



Original research article

## Sustainability Evaluation of the 'Batu Into Green' Village Based on the United Nations Sustainable Development Goals (SDGs)

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### ABSTRACT

Nowadays, environmental issues deserve everyone's attention. People can actually improve their surrounding environment to be healthier and more comfortable, starting with their own houses. This idea was realized in an ecology village named 'Batu Into Green', located on Pattimura V Street, Temas, in the City of Batu, Indonesia. Originally, this village was a slum, but with the initiation of the local village head and with the increase of local public awareness for a healthier environment, the locals improved the ecology of their village. Batu Into Green applies to the concept of an environmentally friendly village. Thus, an analysis was carried out to examine the level of sustainability of this ecology village. This research applied a qualitative approach to descriptively evaluate the current condition of the village based on the principles of the United Nation's Sustainable Development Goals (SDGs). The focus of the SDGs in this discussion is Sustainable Cities and Communities (SDGs No.11) in the manner of indicators such as environmental, community participation, and the use of local resources. From the analyses, the Batu Into Green initiative has a great potential for environmental, economic, and community participation sustainability.

### 1. Introduction

Due to the increasing environmental problems, daily conversations (at least in Indonesia) always revolve around environmental issues [1]. For example, even though the majority of the world understands that cleanliness is the basis of health [2], however, the problem related to environmental hygiene keeps on increasing every year [3]. Many programs have been conducted to encourage serious attention to solving this problem. Though it is hard, there was one community in Indonesia that came up with the idea of creating an ecological village in Temas, the City of Batu. They created a program called the village 'Batu Into Green' or 'Kampung Ekologi Batu', which seeks to apply the concept of an environmentally friendly village.

Batu Into Green's vision is to create a community that is not only environmentally friendly, safe, and comfortable but also fulfills the physical, mental, and spiritual needs of the people who live in it. Batu Into Green was a slum village because the villagers did not really pay attention to their environment. However, in 2015, they are trying to become a healthier village by applying ecological principles. After

becoming a healthier village, the problem arises that they do not know the sustainability of their environment. Thus, this analysis was carried out to examine the level of sustainability of this ecology village.

Research about sustainability at Batu Into Green has never been carried out. The previous research topics related to Batu Into Green are the benefits of goat's milk and marketing strategies [4], [5]. Yet, similar studies have been conducted in different locations [6], [7], despite these studies do not explain the role of community participation in maintaining environmental sustainability clearly. Issues regarding the environment are the responsibility of both the government and non-government (or community) entities [8], hence, this serious issue deserves the attention of all stakeholders. Active participation in playing the roles of responsible community, policymakers, and other related stakeholders could help the region in overcoming environmental problems. A similar topic research in tourist villages clarifies that active community participation can improve the community's economy and make the village more environmentally friendly [9]–[11].

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Environmental friendly areas are created by applying several sustainable principles and has a principle of preservation from environmental aspects that integrate with social, economic, and cultural [12] that could bring prosperity. These principles consist of improving the quality of water, air, and soil; pollution control; maintenance of springs; and reduction of solid waste. The virtue of these principles is not destroying the environment, implemented wisely, and paying attention to the needs of future generations. Additionally, the Indonesian Ministry of Environment and Forestry developed a called 'Program Kampung Iklim' (Proklam) to keep on encouraging interested parties in implementing local actions and increase their communities resiliency towards the impacts of climate change reduce greenhouse gas emissions problems, Proklam project is considered of the sustainable local development solution in managing the sustainability [8]. This program is also in accordance with the SDG's No. 11 principles, which is to make cities and communities inclusive, safe, resilient, and sustainable [13].

The ecological concept in Batu Into Green needs to be identified based on SDGs to determine its sustainability. In general, SDG's No. 11 aims to realize a decent standard of living and manage the natural environment. Apart from that, this research also refers to the community-based theme or community participation which supports the concept of sustainability.

