

## Research Article

### Local Community-based Initiatives of Waste Management Activities on Bunaken Island in North Sulawesi, Indonesia

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**Abstract:** This study describes a study on waste management in Indonesia. Wastes produced by the inhabitants of Bunaken Island and transported by sea from Manado city, contribute to the destruction of the marine ecosystem in Bunaken National Marine Park. Urgent and smart steps need to be taken in order to manage the waste on the island and its sea shore. This study elaborates on a multiparty collaboration program in environmentally sound waste management as an effort to mitigate the impact of waste on the Bunaken sea garden ecosystem. The program covers waste management, community empowerment and a common vision to reduce waste from its source. Its flagship program is the community-based “Rubbish Bank”. The program included socialization of the Rubbish Bank, setting up of a waste management hierarchy and feedback from the community. Due to its approach and scope, this study provides a best-practice example of local community-based initiatives to manage waste in a developing country context, by establishing Rubbish Bank and its technical guidance so that the program can be applied and replicated easily by any other community.

**Keywords:** Bunaken Island, community empowerment, rubbish bank, self-help group, waste management

## INTRODUCTION

The management of solid waste has become a problem faced by developing countries and is also an important issue and major challenge especially in urban areas. The top-down approach used in the past has long proven ineffective and, according to several studies, the successful effort of waste management has been a bottom-up approach. It means that community participation is essential for the program's success. Shukor *et al.* (2011) summarized major factors that contribute, for example, to the problem of waste management: poor management on the level of local authority, lack of knowledge of community and technical workers about waste handling, bad littering habits of people, insufficient waste disposal/poor infrastructure and low law enforcement.

This phenomenon also happens in Bunaken Island, in Indonesia. The multiplier effect of world-class tourism on Bunaken Island has not been felt by the people on the island. Physically, the Bunaken should be the owners and managers of the tourism resources of land and sea. This, however, is far from reality. Local communities have not been able to enjoy the fruits of tourism because monopolized by local and international companies and not owned by local communities. They are still a marginal working-class. People do not have

the bargaining power and should be subject to the policy-makers beyond their neighborhood. Similar problems have been seen in other islands elsewhere (Squires, 2006).

Lack of education and skills are the cause because of which people cannot get out of the zone of marginality. Therefore, assistances needed to enable them to see the resources around them. The Bunaken people still follows the old paradigm of waste management, which is collect, transport and dispose/burn. This shows that efforts are needed to transform this old communities' paradigm into a new environmental paradigm and to view waste as a resource and economic blessing.

Organic and inorganic wastes, if properly managed and processed, will provide economic benefits for the community. In addition, the pattern of farming in the community must be improved in order to no longer rely on the basic needs of the market in the city of Manado. If this can be done well, then the impact is that the Bunaken people can improve their standards of living in terms of environmental cleanliness and comfort, economy and sustainability around the Bunaken National Park. The aim of this study therefore is to provide insight about how local community-based initiative was consider as a best practice in managing

wastes, in order the program to be replicated by other communities.

### LITERATURE REVIEW

Bunaken, an island of 8 km<sup>2</sup>, is situated at the northern tip of Sulawesi Island (Fig. 1 and 2). This island belongs to Manado city, the capital city of North

Sulawesi of the Republic of Indonesia. It can be reached by boat within approximately 30-45 min. Around the island, there is the Bunaken Marine Park which is part of the Bunaken National Park. There are two villages on this island, namely Bunaken with 2,844 inhabitants, which consists of 528 families and Alung Banua with 707 inhabitants from 160 families. Most of them live of farming during the rainy season and



