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A Study of the Contributions of the Winongo River School (SSW) in Developing Disaster Awareness Behavior in Yogyakarta, Indonesia

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Abstract:
This study aims to understand how the river school contributes and enables community members who can be aware of and sensitive to disasters, concerns and behaviors supportive of river conservation. The importance of the river school emerges because the existing river malfunction, becoming a resultant effect of the community development, which is detrimental to the river environment. This case study was conducted in the Sekolah Sungai (River School) Winongo (SSW), a community-based educational institution located in the river-rich Special Region of Yogyakarta, Indonesia. Areas along the Winongo river, a river that crosses Sub-district Sleman, Yogyakarta City, and Sub-district Bantul, are considered the SSW's working areas. Data collection and analysis were conducted qualitatively. The research concluded that the river school was considered beneficial to the shaping of the community's disaster-aware behaviors and provided positive contributions physically or non-physically in terms of the emergence of community disaster awareness, curiosity in children, economic activities, and a healthy environment, although it still needed to be optimally improved. The study results are useful for developing concepts or theories for community education or community empowerment, especially to generate ideas for encouraging the river school. This encouragement is expected to provide more meaningful, innovative, and holistic activities and gain support by establishing partnerships with parties sharing similar concerns. This study on the river school provides important information regarding the management of disaster education actions in forming disaster awareness in the community. The information concluded by this study can also become an input for academics and practitioners to develop meaningful programs and management of river schools.

Keywords: pitch, women entrepreneurs, ATLAS.ti 8, thematic review.

印度尼西亚日惹威农戈河学校(社会福利部) 在培养灾害意识行为方面的贡献研究

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摘要:
本研究旨在了解河流学校如何做出贡献，并使社区成员能够了解和敏感于支持河流保护的灾害、关注点和行为。河流学校的重要性出现，因为现有的河流故障，成为社区发展的结果，对河流环境有害。本案例研究是在位于印度尼西亚日惹河流丰富的特区的社区教育机构双溪塞哥拉(河流学校) 威农戈 (社会福利部) 进行的。威农戈河沿岸地区被视为社会福利部的工作区，这条河流穿过斯莱曼分区、日惹市和班图分区。定性地进行数据收集和分析。研究得出结论，河流学校被认为有利于社区灾害意识行为的塑造，并在社区灾害意识的出现、儿童的好奇心、经济活动和健康的环境方面提供了物质或非物质方面的积极贡献。，虽然它仍然需要优化改进。研究结果有助于开发社区教育或社区赋权的概念或理论，尤其是产生鼓励河流学校的想法。预计这种鼓励将提供更有意义、创新和全面的活动，并通过与有类似关切的各方建立伙伴关系来获得支持。这项关于河流学校的研究提供了有关管理灾害教育行动以在社区中形成灾害意识的重要信息。本研究得出的信息也可以成为学者和从业者制定有意义的河流学校计划和管理的投入。

关键词: 学校、河流、福利、灾害意识、威农戈。

1. Introduction

Indonesians are not strangers to disasters. Almost all the time of the year, disasters hit the community. Those disasters occur in the forms of earthquakes, tsunamis, volcanic eruptions, landslides, floods, hurricanes, and so on, which are always reported in the national media but not limited to them. These disasters occur almost evenly in the entire Indonesian territory. The Special Region of Yogyakarta (DIY) is an area where disasters occur most often. Seventeen natural disaster potentials can hit Yogyakarta, such as fires, floods, tornadoes, landslides, and earthquakes. Yogyakarta has 438 villages, of which 301 are prone to those disasters (BPBD DIY, 2019). More specifically, river-related disasters that can potentially impact Yogyakarta people are floods, landslides, and environmental damage to rivers. The environmental damage of rivers is a consequence of Yogyakarta's geography, which has seven large and long rivers: the Progo River, Gajah Wong River, Gendol River, Krasak River, Kuning River, Code River, and the Winongo River. Even though those rivers greatly increase flood potential, they substantially contribute to Yogyakarta land fertility and water source abundance.

