Group 1, Layer 1, n = 1 Group 1, Layer 2, n = 3 Group 1, Layer 3, n = 4 Group 1, Layer 4, n = 1 Subtotal n = 9
Baturraden	1	3	Group 2, Layer 1, n = 2 Group 2, Layer 2, n = 4 Group 2, Layer 3, n = 5 Group 2, Layer 4, n = 0 Subtotal n = 11
Total of respondents			N=70

To ensure the depth and accuracy of data collection, four trained surveyors facilitated the interviews, using probing techniques to elicit detailed and nuanced responses from participants. The Snowball sampling process that guided the recruitment and expansion of respondents is illustrated in Figure 1 below.

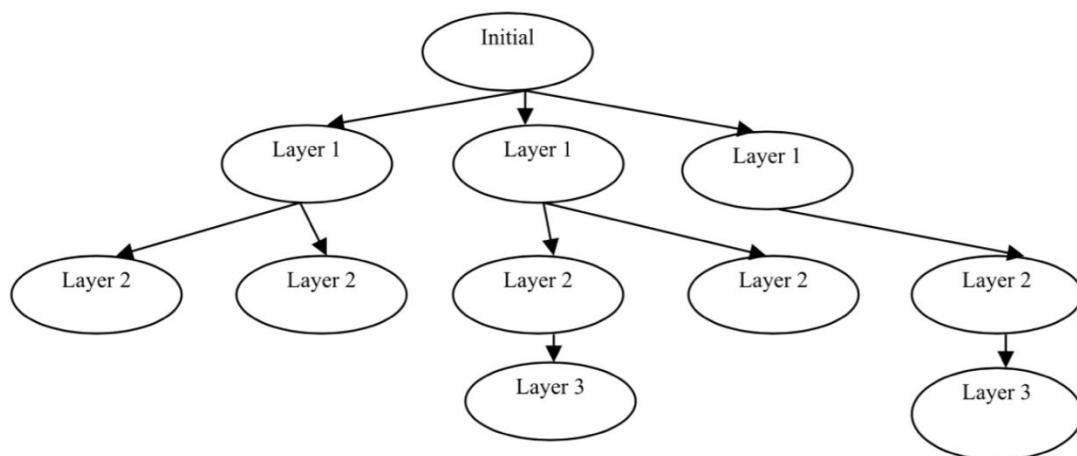


Figure 1. The snowball sampling technique used scheme.

The study's questions were divided into five main sections: respondent identity, relationship to the object, knowledge of the object, utilization of the object, and management of the object. Each section included two tiers of inquiry: general questions aimed at gathering broad foundational information and probing questions designed to explore deeper, more nuanced insights. The research object is *Cimplung*, which is the center of the study. The researcher will investigate it in detail, asking about its history, philosophy, technical process of making, and distribution. Data analysis was conducted descriptively using a critical interpretative approach, which allowed for the systematic organization and analysis of participant responses (Desmiwati et al., 2024). This method facilitated the identification of patterns, themes, and relationships within the data, providing a comprehensive understanding of the respondents' perspectives and experiences. Figure 1. The snowball sampling technique used scheme.

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RESULT AND DISCUSSION

The origin of *Cimplung* snack and the development

The sustainability of *Cimplung* snack products will have a real impact on the socio-economic dynamics of society, especially in Banyumas, Central Java. This is related to the landscape management system to provide the required raw materials, there is sap from sugar palm (*Arenga pinnata*) or coconut (*Cocos nucifera*) plants (Wulandari & Novitasari, 2022). Another ingredient used is young coconuts flesh or can be replaced with tubers or young banana. Apart from the materials used, the expertise in making this is also important to preserve. Because so far, the knowledge of making this food has been passed down from generation to generation orally and verbally by the people of Banyumas, especially the farmers (Ferdinanda et al., 2022). Figure 2 shows an example of the appearance of the *Cimplung* snack.

