Kamikatsu Japan’s Ecovillage Conceptual Framework for Environmental Management (Case Study: Lake Ciburuy, West Java, Indonesia)

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Abstract. Municipal solid waste production is increasing in all conservation destination in Indonesia, as the world’s second biggest plastic waste contributor to the oceans. Thus, the environmental management is needed to evaluate and create the future plan to overcome this problem, one of them is the Eco-village. A successful Eco-village is in Kamikatsu (Japan), where the society is well-educated about the environment and sorting their own waste properly. In this study, Japan’s zero waste village in Kamikatsu will be a role-model for the Eco-village Conceptual Framework. The method in this study are literature review and field survey. Ciburuy village definitely has the potential to achieve sustainable and environmental-friendly society, starting from proper solid waste management. However, the lake is becoming shallower due to the 20 residential settlement waste that has polluted the lake, and the open dumping and burning activities are commonly seen in some region. The result are discussed about the: (1) Ecovillage and Solid Waste Management Aspects Review, (2) Zero-Waste Ecovillage Kamikatsu, Japan Review, (3) Conceptual Framework for Ciburuy Village, and (4) Impact on Society (Environmental Education Plan). This sustainable and environmental-friendly management plan are projected to give positive impacts for society and the conservation nature in Lake Ciburuy.

Keywords: Environmental management, solid waste, conservation

1. Introduction
Indonesia produces plastic waste as much as 175,000 tons per day and is becoming the second biggest waste contributor in the world [1]. In 2014, Indonesia had their municipal solid waste (MSW) production increase due to population growth and its production reached 19,000 metric tons/day. Indonesia is the world’s second biggest contributor to plastic waste in the oceans is in a state of emergency with regard to waste problems. Its decaying trash disposal sites are struggling to cope with tens of millions of tons of waste every year [2].

Environmental education increases required knowledge and skills for preserving the environment throughout life; therefore, it is considered as an important instrument in promoting knowledge of rural district’s governors in relation with village’s environment. Implementing the Eco-village will hence improve the environmental knowledge and influence those living near the village. Therefore, Ciburuy Village is in need of environmental education and improve itself into becoming an Eco-village.

Indonesia is still a developing country therefore the MSW is still inadequate. In developed countries, MSW is commonly well managed. In regular, highly technical and complicated method for MSW
treatment in developed countries was brought to developing countries. Nevertheless, these step gives unsustainable solution because of the lack of capacity and the contradiction of trying to establish systems in distinctive situations. Presently, many developing countries in are implementing an effective system, known as integrated solid waste management (ISWM) system [3].

An example of a successful Eco-village is of course in Kamikatsu Japan where everyone living in the village is well-educated about the environment and how to sort their own trash, hence resulting a zero-waste Ecovillage [4]. Another example would be The Dancing Rabbit Ecovillage located in Missouri where it aims to be an entirely self-reliant town that practices ‘radical environmental sustainability’ [5].

In West Java, Indonesia, there are many events and community actions to reduce waste such as Clean Up Jabar [6]. Indonesia’s environmental work programs are excellent however the enthusiasm of the people needs to increase due to lack in manpower. There are 10 regions in West Java that are focused on developing the Environmental Culture Village Development Movement (Ecovillage) [7]. Therefore, hopefully Ecovillage socialization will strengthen people’s attitudes and behaviour, so that there is awareness from the citizens to improve the environment.

The reason why Ciburuy was chosen is due to its uniqueness of a nearby lake that continues to be a tourist location. In addition, CNN Indonesia has stated that Lake Ciburuy is a potential location however it has been ignored. Although the lake is used for business, none of the citizens nearby treasure the environment. Lake Ciburuy and its surrounding village has the potential to become both an Eco-Village and an Eco-Tourism. However, not many realize this and underestimate it. Many years has passed by and the lake is becoming shallower due to the 20 residential settlement trash that has polluted the lake. The objectives of this study are: (1) to review Ecovillage and five aspects of Solid Waste Management, (2) to review the role model of Zero Waste Ecovillage in Kamikatsu, Japan, and (3) to create a conceptual framework for environmental management and education in Lake Ciburuy, West Java.

2. Method

The method that will be used in this study in literature review (comparative study) and field survey (interviewing villager and spotting existing condition). For data collection, the data of ecovillage and solid waste management are acknowledged from literature review. This data was also compared with the existing condition from field survey result. For data analysis, zero waste ecovillage in Kamikatsu will become the role model to create a basic conceptual framework for environmental management and education in Lake Ciburuy, West Java.

3. Result and Discussion

3.1. Ecovillage and Solid Waste Management Review

Based on GEN History, Ecovillage is a movement that represents an idea whose time may finally have come. The goal of the Global Ecovillage Network (GEN) is to create and promote sustainable human settlements that allow people to live more comfortably [8]. However, an Ecovillage cannot exist without the support of the local government and the community [9]. It is a citizen-organized residential community that strive for a more sustainable way of life based on a culture of cooperation and sharing, as deemed necessary to support a shift to a post carbon world [10].