It is unfortunate that the rivers in the DIY area have undergone a change of function as the result of rapid population growth and attempts to meet the housing demands. Changes in the functions of the river are observable on the lands along the river, which are used as places of residence, and over the rivers themselves, which are misused as a garbage dump. The lives of the people living along the river have more or less affected the main function of the river. For example, the river is used by the community to wash, dispose of household waste, cultivate fish in *keramba* (floating cages), and dispose of livestock waste. In addition to mistreating the river, as mentioned previously, the community even goes as far as to mine the river's natural resources, the sand (Setyowati et al., 2012; Handayani et al., 2014; Surahman, 2019). This condition is of great concern. If it continues that way, environmental damage is unavoidable: floods, extinctions of Indonesian endemic fauna, and the drops of community life quality (for example, exposure to outbreaks, death, loss of property, etc.). The extinction of fauna is a great loss because the riverbank has a rich availability of fauna and flora (Irawati, 2014; Yudha et al., 2017; Yudha et al., 2020). Therefore, the community should have vigilance and awareness regarding such risks and take preventive actions against disasters, disaster handling, and post-disaster measures.

Recently, the river school already flourished as an educational and/or empowerment institution managed independently by an organization or community. The function of the river schools is to build disaster literacy for the community, especially those living along the river.

The river school aims to equip community members with knowledge on the types of disasters and the risks those disasters invoke, develop the people's readiness to take effective measures to avoid the impacts of disasters, and build awareness over environmental sustainability (Duffy, 2018, 2020; Torani et al., 2019). As a social institution, the river school has independent management, which the community handles, either by an individual or a certain group. The river school organizes various activities related to disaster mitigations, for example, managing learning and training activities for all levels of society, organizing productive economic activities, managing the surrounding environments, and providing environmental development assistance or advocacy to the community. Individuals involved in the river school have the authority to plan, manage, and evaluate various education and/or community empowerment programs to develop community disaster literacy (Habiba et al., 2013; Shaw, 2014).

As an educational institution, the river school plays an important role in developing disaster awareness because the school management involves the community and the potencies in the community. In its efforts of educating and empowering the community to develop the community's adaptability and resilience to disaster, the river school requires collaborations from

various parties. These various parties, on which the river school is managed and relies, come from more than one particular party, such as particular individuals or private organizations. Aside from those parties, the river school also uses local potencies (Clurk-Ginsberg, 2020; Luu et al., 2018; Chowdhooree et al., 2020; Feteke et al. 2021). This statement is verified by an empiric finding stating that the community's awareness and involvement in the management of disaster risk reduction activity provide benefits in the disaster risk reduction (Apriliani, 2017; Sharma et al. 2015; Miles, 2018; Jamshed et al. 2018; Engel & Wanger, 2019; Fernandez & Shaw, 2013; Tohani & Wibawa, 2019; Lin, 2019). In addition, the community involvement in the river school management serves as proof of democratization and decentralization processes of the disaster management, reducing the top-down approach, which puts more emphasis on the development of infrastructures such as developing *talud* (retaining walls), preparing evacuation routes, and making green areas; as well as lowering strong sectoral ego (silo mentality); and allowing people to understand that disaster management is not solely the work of government or other external parties.

Based on the notions previously presented, this research tried to find out the contributions of the river school as an institution that educates and develops disaster literacy of the community, especially the communities living around a watershed that are highly vulnerable to disasters, to lower the disaster risks. In the Indonesian disaster discourse, only a few studies on the river school's efforts on disaster education have been conducted. The number of studies on such education that is well-planned, systematic, and tends to people's needs is even fewer. Understanding how the river schools conduct their educational efforts should be achieved. Such understanding will become important information to build a fundamental to formulating a development program or educational effort on disaster management. That program or effort is expected to be innovative, both in the management and the education effort, and impactful to the life of the society.