## 2. Literature Review

### 2.1. Ecovillage

A slum is an area where the condition of living is sufficiently not good, and do not fulfilling one of the following indicators;

- a. Sturdy housing, which can protect occupants from extreme weather conditions;
- b. Sufficient living space;
- c. Access to clean water at an affordable price;
- d. Access to adequate sanitation, whether private or shared toilets; and
- e. Certainty in living that can protect the occupants from forced evictions.

According to Global Ecovillage Network, an ecovillage is a planned, traditional or urban community that is purposefully built with locally owned participatory, including four aspects of sustainability (social, culture, ecological, and economics) to regenerate social and natural environments [14]. Furthermore, Blahovestova et al. have identified the basic principles of ecovillage design [15], such as:

- a. Ecological functioning principle;
- b. Applying traditional building materials;
- c. Technogenic principle; and
- d. Sustainable transportation development.

### 2.2. Sustainable Development Goals (SDGs)

The United Nations (UN) Sustainable Development Goals (SDGs) are a 15-yearly development agenda concept outlined by the UN member countries. Issues discussed were mainly related to natural resources, environmental damage, climate change, social protection, food, and energy. The SDGs is a new

concept that supported the continuity of the previous Millennium Development Goals (MDGs) development agenda outlined from 2000-2015. The SDGs expect to achieve all goals in 2030 [16]. The changes to the SDGs from the MDGs were said to have many benefits and advantages because the SDGs targets are universally applicable, the solution more comprehensive, and there is bottom-up participation if compare to the MDGs which were only targeted the developing countries, lacking solutions, and ignoring collaboration with local government.

The SDGs altogether contains 17 development goals, with the SDG No. 11 aims to make cities and communities inclusive, safe, resilient, and sustainable. Targets of the SDGs No. 11 included:

- a. Raising the living standards in slums;
- b. Expanding urban employment opportunities;
- c. Ensuring universal access that is safe and equitable; and
- d. Provide urban services (sanitation, waste management, and low-carbon transportation).

In Indonesia, the application of SDGs No.11 for villages is to fulfill the need for decent, clean, and sustainable environments. Therefore, maintaining sustainability can help community run their social and economic functions [17]. According to [18], the environments must be facilitated by:

- a. Green open spaces;
- b. Sport fields;
- c. Places of business and commerce;
- d. Public facilities;
- e. Sanitation;
- f. Clean water; and
- g. Waste management;

The current state of the implementation of SDGs in the City of Batu is quite well. In 2022, two villages in the City of Batu made the top 10 national villages with the highest 'Indeks Desa Membangun' (IDM) in Indonesia. The IDM is a village assessment based on the social resilience index, the economic resilience index, and the environmental resilience index. Two villages mentioned before are considered to be able to survive independently without poverty and hunger by applying SDGs principles.

### 2.3. Community Participation

Participation is a process in which members of a community or organization are involved and have influence on decisions making of their development activities. Thus, community participation can be defined as the involvement of people (not forced) in a community or specific locality) to solve their own problems [19], [20]. According to Tritter & McCallum, there are seven levels of community participation [21] consisting of:

- a. Manipulation;
- b. Therapy;
- c. Informing;
- d. Consultation;
- e. Placation;
- f. Partnership; and
- g. Citizen control;

Meanwhile, Jones & Kardan explained that the levels of community participation consists of seven levels [22], namely:

- a. Manipulative participation;
- b. Passive participation;
- c. Participation by consultation;
- d. Participation for material incentives;
- e. Functional participation;
- f. Interactive participation; and
- g. Self-mobilization;

One of the keys to village development is community-based development through the active role of community participation. Any planning undertaken by the government needs to involve the community. Community participation can help clarify the needs of the community. Moreover, the stakeholders and the community in synergy will create community prosperity. This is in line with the implementation of village SDGs which expect the participation of all parties in village development. So, in the City of Batu, the participation of its community is important to be part of sustainable village development.