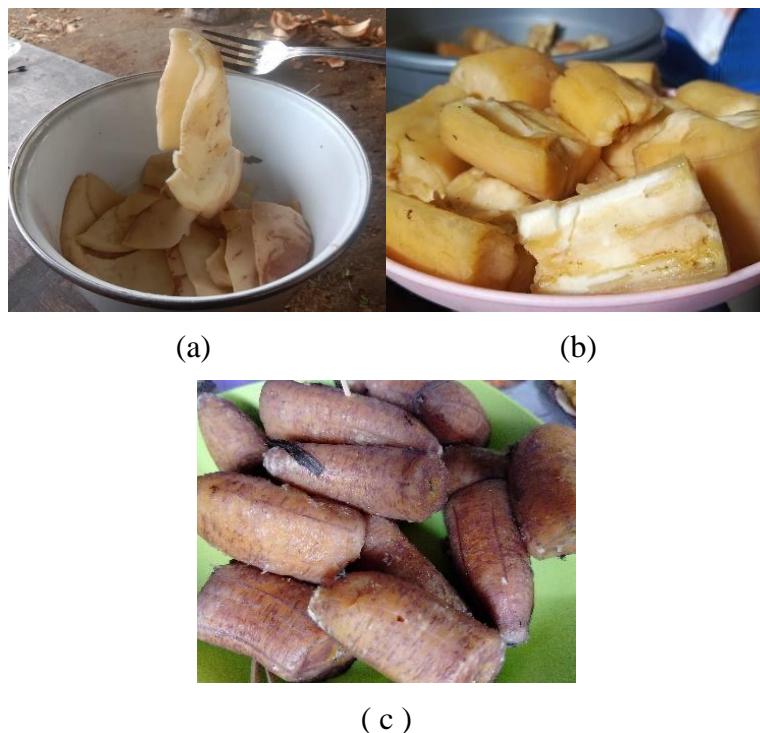


Figure 2. Example of a *Cimplung* snack display. (a) Coconut *Cimplung*, (b) Cassava *Cimplung*, (c) Banana *Cimplung*.

source: document by (a) Muh. Fauzi, (b) Salis Sulistiono, (c) Isrodin

Cimplung snack is a typical Banyumas food which is made from the young flesh of coconuts, sometimes this ingredient can be replaced with tubers such as cassava, sweet potatoes, yams, taro, etc (Kartika, 2011). These ingredients are cooked by boiling them in palm sugar or coconut sap until the sap is completely absorbed into the ingredients until they have a soft and mild texture. The manufacturing process is quite simple, there is just washing thoroughly and peeling the skin from the basic ingredients. Then filtering the sap from the sugar palm or coconut plant until the crumbs or impurities are gone. Next, the sap water must be boiled over medium heat until it boils (Putri et al., 2023).

The clean basic ingredients were boiled in sap water until the texture is soft and mild, so it can be sure the sap has been absorbed. The thing to pay attention is that during the cooking process, the basic ingredients being boiled must be completely submerged in the boiling sap water (Wulandari & Novitasari, 2022). So, sometimes *Cimplung* craftsmen use special filters made of bamboo to suppress materials that stick out to the surface. The cooking process also takes quite a long time, even hours, until some of the boiling sap slowly thickens and turns into sticky crema or cotton candy. Apart from that, the color of *Cimplung* will also change to brown when it starts to ripen (Puspasari & Sudibyo, 2019).

Cimplung was originally a by-product of the process of making brown sugar (Puspasari & Sudibyo, 2019). Brown sugar craftsmen in Banyumas (map presented in Figure 3) in the past had the idea of putting food ingredients into sap of palm sugar which was being processed into brown sugar. They hope these food ingredients have a sweet taste to increase appetite. The name *Cimplung* is taken from the way it is cooked, namely by "Cemplung" (plunging – Banyumas Javanese language). In the past, *Cimplung* could be treated as a substitute food, especially during the lean season or when rice farmers have a crop failure.