2. Method

This research is a case study (Yin, 2015) to understand how to improve the beneficial contributions of the river school to developing disaster awareness behavior in Yogyakarta. The case observed was the Winongo River School (SSW). The reason for this selection was this river school conducts its activities from the areas around the upstream to those around the downstream of the Winongo River. The Winongo River is a long river that crosses Sleman Regency in the north, Yogyakarta City in the middle, and Bantul Regency in the south. The length of the river from its upstream to downstream reaches 63 km. This river has many tributaries, especially in the upstream area (Sleman). Communities make use of this river because it is not too big/wide or deep. SSW has three main working areas: 1) the north area, which covers Girikertoand Turi, serving as a water conservation and tree planting area; 2) the central area or Yogyakarta City, an area whose focus is the regional planning; and 3) the south area or Bambanglipuro, Bantul, which focuses on river fauna conservation.

Informants were selected purposively. The basis for their selection was their roles in the river school management, namely river school managers, community leaders, disaster volunteers, and community members who lived around and used the Winongo River. Researchers interviewed informants, both personally and in the focused discussions, in the three SSW working areas. Prior to the interview, permission was requested, and good communication was established. Interviews were carried out in turn from one source to another based on the research locations. Initially, interviews were conducted with key informants who initiated the river school. Later, other informants, both administrators and community representatives in Sleman, Yogyakarta, and Bantul areas, were gradually interviewed. Researchers also carried out observations by perceiving the conditions of the river environments, river school activities, and arrangements of the river environment and community activities around the school and river environment directly. While performing observation, the researchers still focused on the research objective, i.e., the benefits offered by the river school. In addition, researchers studied information from the documents on the river school management, river school products, teaching materials developed for the school, and related documents or archives owned by informants.

Data analysis was performed qualitatively by reducing data, presenting data, and drawing conclusions. Triangulation techniques were used on the data sources to ensure data validity. Such triangulation was performed by checking the data that had been obtained through several sources. The checking procedure involved comparing various information on the same thing obtained from different parties so that the level of data confidence was assured. The researchers carried out the extension of the observation to obtain objective data and research results. Thus, the research results were declared valid and accountable.

3. Results

Referring to the research objectives as previously stated, the presentable results of the research include: a) a brief description of the Winongo river school (SSW), b) the education or empowerment program carried out by SSW, c) the benefits offered by the SSW, and d) the obstacles faced by the SSW. The details of the research results are presented as follows.

3.1. Brief Description

The Winongo River School (SSW) is a community development program aiming to conserve the Winongo River. This institution is under the *Winongo Asri* Communication Forum (FKSW) management, which was established on August 16, 2009. This forum was founded by several people who had a great concern for the environmental conservation of the Winongo River. Those people voluntarily educated societies to develop clean-river-awareness. SSW's vision is to "Create a Clean, Healthy, Productive Winongo River". This vision is to be achieved through the missions of the institution, namely: (a) undertaking conservation and saving springs to ensure basic availability of water, (b) improving the quality of the residential environments and healthy residential areas, (c) improving the life and livelihood of community living in the river environment to be more productive, and (d) developing behavioral or cultural changes in the community towards the Winongo River. SSW organizational management was formed to bring this mission into reality, consisting of forum chairman, program coordinator, guidance division, education and training division, research and data division, advocacy division, secretariats, financial divisions, and regional coordinators for Sleman, Yogyakarta City, and Bantul. Regional coordinators are, in particular, received assistance from group leaders. Sleman has three groups, north, central, and south zone groups. The regional coordinator for Yogyakarta City receives assistance from eight groups, namely the *Becak Maju* group, the *Bendolole* group, the *Tombro* group, the *Greskap* group, the *Pakalan* group, the *Wiranata* group, the *Panduwijayan* group, and the *Dukuh Julantoro* group. The Bantul coordinator enlists assistance from the north zone group, the central zone group, the south zone group, and the west zone group.

The working areas of SSW are areas along the Winongo river, which cover 49.7 km and include three regency administrative levels, including Sleman Regency, Yogyakarta City, and Bantul Regency, with a total of 19 sub-districts. The focus of the river school development can be described in three points, in which those points are based on strategic issues that are considered important. For the northern area (Sleman Regency), conservation, management, and utilization of water resources are the focus. The Yogyakarta City area emphasizes planning residential areas and their environments: conserves the river boundaries and carries out the M3K movement (*mundurmunggahmadhep kali*), moves away from the river, builds a higher building, and builds a building facing the river. The south area (Bantul Regency) directs its efforts on conserving fish reserves. The following is a map of the Winongo river basin. The light blue color on the left shows the flow of the Winongo River.