### 3. Method

In this research a qualitative approach was applied to evaluate the current condition of the Batu Into Green village descriptively based on the principles of the United Nations Sustainable Development Goals (SDGs) No. 11 – Sustainable Cities and Communities. At first, secondary data were collected through the investigation of the literature available, before an on-site observation was held and interviews were conducted which involved the village administrators. Secondary data was collected to enhance information about research objects and related research topics. Observations and interviews were carried out to find out the research object directly and discover phenomena related to the research topic. Then, the analysis conducted by describing the existing conditions (physical and non-physical) using related indicators.

Regarding the principles of SDGs No. 11 that this research is concerned on the conditions of environment and houses, the social and economic aspects, providing urban services, and ensuring universal access. This research also investigated the participation of the local community and the government in achieving the goal of a sustainable city, so, the community roles contributions in the development of the village are also included. The indicators that need to be considered will be described in Table 1.

### 4. Result and Discussion

#### 4.1. Description of Batu Into Green

The village of Batu Into Green (Figure 1) was once a slum, but with the initiation of the head of the local village with the increase of community awareness for a cleaner and healthier environment – the community together rebuilt their area into ecological village. The initiation of the idea started in 2012 and implemented in 2015. In January 2017, the Mayor of Batu inaugurated this village as an ecology village after the characteristics of an ecological village according to the Indonesian Ministry of Environment and Forestry were fulfilled by the village.

Table 1. Research's indicators

No	Indicators	Description
1.	Raising the Living Standards in Slum	Eco-friendly design, using local material construction Responsive to climate Providing green spaces
2.	Expanding Urban Employment Opportunities	Ensuring secure and prosperity Support domestic economic and business activities
3.	Ensuring Universal Access	Ensuring energy efficiency, resource, and generation Affordable use of resources
4.	Provide Urban Services	Ensuring public spaces and infrastructure access Providing waste treatment
5.	Community Participations	Empowering communities and public participation



Figure 1. 'Batu Into Green' or 'Kampung Ekologi Batu'

Batu Into Green located in Pattimura V Street, Temas, in the City of Batu, Indonesia. This village is one of the many sustainable development projects by the City of Batu, especially their vision on becoming a tourism city. Moreover, this village also has several other community activities including waste management and organic agriculture. Although initially they do not intend to be a tourism attraction, this village already succeeded in attracting tourists to study and travel here. The community started to gain economic benefits due to the tourism activities.

#### 4.2. Raising the Living Standards in Slum

##### 4.2.1. Batu Into Green Settlement

Basically, many residents' houses are generally simple in shapes; with the dominant rectangular floor plans, and use a shield or gable roof (Figure 2) that suits the tropical climate well. Building facades have many openings (windows and doors) for natural ventilation and lighting. The facades of houses varies in colors according to the preferences of the owner. Most of the buildings use materials, such as red bricks, clay roof tiles, and wood. The construction materials used in building the houses are locally available, which supports the





**Figure 2.** The use of local materials of building houses in Batu Into Green

principle of ecological village for cut off the carbon footprint from the transportation activities [23]. By applying the concept of passive design such as putting natural light, natural air movement, and using local materials, it can be said that they have utilized affordable energy and helped implement environmentally friendly energy.

#### 4.2.2. Green Spaces

The architecture of houses in Batu Into Green adapted the tropical climate design. However, due to limited land use, green areas can hardly be founded in this area. The already dense land areas with buildings cause the lacking of horizontal green open space. One of the suggested green strategies for this area is to optimize the greeneries. The community of Batu Into Green implemented the creation of roadside green spaces inclusive the frontal sides of their houses (Figure 3). The greeneries were made in vertical gardens of hanging plants.