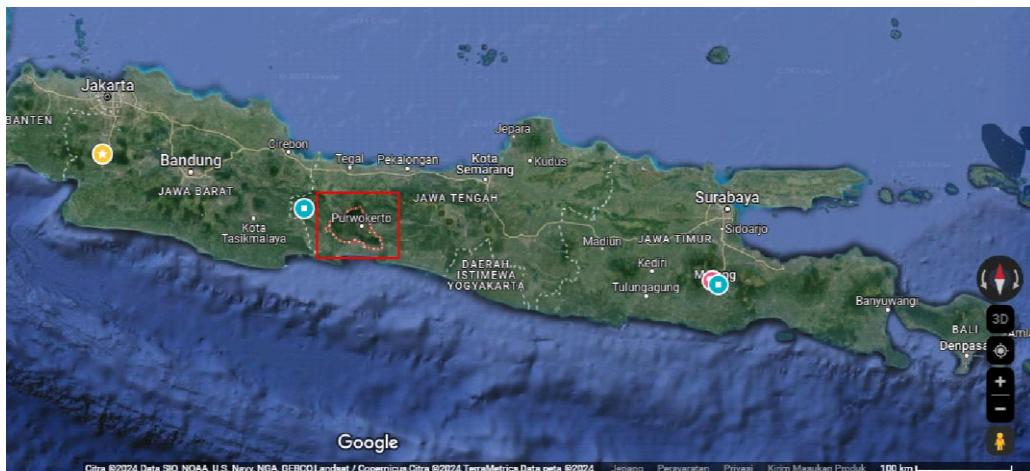


Figure 3. The origin location of *Cimplung* snacks (red mark). Shown in the picture is Banyumas Regency and its surroundings.

Source: <https://www.google.com/maps/place/Kabupaten+Banyumas,+Jawa+Tengah,+Indonesia>

As time goes by, brown sugar craftsmen often cook *Cimplung* just as a snack or as lunch when they go to work in the garden. But a few neighbors of craftsmen who work in other professions also sometimes order *Cimplung* to be made. So, *Cimplung* automatically becomes one of the typical snacks produced by brown sugar farmers (Putri et al., 2023).

This characteristic sweet taste with a soft and mild texture is quite popular with the people of Banyumas. Even more, for the people of Banyumas, this *Cimplung* snack is also very suitable to be served with coffee or tea in their free time or when relaxing. Another advantage is that *Cimplung* has a long shelf life for wet snacks, that is around 3-5 days at normal temperature (20°-30°C) even in an open container. Apart from that, this product has also initiated other innovations in creating another derivative product, namely "*Cimplung goreng*" (fried *Cimplung*), which is simply by frying *Cimplung* that has cooled by storing it overnight. However, the challenge is that *Cimplung* is vulnerable to being swarmed by ants because the sweet taste of this snack can invite ants to come (Kartika, 2011).

Through fried *Cimplung*, the storage process can be carried out longer, that is around 5-7 days at normal temperature and in an open container. This shelf life can be longer if stored in a closed container, that is up to two weeks. Another unique thing about fried *Cimplung* is its taste and texture. While ordinary *Cimplung* has a strong sweet taste, fried *Cimplung* has a lighter sweet taste. The soft and tender texture of regular

Cimplung has also changed, whereas fried *Cimplung* has an additional crunchy texture on the outside.

Cimplung's popularity in Banyumas then spread outside the area (Chusmeru, 2020). This started with people from outside Banyumas who when they visited people's homes, sometimes found food for treats in the form of *Cimplung* or fried *Cimplung*. Apart from that, workers migrant people from Banyumas also sometimes bring *Cimplung* just as a snack while they are traveling or as a souvenir for neighbors in overseas places. These two routes for introducing *Cimplung* outside Banyumas are slowly starting to gain interest and popularity among people outside Banyumas. So *Cimplung* has become quite popular among Banyumasian snack lovers (Ferdinanda et al., 2022).