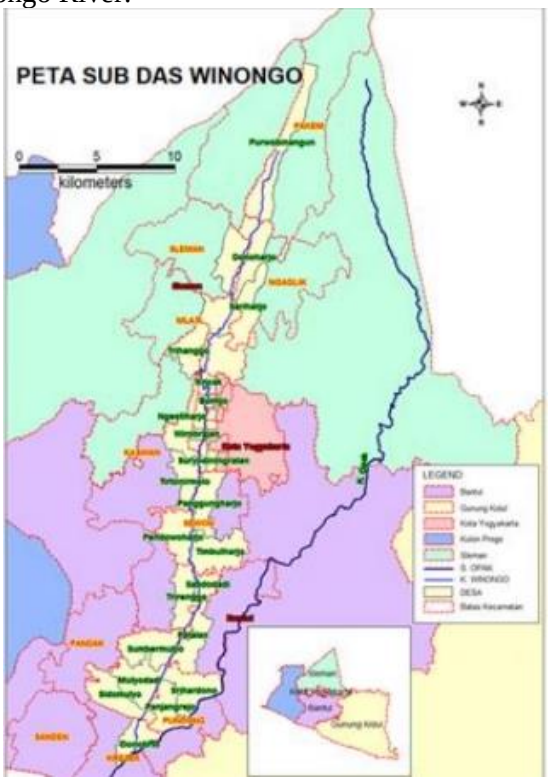

Figure 1. Sub Winongo River Basin (FKSW profile, 2020)

SSW program implementation relies on the collaborations of its managers with various parties having the same views in developing a culture of loving and preserving rivers. The parties involved include government agencies at the regency/city, provincial, and national levels whose job are related to the development and preservation of river areas, such as the *Dinas Lingkungan Hidup* (Environmental Service), *Badan Lingkungan Hidup (BLH)* (the Environmental Agency), *Balai Besar Sungai Serayu Opak* (Major Service Agency of the Serayu and Opak Rivers), *BAPPEDA DIY* (Development Planning Agency at Sub-National Level of Special Region of Yogyakarta Province), and the government of Yogyakarta City. Partnership with government agencies is required to obtain supports, legal recognition, and funding required to implement SSW programs. Cooperation with universities such as UGM, UKDW, UIN, and Atmajayawas also established for community assistance, environmental planning implementations, water quality assessment, etc. In addition, *SSW* also partners with similar institutions such as *Satu Nama* NGO, *ARKOM*, and *HDS*to socialize and communicate the development of the river awareness movement.

3.2. River School Education Program

SSW provides education and/or community empowerment for both children and adults by considering the resources it has, as described below.

3.2.1. Biotilik Learning

Biotilik stems from the word 'bio', which means biota, and 'tilik', which means observing carefully. Thus, *biotilik* is defined as an environmental monitoring activity using biota indicators. It is synonymous with the term "biomonitoring". *Biolitik* learning aims to build the younger generation's understanding of water quality, river water pollution, prevention measures and develop caring attitudes for river conservation. The targets of *biotilik* learning are children taking early childhood education, elementary school students, and adolescents at the high school level. They are recruited by river school managers from partner schools. The recruitment procedure requires the river school managers to visit the nearby schools to inform and offer *biotilik* activities, especially schools in Bambanglipuro and Yogyakarta City. *Biotilik* is funded from the tuition fees by people who register, each person paying about 70 thousand rupiahs. These funds are used for meals, accommodation, equipment, and the guide's fees.