Fig. 1: Sulawesi Island

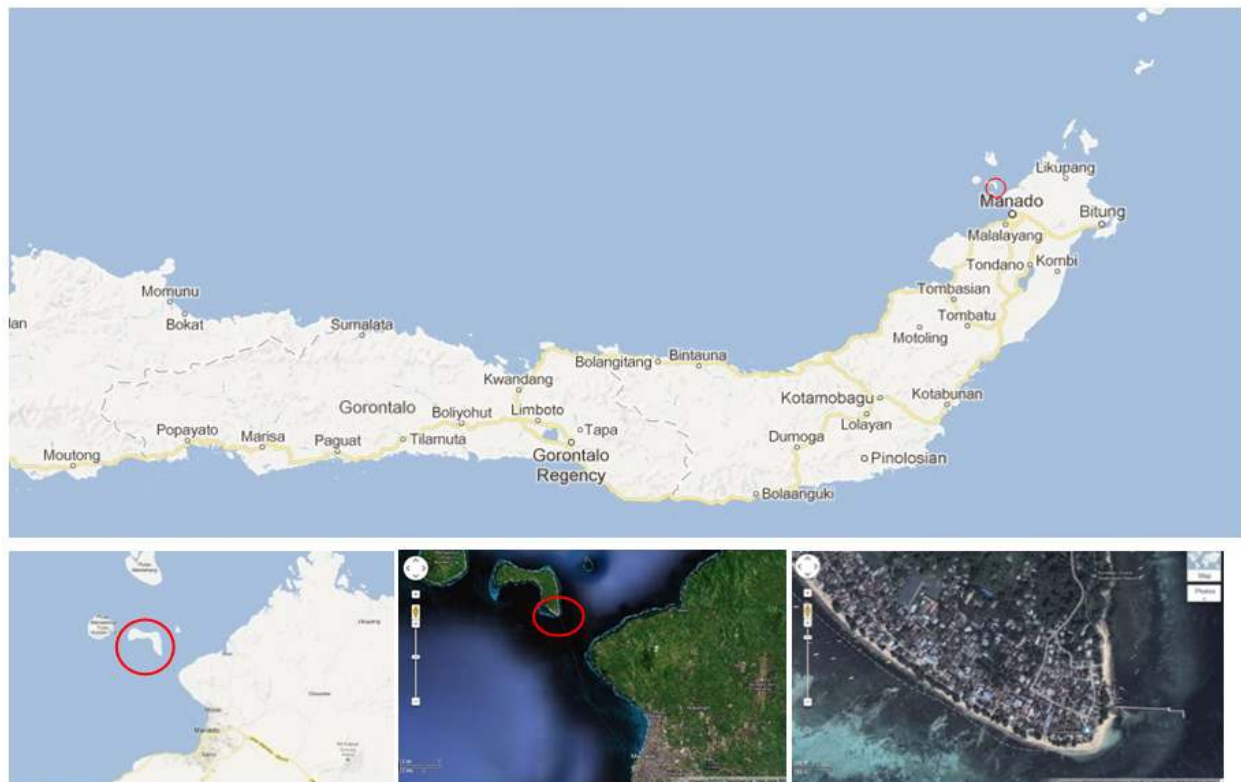


Fig. 2: Bunaken Island and location of Bunaken village

fishing in summer. The remaining 25% work in the field of tourism.

Bunaken National Marine Park is the home to thousands of unique and diverse marine species. This marine park's fame has begun to fade due to waste and environmental problems. This has been the largest contribution to the destruction of marine ecosystem (Yunia *et al.*, 2013). Therefore, smart steps need to be taken in order to manage the waste, particularly on the island.

Conflict in Bunaken is exacerbated by the monopoly of foreign investors, thus making people feel increasingly marginalized. A mediocre economy made people expect to have their economy increased-from the tourism sector, which in fact did not come true. Davis (2005) stated that Bunaken National Park Management Advisory Board (BNPMAB) had no data on actual benefit resulted from impact of tourism on local economy in the area. Investors from outside of Bunaken profit from this business. Based on 2004 national poverty line, poverty rates in Bunaken island and surround is greater than 30% (Van Beukering *et al.*, 2007). Garbage is another serious problem. Lack of education and awareness of environmental sustainability makes people view waste as a burden rather than a resource. Garbage has also made the sea and the image quality of the Bunaken Marine Park decline (Tedjasukmana, 2011).

## METHODOLOGY

The Multiparty Collaboration Program in environmentally sound waste management on the island of Bunaken is one of the smart efforts in anticipating the impact of climate change. This program is one of the priorities administered by the North Sulawesi Environment Agency in collaboration with the grEEN Foundation North Sulawesi. The grEEn Foundation has the necessary capacity and experience in environmental management particularly organic and inorganic waste management and community empowerment. Both sides have agreed to establish a common vision to reduce waste from the source with the flagship program called the community-based "Rubbish Bank". The bank, which is managed by the community, collects selected rubbish such as paper, plastics, glass products and scrap-metals from local citizens and exchanges them for Rupiah (the Indonesian currency).

**The plan:** In the implementation of community-based waste management, there are three activities that must be carried out in synergy and sustainably:

- The process of waste management since the garbage is taken out from the household.
- Explain to the community about Rubbish Bank with the waste management hierarchy.
- Provide mentoring to the community about the conduct of waste management hierarchy and familiarization with Rubbish Bank.



Fig. 3: Making friends with the community through a discussion

The practice of reducing waste by waste management hierarchy methods and intelligent practice replication processes are not easy to do because it will depend on the willingness of people to change their behavior. It requires many direct or indirect efforts such as, among others: the Rubbish Bank pilot program, socialization and education programs, community empowerment and assistance and the educational/environmental campaign.