A successful ecovillage is in Kamikatsu village located in Japan. Since 2003, the city was commencing a rigid zero-waste program. Before this program, the city is used to incinerate the waste. But, they acknowledge that this waste incinerators could harm the food supply, health and the environment. The incinerator has been shown to emit vast quantities of greenhouse gases and toxins, that leads then to initiate and sustain the zero-waste program. Although it need a long journey for residents to get used to the tedious task of washing, sorting, and bringing their trash to the town’s sorting centre, the process for them has now become a routine and can achieve the recycling rate of 80% [11].

A village near Lake Ciburuy has the potential to be an ecovillage as well, however the community does not have the willingness to do it yet. Therefore, the five solid waste management aspects have to be
implemented first [12]. The role-model for the Ecovillage concept design that Ciburuy should hopefully use is from the Ecovillage Design Education (EDE) curriculum that covers four dimensions of sustainability: Worldview, Social, Ecological and Economical.

3.1.1. Solid Waste Management in Kamikatsu

There are 5 solid waste management aspects (SWM) that have already been implemented in Kamikatsu Japan which are:

- **Regulatory Aspect**
  This aspect is an aspect that gives legal power to implement responsible waste management.

- **Institutional Aspect**
  The institutional aspect that arranges the division of tasks and authority of all parties involved in waste management, so that waste management can be completed in accordance with the objectives expected.

- **Funding Aspect**
  Responsible waste management requires adequate funding and usually the amount will be greater than the current general waste management.

- **Socio-cultural Aspects**
  The socio-cultural aspect is how to manipulate the mindset and behavior patterns that need to be done to support the changing understanding of waste management.

- **Technical Aspects of Operations**
  Technical aspects of operations are aspects that can be physically seen and used to manage waste which includes everything related to sorting and storage activities, collection, transportation, processing and final processing.

3.1.2. Solid Waste Management in Ciburuy

Based on the comparison between Kamikatsu Japan and existing condition in Lake Ciburuy, there are quite a lot of gaps regarding the aspects that needs to be evaluated in Ciburuy. Therefore, all these aspects need to be designed as a part of conceptual framework in Ciburuy.

- **Regulatory Aspect**
  In Ciburuy, there are no firm regulations that bans throwing trash irresponsibly. If there were proper regulations that prevents people from throwing trash in the incorrect places, it would definitely strengthen the regulatory aspect. The village leaders should be more assertive.

- **Institutional Aspect**
  In Ciburuy, there are no clear arrangements about the disposal of waste. People just throw their garbage into one huge container and a garbage truck collects it afterwards, or if the garbage truck does not pick it up within a week, the people of Ciburuy burns the garbage without knowing the consequences of the dangerous gas. Ciburuy should have a division where it’s specifically for focusing on the disposal of trash.

- **Funding Aspect**
  A lot of unknown money-spending has been a great problem in the Ciburuy area due to an unclear accountancy. Ciburuy should have an honest division where they would be in charge of the accountancy. The villagers should also work together and donate money per month to buy better waste disposal facilities.

- **Socio-Cultural Aspects**
  In connection with the environmental education needed in Ciburuy, a majority of the people living in Ciburuy do not have a great education background. Many of them are not able to continue school and stop in middle school. Therefore, a solution would be to gather all the educated people living in Ciburuy, even if it’s only a few of them. After gathering them, an environmental education class should be held in order for everyone to understand and learn more about the environment. Education is a boost to achieve a great ecovillage.

- **Technical Aspects of Operations**
  The technical aspect in Ciburuy is appalling. The facilities do not comply with the correct solid waste management system. Ciburuy should collect funds and purchase a warehouse just like the one in
Kamikatsu Village, Japan. In the warehouse, the waste would be separated into clear categories and there would be workers that help arrange them properly.

3.2. Zero-Waste Kamikatsu Japan Review

The concept of the zero-waste education in Kamikatsu has been a helpful boost towards a successful ecovillage. 80% of the garbage there is recycled and the rest goes off as fertilizers in the fields [13]. The very most unique system in Kamikatsu that currently no village has succeeded in yet is their waste disposal system. In the beginning, waste segregation between paper and plastic can be time-consuming. But it is nothing compared to the recycling efforts of Kamikatsu’s residents. They have successfully achieved the 5Rs of the environmental triangle which are refuse, reduce, reuse, recycle and recovery.

![Figure 1. Trash cans in Kamikatsu Village](image1.png)

![Figure 2. Sorting Center in Kamikatsu Japan](image2.png)

As shown in Figure 1 and Figure 2, Kamikatsu village sorts their garbage into 34 separate categories of waste. To make it easy as well, they made their trash cans into detailed colours and writings [14]. Residents sort their trash into super-specific categories, like aluminium cans, steel cans, paper cartons, and paper flyers. They also facilitate a sorting center in the village to sort their trash into 34 categories, and if some are confused, the people in charge there are always welcome to help out. 80% of the Kamikatsu Village is recycled, reused, or composted with the rest going to a landfill. The processes save the village a third of its former costs from waste incineration. By 2020, Kamikatsu aims to be a completely zero-waste village.