The impact of socioeconomic dynamics on society

Currently, not much research has been done regarding this unique snack. The potential for local resources for making *Cimplung* is still very large. This is based on how easy to find the basic ingredients for the production process. Apart from that, public knowledge regarding the *Cimplung* production process is still easy to find (Wulandari & Novitasari, 2022). However, *Cimplung* processing still needs improvement in packaging innovation and processing techniques for effectiveness and efficiency in the industry (Nareswari et al., 2022).

There are three main components in making *Cimplung* snacks (shown in Figure 4), namely: (a) palm sugar or coconut sap, (b) young coconut flesh or tubers (for the example is taro) that can be replaced, and (c) knowledge of the manufacturing process. These three main components are still often found in society. Even more, this snack is also popular in the public so the demand for it is still quite high.



Figure 4. The main component of making *Cimplung* snacks. (a) sugar palm or coconut sap, (b) raw material – in the picture shown is Taro, (c) process of making *Cimplung*.
source: document by (a) Muh. Fauzi, (b) Salis Sulistiono, (c) Muh. Fauzi

The main components of making *Cimplung* indirectly influence the socio-ecological dynamics of landscape management. This is based on how farmers maintain stocks of materials for making them. This condition is described in the discussion in the following points (Kartika, 2011).

a. Palm sugar or coconut sap

The process of producing palm sugar or coconut sap is obtained from palm sugar or coconut flowers which are tapped/"dérés" (local language) by cutting a small portion of the flower stalk. There are several differences in the techniques for harvesting sap from those plants. The difference lies in the part that is cut to produce sap.

In sugar palm plants, the part that is cut to harvest the sap is the base of the flower (the flowers are discarded). So generally, the sap produced is cleaner. In coconut plants, the part that is cut to harvest the sap starts from the end of the flower (the flowers are tied to get a flat end to make the process of collecting the sap easier). The different flower cutting positions are shown in Figure 5.



(a)

(b)

Figure 5. Differences in flower cutting positions for the sap harvesting process (see in red mark). (a) palm sugar flower – the cut was on the flower stem/stalk, (b) coconut flower – the cut was on the flower panicle.

source: document by (a) Isrodin, (b) Mahrudin

The quantity of sap water production of course related to the population of sugar palm or coconut plants in that location (in this case in Banyumas). Sugar palm and coconut plants that are suitable for harvest are those that have passed the initial fruiting phase (3 years old) so that the plants are still suitable for climbing/not too old (20 years old). These two plants have quite different habitat characteristics.

Sugar palm plants in Banyumas tend to thrive in areas near forests which are generally sloping areas. Another advantage of the presence of sugar palm plants is that this plant has an ecological function as a natural water reservoir. So, during the rainy season, this plant will greedily collect rainwater in its root system. Then, in the dry season, this plant slowly releases the water it stores into the surrounding environment to maintain moisture in the surrounding soil. This condition is what ecologically makes sugar palm a useful plant for spring conservation.

Coconut plants are relatively easy to plant in various types of habitats. Starting from dry locations to very wet ones. This happens because the adaptability and survival power of coconut is very high. This condition generally makes coconuts more preferred by farmers for planting in their mixed gardens.

Indirectly, sap tapping farmers have a very important role in landscape management. This is demonstrated by farmers planting palm sugar in sloping areas that are prone to landslides, which is a vegetative soil and water conservation technique. Areas of the valley where sugar palm is planted also get other benefits in the form of maintaining springs which are used as a source of clean water for local residents. Likewise, coconuts planted by farmers can provide plant diversification in terms of species and plant height strata in mixed gardens. This suggests that agroforestry practices are close to secondary forest conditions in terms of biodiversity.

b. Young coconut flesh and tubers

The next component, namely young coconut flesh, can be produced from coconut plants whose sap is not extracted. Coconut plants that are not harvested for their sap will produce coconuts. These young coconuts can be harvested to extract the young flesh. The character of this young coconut flesh is very soft so it can provide a unique sensation for making *Cimplung*.