The learning directly involves the participating people to understand the river environment. The learners are invited to go directly along the river, commonly called *susursungai* (river tracking) over a particular distance. The distance covered depends on the river conditions; for example, they follow the river for two kilometers in the central area. In this lesson, the learners are divided into several small groups, each under a guide who helps them in the learning process. At the beginning of the lesson, the guide explains the learning objectives and gives instructions or directions regarding the technical implementation of learning, such as finding location points, filling out worksheets, and assigning tasks. The task given is to observe the quality of the river by taking water samples at a certain point or place. This *biotilik* learning uses modules developed by managers. The materials of the modules discuss things such as types of animals that indicate that the water is clean, river conversation process, nature preservation, and what the riverbanks look like. At the end of the lesson, the guide asks the learners to discuss the findings in a study group where each smaller group presents the results of their study, and then the results are discussed with other groups. The guide also provides a detailed explanation related to the research results by the learners so that the learners acquire uniform knowledge, such as river pollution, indicators of changes in water quality, negative impacts of environmental damage, etc. Figure 2 below shows the activities of the elementary and high school learners who observed the river during a *biotilik* learning process.

Biotilik activities are also offered to local community members. Those activities serve as a means of evaluating river water quality. The procedure goes by inviting the locals to dive into the river to assess the water quality using the guidelines provided by the river school. Locals also receive information on the environmental problems in the river ecosystem, so they can formulate a plan to improve river conditions. In addition to assessing the quality of river water, *biotilik* is also carried out to observe the community wells to measure the level of pollution in the surface water. The manager carries out this activity, together with community leaders, students, WALHI (an environmental NGO) volunteers, and local youth by studying particular points of the river where river water samples are collected.

Figure 2. Biotilik learning process

3.2.2. Releasing Fish Seeds

Releasing fish seeds is the answer to people's exploitation of natural resources in the river. Overfishing using drugs, stun equipment, and so on, while ignoring its destructive impact, is the causing factor of fish depopulation in the river. This problem becomes increasingly alarming as there is public disinterest in this exploitative behavior. The process of releasing fish seeds is tailored to the needs. It involves fishermen, as conveyed by Ivn, the manager of a river school in the Turi area, "Releasing fish seeds is carried out to establish a partnership with the fishermen who always play a part in the river protection". Similar actions are taken by the river school manager handling the southern part of the Winongo River, as explained by Yud, "several activities were carried out such as *mertikali* or releasing fish seeds to improve public awareness of the river". According to Yud, this concept is basically an invitation to the community to be more concerned with the condition of the river through the holding of various activities, such as releasing fish seeds. These activities aim to encourage people to improve their concerns and restore fish populations in the river.

3.2.3. Prohibition of Illegal Fishing

Managers issued a prohibition to anyone benefitting from the river wealth by harming nature, including river fauna. This prohibition is disseminated in the form of delivering information that tells, educates, and enlightens the community not to engage in illegal fishing, such as fishing using electricity and poison, and

following the applicable regulations. The information also contains messages about sanctions for those who violate the applicable regulations and social sanctions from the community that the violator will receive. This information is conveyed to the community members in writing forms or non-writing forms. The manager communicates this message on various occasions in the community, for example, in meetings at the village and hamlet levels such as *PKK* (family welfare program) staff meetings, *RT* (neighborhood association)/*RW* (society association) meetings, *karangtaruna* (village youth association) meetings and through informal communication during interactions with community members. Such an enlightenment method is predominantly carried out by the manager to the community living upstream of the Winongo River, especially people of Girikerto, Turi, Sleman.

Meanwhile, in the southern area of the Winongo River and informal communication, written information, such as distributing or placing leaflets, banners, posters, and announcement letters, is also used. Banners are placed in places where a large number of community members can read them, for example, on the main road, bridge to the village, and on the banks of the Winongo River. The banner placement uses funds obtained from other parties, such as financial assistance from the government and/or voluntary donations from community members or other parties.

Figure 3. River cleaning (*mertikali)* (Forum Komunikasi Winongo Asri, n.d.)