**Approach and implementation:** The process approach and implementation of the integrated waste management program that were implemented in the village of Bunaken Island from April to December 2012 were the community-based Rubbish Bank. In practice, such activities were generally carried out in several stages, as follows:

- **First phase (April-June 2012):** Making friends with the community through discussion of the management of waste (Fig. 3), which includes:
  - Disseminating information regarding government policy in environmental management in the Bunaken National Park area.
  - Giving information about waste management to the entire community in the Bunaken village.
  - Building critical awareness of the group about the benefits of waste as well as institutional strengthening of Self-Help Group called "BRITS" in environmentally sound waste management in Bunaken village.
- **Phase Two (July-September 2012):**
  - Discussion and Q and A regarding the management of waste with SHG BRITS and sharing technical guidance material about the Rubbish Bank.
  - Distributing trash bags to the community.



Fig. 4: Community activities together with SHG BRITS in inorganic waste management

- A visit to the community to get closer to the people in the Bunaken village, together with SHG BRITS.
- Performing simulations of plastic waste sorting along with SHG BRITS.
- Providing information on the benefits of waste sorting to the members of SHG BRITS, either on the group itself or the environment.
- Educating SHG BRITS in terms of the institutional management of the organization, especially regarding Articles of Association and by laws.
- Consolidating with the village chief, community leaders, religious leaders, local business-men, tourism entrepreneurs and communities in Bunaken village.
- Providing a better understanding of the mechanisms and technical activities in work units, from garbage collecting to sorting to packaging.
- **Phase Three (October-December 2012):** The focus at this stage is on conducting applied working mechanisms and strengthening members of SHG BRITS:
  - Carrying out the implementation of waste processing mechanisms from collecting to sorting to packaging groups (Fig. 4).
  - Doing technical sorting, cleaning, packaging and weighing of plastic waste that has accumulated (Fig. 4).
  - Composting organic household waste using appropriate technology of BiogrEEen composter (Fig. 5).



Fig. 5: Organic waste management for composting using BiogrEEen composter

- Visiting the construction of the Integrated Waste Processing Site in Bunaken Island, along with members of SHG BRITS. The construction is

carried out by the department of Public-Works of North Sulawesi province.

- Monitoring and evaluating the performance of members SHG BRITS in the collection, sorting and packaging of inorganic waste.
- Presentation on management of Waste Bank to members of SHG BRITS as well as answering frequently asked questions in a relaxed, friendly and interactive setting.
- Providing education on environmentally sound organic waste processing mechanisms, i.e., the use of appropriate technology of BioGreen Composter
- Together with the village headman and chairman of SGH BRITS disseminating a program called local community initiative-based waste management around the Bunaken island sub-district and Manado Tua Island.
- Assisting SGH BRITS in designing a group work plan.
- Implementing Rubbish Bank management to SGH BRITS, which includes the formation of management structure, training about the rubbish bank mechanism, the administration system of waste management, interactive debriefing about material and the training as such.

## RESULTS AND DISCUSSION

Some findings resulted from conducting community-development activities in the Bunaken island sub-district. These are as follows:

- Socialization unifies perceptions about waste issues in general as well as the vision for the next few years. This took place by discussion and answering questions on waste management in Bunaken.
- The waste management group agrees to support the waste management program in the Bunaken National Park area.
- The grEEen foundation of North Sulawesi as an escort team/partner has helped out in setting up a plan and mechanism of waste management based on local community initiative in Bunaken Island.
- Waste management mechanism through rubbish bank management has been running according to plan.
- BiogrEEen composter designed and produced by the grEEen foundation has been applied by the group in processing organic waste into compost to be used for the cultivation of horticultural crops on land provided by the group.
- The group has been able to sort and process inorganic waste into craft materials as alternative souvenirs for sale in the tourist area of Bunaken

Furthermore, the Environment Agency North Sulawesi fully supports the implementation of

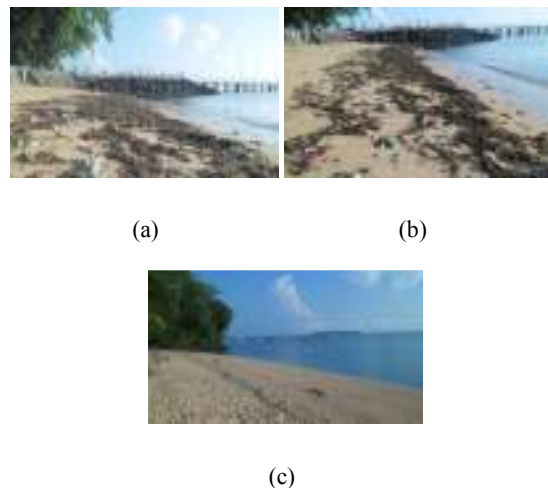


Fig. 6: Clean environment resulted from the program

activities through funding specified in the budget. As the result of all above activities, Bunaken village and its surrounding become cleaner and well-maintained due to the management of its waste (Fig. 6).