Tubers are a carbohydrate-producing food other than rice. Its use to make *Cimplung* gives it a distinctive taste. This is because each tuber has a different basic taste. When combined with the pervasive sweet taste

of sap it provides a unique taste experience. Some tubers that are commonly used as *Cimplung* include cassava, sweet potato, yam, taro, etc.

c. Knowledge of the *Cimplung* manufacturing process

Making *Cimplung* is very easy to teach by oral and verbally. However, until now sufficient scientific documents have not been found to document the wisdom of local resource management. Even though knowledge is a very valuable thing that can be preserved. Apart from that, knowledge that is passed down orally and verbally will be very vulnerable to extinction someday when future generations' interest in preserving it decreases. Moreover, currently the number of palm sugar farmers and brown sugar craftsmen is decreasing. So scientific documentation of the various aspects being researched today is very necessary.

A well-documented *Cimplung* manufacturing process will give rise to the potential for industrialization of *Cimplung* on the market. Various improvements and improvements in various things can be done. As is the assessment of the nutritional and calorie content that can be produced in each *Cimplung* dish. Then various techniques can be used to produce *Cimplung* effectively and efficiently. Furthermore, packaging improvements to increase shelf life and food safety can also be carried out.

Balanced landscape management indirectly becomes an integral part of local community knowledge (Sarivaara et al., 2013). The condition of the surrounding natural resources naturally makes people habituated in their use (Heydir et al., 2017). One of the efforts to manage this landscape is shown in the division of agricultural zoning vertically and horizontally. The vertical division can be seen from locations with sloping land planted with sugar palm as an effort to ensure food security while maintaining the groundwater system. Meanwhile, coconut plantations are planted in mixed gardens. The horizontal division can be seen from the proximity of the location to the water source. Generally, palm trees are planted in locations close to water sources. Meanwhile, coconut trees are planted in mixed gardens which are usually locations that do not have water or irrigation. A sketch of the vertical and horizontal zoning is shown in Figure 6.

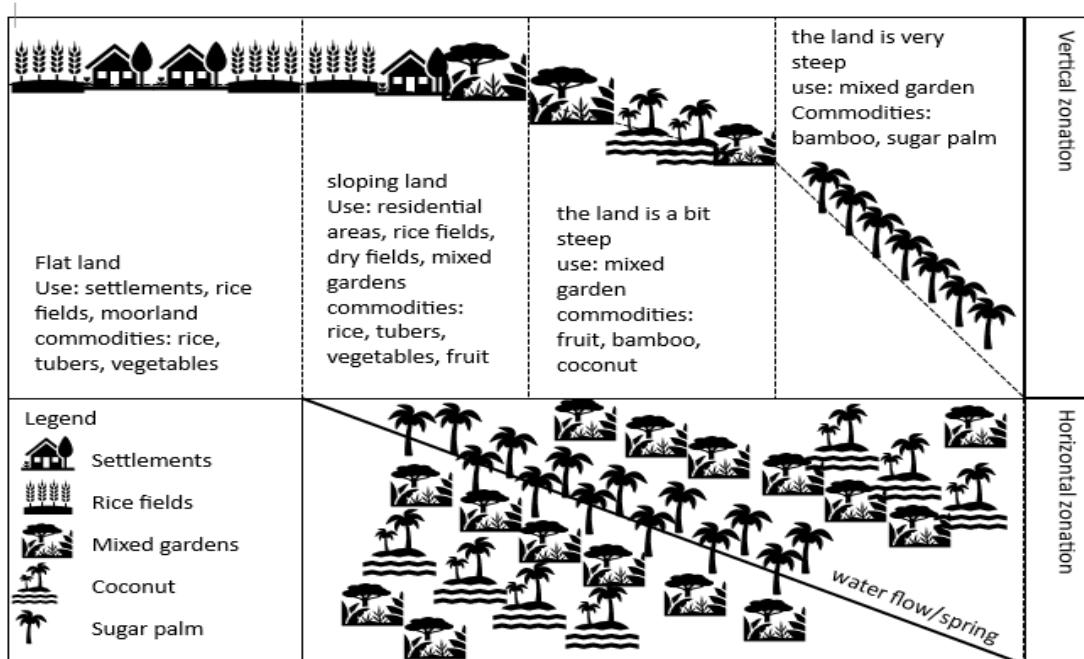


Figure 6. Illustration of a sketch of the zoning for landscape management of the sap farming community.