### 4.3. Expanding Urban Employment Opportunities

#### 4.3.1. Social and Economic Conditions

Batu Into Green consisted of 424 households with approximately 1,500 total population (Indonesia Census, year 2020). The majority of the residents' are Muslims, and most of the residents received at least high school education (compatible with Indonesian regulations regarding 12 years of compulsory education). The people of Batu Into Green generally work as farmers and traders. Other residents work in the management and services sectors. Batu Into Green has organic agriculture plantations which are used as food sources and additional tourism attraction that increase their income.

#### 4.3.2. Additional Building Function

Batu Into Green does not experience significant changes in the function of its area as existing human settlements. The arrangement of the dominant buildings has not changed much, except for several buildings that have been added its purpose of use. Examples of the buildings that have additional functions are 'Keday Kado' and the gathering hall. *Keday Kado* (Figure 4) was originally a living place that is now becoming a place to produce recycled crafts. While, the gathering hall, which was used as a gathering place has now become a waste bank.



**Figure 3.** A green area in the front yard of the residents' houses



**Figure 4.** *Keday Kado* as a place to live and a place for recycling crafts

#### 4.3.3. Tourism Attractions

Batu Into Green is planning to set thematic alley spots based on different zoning for their area. This zoning is purposely designed to become tourist attractions. Even though the alleys are narrow, residents improved by making the routes has particular themes and unique names to be attractive for visitors (Figure 5).

The organic agriculture utilizes the underused land available within the village area as the organic agricultures are now becoming one of the educational projects that attracted visitors and tourists to Batu Into Green (Figure 6). Visitors can take part in organic plant training which includes how to care for plants, deal with pests, and use organic fertilizer. There are 48 types of vegetables and organic herbal plants planted here and becoming another source of food supply and the excesses can be sold to neighboring markets.



**Figure 5.** 'Gang Cinta' or translated to be 'Love Alley' is one of the thematic alleys consists of photogenic spot areas with walls covered in pink color



Figure 6. Organic agriculture as an educational object for an ecological village

#### 4.4. Ensuring Universal Access

The supply of daily water needs comes from nearby rivers and rainwater storage. The use of the water is generally for drinking, cooking, washing, and agriculture irrigation. Most houses also practice rainwater collection, and the treated rainwater is used for watering plants and other uses. For daily needs, water is clarified first using a manual filter and cooked before consumption.

Even though the implementation of other natural energy contributors such as solar power does not yet exist at *Batu Into Green*, the management of the village has started working on their plan to introduce solar panels to the village with the help from the City of Batu local authority. This solar panel is planned to convert sunlight into renewable electrical energy. This electricity will be used for lighting streets and residents' homes [24].

#### 4.5. Provide Urban Services

##### 4.5.1. Waste Treatments

Environmental sustainability can be achieved by reducing consumption of energy, resource use and production waste; and adapting attitudes to extend usable life of materials [25]. The community of the *Batu Into Green* village improve

their healthy culture by sorting and process their waste properly at the waste bank, including recycling waste into useful and beneficial things [26]. Residents or visitors will be given guidance on sorting organic and inorganic waste and reusing the waste by making crafts and organic fertilizer. They was also developing ecological techniques of printing batik craft using organic waste. These activities were held at *Keday Kado*. In general, the surrounding environment of *Batu Into Green* is clean with rubbish bins easy to find. The community are so conscious about their clean surroundings and cleaning activities were done daily or weekly, foremost in cooperation of all residents.

##### 4.5.2. Access to Transportation

The geographical location of *Batu Into Green* is close to the shared taxi terminal and the traditional market of Batu City. Visitors and tourists can access the village via the trunk route of Batu – Malang using public transportation or personal vehicles. *Batu Into Green* area can be accessed through the many alleys (minor) roads, also the main road (Figure 7). The alley routes can only be passed by two-wheeled vehicles, while the main road can be accessed by four-wheeled vehicles.

#### 4.6. Community Participations

##### 4.6.1. The Community and Authority's Participation

Community actively participates in the development of this ecological village. The community of *Batu Into Green* working together to change the original state of their area from slums into becoming a cleaner and healthier village. The community who used to be indifferent to their surroundings are now taking good care of the area.