Mertikali (cleaning river) is local wisdom adopted by the Yogyakarta people to conserve, protect, and preserve a river. *R*egularly done at least twice within one year, *mertikali* aims to foster togetherness, awareness, concern, and a sense of belonging in the community to maintain river preservation. *Mertikali* tries to revive people's awareness and concerns maintaining and preserving the river through local wisdom and the spirit of mutual cooperation as a tradition of the people around the river. This activity is manifested in the efforts of cleaning river from trash carried by water flow to be later disposed of to a specified trash dump, checking places of pollution on the river, conducting planning to the surrounding environment (for example, building a playground), controlling the household waste sewer running into the river, etc. In addition to those activities, *mertikali* also held events that developed environmental and cultural literacy, for example, *jathilan*/*reog* art performance, art performance for children, and *karawitan* (musical) art performance. *Mertikali* starts when the manager establishes coordination with community leaders and representatives and receives the involvement of external parties outside the river school. Examples of community leaders and representatives are the *RW* head, *karangtaruna* leader, and PKK head at the hamlet level. The manager discusses the implementation of *mertikali* with these people. The external parties involved are, for example, local village government, regional government, local environmental services, *BPBD* (disaster management agency), local police department, etc., whose support will guarantee the success of the programs.

3.2.4. Waste Bank Management

There is waste bank management in the area of the Winongo River, to be precise, in the Kalurahan Pakuncen. Several years ago, Kalurahan Pakuncen was an area where household waste was dumped. Lack of public concern for the environment turned the household waste area into a waste ravine. The waste bank was then built and called the *Migunani* Waste Bank. It operates from the *RW* Hall. This waste bank accepts various wastes from the community, such as paper, plastic, bottles, iron, and worth selling waste. The depositing waste mechanism is the waste from the people's homes is sorted based on the waste category before the waste is deposited to and weighted by the waste bank every Sunday. The deposited waste, called waste saving, is recorded by the management in both the customer's and management's books. The customers do not immediately receive money from the waste they deposit but have to wait until the trash is sold. The agreement states that the customer will receive 80% of the waste sale while the remaining 20% goes to the bank to fund its operations. Currently, locals have various savings and usually withdraw the money at a particular time, for example, before the Eid al-Fitr. In its management, this waste bank technically has a problem. This problem lies in difficulty to select and weight the waste due to lack of required tools and the waste variety-related problems.

3.2.5. Planting Trees

SSW manages water resources conservation efforts to prevent flooding or water shortage, especially in the Winongo upstream. One of the conservation efforts is to educate the community to grow plants that collect water underground in the residents' yards, such as *gayam* trees (Tahitian chestnut (*Inocarpusfagifer*)), *ketapang* trees (tropical almond (*Terminalia catappa*)), *manggis* (mangosteen (*Garcinia mangostana*)), and *bungur* (crape myrtle (*Lagerstroemia*)). The tree planting is carried out through a series of mechanisms. First, the

productive trees such as mangosteen and mango trees are intercropped with the *salak* trees (*Salaccazalacca*) in the people's *salak* plantations. The reason behind this intercropping is to avoid people's rejection if they are directly requested to plant those recommended trees and have to ignore their *salak* trees. Locals heavily rely on their *salak* plantations economically. Replacing their *salak* trees with trees recommended by SSW will significantly disrupt their livelihood. Thus, such an action tends to incur the locals' uncooperative behaviors. Second, they conserve water by planting trees along the river to prevent landslides and conserve groundwater, ensuring sufficient water in the river, especially during the dry season. The manager relies on seed supplies from other parties in this activity, such as the local agricultural office and the village government. The school is still unable to produce seeds independently due to a lack of expertise and minimal funding.

Downstream the Winongo along *Dusun* (hamlet) Samen, Bambanglipuro, it is recommended to plant *serai*trees(lemongrass (*Cymbopogon citratus*). These trees grow in numbers along the river, have an economic value, collect water in the river ecosystems, and reduce soil erosion. The manager formed a lemongrass cultivation group whose members were the locals. However, economic profit obtained from lemongrass has dropped due to lower market demands and increased supplies, especially in the last three years. The lemongrass is also sold unprocessed, so it does not have an added value.