The size of each component does not indicate the actual size.

(source: illustration made by researcher based on field data observation, 2024)

Developing the *Cimplung* Snack for Sustainability

The development of the *Cimplung* snack presents an opportunity to align local food innovation with the United Nations Sustainable Development Goals (SDGs) while addressing key climate change challenges (Chusmeru, 2020). Integrating socio-ecological principles, this initiative aims to preserve cultural heritage, support community livelihoods, and contribute to global sustainability efforts (Nugroho & Nuraini, 2016).

A major advantage of the *Cimplung* snack is its alignment with several SDGs. For instance, sourcing locally available, nutritious ingredients directly supports SDG 2 (Zero Hunger) by enhancing food security and promoting sustainable agriculture. The production and distribution processes generate economic opportunities in marginalized communities, contributing to SDG 8 (Decent Work and Economic Growth) (Puspasari & Sudibyo, 2019; Putri et al., 2023). Sustainable sourcing practices, waste minimization, and eco-friendly packaging align with SDG 12 (Responsible Consumption and Production). Furthermore, by prioritizing local supply chains, the *Cimplung* snack reduces its carbon footprint, contributing to SDG 13 (Climate Action) and highlighting its potential to mitigate environmental impacts (Ferdinanda et al., 2022).

Addressing climate change is integral to the development of *Cimplung* snacks. By emphasizing local and seasonal ingredients, the initiative reduces emissions associated with transportation and storage. Sustainable agricultural practices, such as regenerative farming and agroforestry, can be adopted among suppliers to sequester carbon and enhance soil health (Suwarno et al., 2022). Additionally, incorporating surplus or underutilized crops helps minimize food waste, a significant contributor to methane emissions. Choosing biodegradable or recyclable packaging further reduces environmental harm, demonstrating a commitment to sustainability throughout the product lifecycle.

Climate resilience is a crucial focus of the SDGs project. By incorporating drought-tolerant or climate-resilient crops into production, a system can be created that can better withstand climate variability. This approach reduces community reliance on global supply chains, often vulnerable to disruptions, and fosters a localized and sustainable food system. Additionally, marketing the snack as an eco-conscious product helps raise consumer awareness about the environmental impacts of food choices, encouraging climate-friendly consumption habits (Puspasari & Sudibyo, 2019; Wulandari & Novitasari, 2022).

The socio-ecological approach ensures that the *Cimplung* snack benefits local communities while addressing global challenges. Involving community members in participatory design processes empowers them as co-creators, fostering a sense of shared ownership and resilience (Dorji et al., 2024; Zurba & Papadopoulos, 2023). By blending traditional knowledge with modern sustainable practices, this initiative not only preserves cultural identity but also contributes to broader environmental and social well-being efforts (Anau et al., 2019; Suwarno et al., 2022).

Through phenomenon of *Cimplung* snack represents a model of sustainable food innovation that balances cultural heritage with ecological responsibility. By aligning with the Sustainable Development Goals (SDGs) and incorporating climate change mitigation strategies, this initiative illustrates how localized efforts can create a meaningful global impact, benefiting both people and the planet.

CONCLUSION

The terminology "Local Resources" in *Cimplung* snacks management has proven effective in promoting community development within the socio-ecological context of Banyumas, Central Java, by emphasizing sustainable use and conservation of materials like those used in *Cimplung* production. The "Local Resources" concept serves as a unifying framework, fostering stewardship and collaboration among stakeholders contributing to long-term sustainability and community well-being. The *Cimplung* snack exemplifies sustainable food innovation, balancing cultural heritage with ecological responsibility while aligning with the Sustainable Development Goals (SDGs) and climate change mitigation strategies. This

initiative demonstrates how localized efforts can have a meaningful global impact, benefiting people and the planet.

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