*Batu Into Green* community are given freedom to involve themselves in various types of community work, and they may choose to take part in activities that interest them the most such as working in the organic vegetable agriculture, or processing the waste at the recycling center. This village values diversity, and everyone works voluntarily with a motto "from us, for us".



Figure 7. Map of *Batu Into Green*



The level of the community participation in the development of the ecological village is categorized as interactive participation. The '

*Batu Into Green* village communities have actively participated in managing their village. Up to date this article was written, the *Batu Into Green's* village managerial committee has already been working on the next planning with the government to further develop the City of Batu.

**4.6.2. Government Participation**

The effort to materialized this ecological village program was a bottom-up concept. The local government supports the villagers by giving them authority to run the program, and providing technical and other kinds of assistantship, so, the village residents can continue developing and improving their environment. With this good supports and contributions from the government, *Batu Into Green* has won the main prize at the provincial level in the Climate Village Program.

From the analysis, almost all aspects can be fulfilled by *Batu Into Green*. Aspects that are in accordance with SDGs, have the potential to be sustainable are environmental (raising the living standards), economic (employment opportunities) and community participation aspects. These three aspects are fulfilled in [Table 2](#).

**5. Conclusion**

In 2015, *Batu Into Green* are trying to become a healthier but they do not know the sustainability of their environment.

Thus, this analysis was carried out to examine the level of sustainability of this ecology village. The ecological concept in *Batu Into Green* needs to be identified based on SDGs and refers to the community-based theme or community participation which supports the concept of sustainability. *Batu Into Green* has the potential to sustain itself in terms of environmental, economic, and community participation aspects. The community managed their area well by using local materials, using natural resources well, support domestic activities, manages the waste, and managing an organic agriculture. The community also are very cooperative in maintaining their area's cleanliness. They keep their environment clean and are always willing to conduct community service at any time which shows the positive characteristics of the social and cultural aspects of sustainability.

*Batu Into Green* was not intended to become an educational tourism destination, but because of its uniqueness visitors can visit this village. Visitors can learn how to recycle and process waste and organic agriculture activities. However, based on this research, several things need to be improved, such as public facilities, green areas, use of renewable resources, and infrastructure and transportation. Research in the same location with different topics can also be a reference so that *Batu Into Green* can be more sustainable, for example, topics regarding tourist villages and small business research.

**Table 2.** *Batu Into Green's* analysis based on the SDGs No. 11

	Indicator	Existing Conditions	Application of the SDGs	
			Yes	No
Raising the Living Standards in Slum	Eco-friendly design, using local material construction	Use local materials, such as red bricks, clay roof tiles, and wood.	√	
	Responsive to climate, providing green spaces	Suitable for tropical climate.	√	
	Providing green spaces	Green areas can hardly be founded due to limited land use.		√
Expanding Urban Employment Opportunities	Ensuring secure and prosperity	Organic agriculture used as food sources and additional tourism attraction that increase their income	√	
	Support domestic economic and business activities	Several buildings have been added its purpose of use Set thematic alley spots based on different zoning for tourism	√	
Ensuring Universal Access	Ensuring energy efficiency, resource, and generation	Solar power does not yet exist		√
	Affordable use of resources	The supply of daily water needs comes from nearby rivers and rainwater storage	√	
Provide Urban Services	Providing waste treatment	Sorting and process their waste properly at the waste bank, and <i>Keday Kado</i>	√	
	Ensuring public spaces and infrastructure access	The alley routes can only be passed by two-wheeled vehicles		√
Community Participations	Empowering communities and public participation	village managerial committee has already been working on the next planning with the government to further develop the City of Batu.	√	

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**Author Declaration****Authors' contributions and responsibilities**

The authors made substantial contributions to the conception and design of the study. The authors took responsibility for data analysis, interpretation and discussion of results. The authors read and approved the final manuscript.

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**Competing interests**

The authors declare no competing interest.

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