Indeed, it seems like a very simple task if there is environmental education given, which currently Ciburuy Village lacks. Every person in Kamikatsu, from young to elderly understands how horrible pollution is towards the Earth and therefore made going zero-waste a habit in their everyday lives [15]. They even invite schools from every city in Japan to come visit them to educate the future generations on how to live simply and beautifully in a world without waste.

3.3. Conceptual Framework for Ciburuy Village

Compared to what has been discussed earlier about Kamikatsu, Ciburuy still lacks in many areas in achieving an ecovillage [16]. Firstly, the waste disposal system is still appalling due to just free-dumping, not knowing what is thrown by the residents. The trash cans are nothing like the ones in Kamikatsu, there is only one trash can per approximately 12 houses and it’s closed and un-separated. After dumping, open burning is initiated to eliminate trash. This is a very unhealthy and dangerous way to get rid of trash in Ciburuy. In Figure 3 the condition of trash box near the lake is improper. In Figure 4, the open burning are becomes a common practise near the lake that shows us an unmanaged waste in Ciburuy village.
Figure 3. Trash box in Ciburuy Village.

Figure 4. Open field burning right in front of a resident house in Ciburuy.

This existing condition is due to the poor facilities given due to economic problems and also due the lack of education and awareness given to the surrounding communities in Ciburuy. Not many residents understand how dangerous it is to initiate an open burning very close to housings. Indonesians should know that the government had already stated that citizens are not allowed to initiate open burning in the Constitution of the Republic of Indonesia Number 18 Year 2008 Article 29 regarding waste management. Therefore, a proper education is needed to empower society to understand how important the environmental management in Lake Ciburuy is. The main points for the future action plan of the Lake Ciburuy Eco-Village should be as follow (see Figure 5):

Figure 5. Lake Ciburuy Future Action Plan.

- **Set Rules**
  Rules are easily broken, but without rules, everything would also be a mess. Therefore, it is obligated for rules about the environment to be written in a very easily understood way. If the rules are too complicated, not everyone would be able to understand it.

- **Educate**
  Educating the people living in Lake Ciburuy will definitely be compulsory. If the people are not educated, then the plan and rules would be futile.

- **Raise Awareness**
  A person might have the knowledge inside their brains; however, they might still not be aware. The people have to understand how dangerous it is if the waste is not managed properly.

- **Raise Money**
  Without money, there will not be any facilities that comply with the ideal waste managing. Therefore, raising money is crucial in order for the plan to commence.

- **Work Together**
  Not everything can be done by a single person. The more people with the same mind-set, the better. Working together is an important step towards an Ecovillage.

- **Stick to the rules**
  The law and regulations should never be broken in order to maintain a great environment.

3.4. **Impact on Society (Environmental Education Plan)**

Many citizens visit Lake Ciburuy to take a glance at the wonderful famous and historical lake, however due to the increase of trash and the decrease of water level in the lake, not many people visit it anymore.
Lake Ciburuy will definitely be one of the most beautiful lakes in Bandung, if it is able to be improved using the conceptual framework on this study. Moreover, Ciburuy regulator and residents are also needs to educate tourists as well to not throw trash as they please, and engage with good practices in solid waste management. The community empowerment for household waste management can be conducted in a nearly future [17] and also environmental education to segregate and recycling the waste (ex. making the ecobrick) [18]. At an economical aspect, it will definitely be a benefit for the residents on Ciburuy if the tourists increase, and not only will it give a great impact towards the tourists and visitors, it will also be a much more comfortable and more environmentally friendly place where residents will feel a much better wellbeing.

4. Conclusions
There are 5 solid waste management aspect in Ciburuy that are evaluated and re-designed, which are regulatory aspect, institutional aspect, funding aspect, socio-cultural aspect, and technical aspect of operation. This step are simplified as a future action plan shown in discussion.

Kamikatsu Japan sets a good example for Ecovillage. Everyone living in the village is well-educated about the environment and how to sort their own trash, hence resulting a zero-waste ecovillage. Lake Ciburuy and Ciburuy village definitely has the potential to achieve sustainable and environmentally-friendly society, starting from good solid waste management.

The conceptual framework in this study will helps the society through environmental education and community empowerment plan. Sustainable infrastructure must lead us to integrated environmental management, especially on solid waste issues. In the next stage of its implementation of this conceptual framework, many positive impacts will occur for the residents and the nature of Lake Ciburuy. Once it is applied to Ciburuy village then a much healthier and wealthier village will be born. Lake Ciburuy and Ciburuy village definitely has the potential to achieve this but it must be applied immediately because the quicker the better and it is never too late to help mother nature.

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