## POST-PROGRAM STRATEGIES

The post-program strategy is a way to bridge the gap between the period of program implementation when the funds are available from sponsors and with the condition that the program is completed. In principle, the Rubbish Bank is the community's starting capital to enable them to manage waste within the community itself. The initial capital includes community preparation, establishment of institutional management and work planning guidance, transfer of information on the various waste management technologies and the provision of waste management facilities.

Before the Rubbish Bank program is completed, efforts must be made to expedite the process of waste management facilities and their submission to SHG BRITS upon completion of re-evaluation. Furthermore, it is hoped that SHG BRITS will drive people to manage their own waste through the Rubbish Bank based on the principle of hierarchical management of environmentally sound waste management.

## CONCLUSION AND FOLLOW-UP RECOMMENDATIONS

Mentoring activities for waste management run by SHG BRITS so far have been going well with the support of stakeholders and local communities. Waste management through a mentoring program for the group has been running as expected, critical awareness of group members is established and the group has gained a technical understanding of waste management, namely plastic waste sorting and processing of organic

waste into compost through the mechanism of the waste bank system coordinated by SGH BRITS and Bunaken Village community. Approaches on household prevention used elsewhere have proven effective (Cox *et al.*, 2010).

From the results of evaluation activities for the year of 2012, there are several alternative recommendations for follow-up activities in 2013 to ensure a sustainable program. Sustainability of community-based integrated waste management is a very important thing to maintain the continuity of management processes that have been built up. The things that need to be considered in some aspects of sustainability are as follows:

- Improvement of coordination between sectorial or inter-bureaucratic administration.
- Operational management works in order to improve planning aspects and its control, while the implementation aspect is customized or adapted.
- Operational planning shall be based on long-term plans.
- Involving partners in program planning.
- The formation of a community group as a management organization, which is not formal, but legalized and in accordance with the aspirations of the people.
- It takes 1 (one workshop unit/storehouse equipped with supporting facilities to process and reuse organic and inorganic waste.
- It takes training to increase the capacity of companion and SHG BRITS waste management in the field of handicrafts.
- Infrastructure needed support the implementation of administrative activities of SHG BRITS. There is support for village-level rules for the implementation of community-based waste management.
- Funding for the operational management and maintenance fees or additional infrastructure investment and facilities as needed. The funds can come from government subsidies and community contributions.
- Environmentally friendly technologies and the availability of infrastructure and regional scale waste facility according to community needs are needed.
- There should be active role in implementing the waste management program, primarily related to changes in behavior and culture in sorting garbage from the source.
- There should be support from agencies from urban to transport waste residue levels, absorption compost products and recycled materials, as well

as advanced handling of household waste, which is toxic and dangerous, according to applicable regulations.

- There should be assistance from NGOs, relevant government authorities or consultants to the Self Help Group for a minimum of 2 years.

Finally, there should be a pattern of monitoring and evaluation of the relevant agencies, starting at the village, district, city/county, up to a higher level, i.e., the provincial and central governments. Monitoring and evaluation results can be used as an input to the process of replication. Program development is required as well as more accurate data collection to determine the achievement of program outcomes of Rubbish Bank on a national level. In other parts of the world, such as the Sea = Baltic Sea Region, the project RECO Baltic 21 Tech (<http://www.recobaltic21.net/>) has shown how investments can help to promote waste management.

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#### **REFERENCES**

- Cox, J., S. Giorgi, V. Sharp, K. Strange, D.C. Wilson and N. Blakey, 2010. Household waste prevention-a review of evidence. *Waste Manage. Res.*, 28(3): 193-219.
- Davis, T.B., 2005. Local and semi-local economic impacts of dive tourism in Bunaken national park. Study Report for WWF-Indonesia, North Sulawesi, Indonesia, pp: 54.
- Shukor, F.S.A., A.H. Mohammed, S.I.A. Sani and M. Awang, 2011. A review on the success factors for community participation in solid waste management. *Proceeding of International Conference on Management (ICM, 2011)*. Penang, Malaysia.
- Squires, C.O., 2006. Public Participation in Solid Waste Management in Small Island Developing States. A Research Paper, Caribank, Barbados.
- Tedjasukmana, J., 2011. Paradise Lost: Trash Threatens an Indonesian Treasure. Retrieved from: [www.time.com](http://www.time.com).

- Van Beukering, P., L.M. Scherl, E. Sultanian, C. Leisher and J. Fry, 2007. Case Study 3: Bunaken National Park (Indonesia). The role of marine protected areas in contributing to poverty reduction. The Nature Conservancy Australia, Carlton, Victoria.
- Yunia, C., A. Fauzi, Kirbrandoko and A.M. Yusuf, 2013. Model for strategy of sustainable development of national park (case study of Bunaken National Park). *Int. J. Inform. Tech. Bus. Manage.*, 13(1): 44-53.