3.2.6. Environmental Advocacy

The actualization of environmental advocacy is through community awareness and partnerships. In particular, this activity intends to foster the community's sensitivity. This sensitivity will, in turn, lead them to avoid damages to the environment, prevent flooding, keep out pollution and disease outbreaks due to actions of irresponsible individuals or organizations, and provide public facilities such as trash facilities, green land, and bridges. Advocacy also builds educative and awareness-invoking communication to disseminate knowledge on environmental preservation, actions polluting environments, illegal fishing, etc. through various media such as community meeting forums, *pengajian* (Islamic studies) and *karangtaruna* (youth organization activities), telephone/WhatsApp, and written media such as appeals, banners, or articles which develop awareness and knowledge of environmental literacy. In addition, the management, together with the residents, conducts problem analyses, for example, how to prevent plastic waste from being dumped into the river, arrangement of trash bins on the banks of the Winongo River, productive use of rivers, etc. There are open discussions with community members to identify the causes of environmental damage. Waly told a story when the river was once polluted by waste from an educational foundation. Responding to the misevent, the manager and the community representatives started a discussion before they decided to survey the location of the pollution and start a discussion with the foundation, so the foundation did not take such an action. There are also discussions about the development of riverbank areas, aiming to make those areas productive. Those areas include *Dusun* (hamlet), Mraen, and Melati. An agreement was once reached to use vacant lands for environmentally friendly fish farming, which later led to the foundation of the *Mina Mandiri* fish farmer group, and for vegetable farming.

The manager also creates a communication network to connect the community with external parties who want to help develop environmental sustainability. The manager lobbies other parties, such as the local government, to convey the environmental problems faced by the community, either by directly visiting related parties, attending meeting invitations, or personal approach. For example, the bridge connecting *Dusun* Bener and *Dusun* Kricak, Yogyakarta City, was constructed after the manager heard complaints from the residents of the two *dusuns* (hamlets) during a community meeting forum. This complaint summarized the difficulties the locals experienced when they wanted to go to the other hamlet. Moving to the other hamlet, which was located to only the east or west of their hamlet, the locals had to take a longer route. This problem was intensively brought to the knowledge of the *Dinas Pekerjaan Umum dan Permukinan Rakyat* (Office of the Public Works and Housing) by the manager, one of which was by submitting a bridge construction proposal. The serious efforts finally paid off when the proposals submitted were finally approved, and construction started.

The *Mundur Munggah Madhep Kali* Program implies moving away from the river, building higher buildings facing the river.

The *Mundur Munggah Madhep Kali* Program is a form of settlement reorganization in the *Kelurahan* (urban village) Pekuncen, Yogyakarta City, a densely populated area with a messy settlement condition, especially the residential areas belonging to those living right on the edge of the Winongo River. This program was carried out to develop a healthy environment-aware community through building well-ordered residential physical facilities. As a definition, this program was a movement to invite the community to build a settlement by moving away from the river bank at least three meters, building a higher house, and turning the house to face the river. This program, called 3M, had a process that was carried out in stages: identifying problems, planning, and evaluation. The staff and volunteers conducted the stage of understanding the problem to find the root of the problem that led to an unhealthy

environment. Through observations and interviews with the community, information on existing physical and non-physical problems was obtained. Physical problems were problems related, but not limited to, messy buildings, population density, physical feasibility of buildings, environmental accessibility, drainage, drinking/raw water services, wastewater management, and solid waste management. Examples of non-physical problems were the legality of building construction, population density, livelihoods of the population, use of electricity, health service facilities, and educational service facilities. A solution to this problem was then formulated by conducting participatory planning that involved community leaders, representatives, and facilitators. The results of the planning were accommodated in a grand design plan which includes the construction of hydrants, construction of a 200-meter-long retaining wall, repair of communal IPALs (*instalasipengolahan air limbah*–communal wastewater facilities), construction of PAMs (tap water facilities), green open spaces, and construction of livable houses on river banks.

The grand design was then brought by the facilitators to the relevant government agencies, for example the *Dinas PU ESDM* (*Pekerjaan Umum, Perumahandan Energi Sumber Daya Mineral*) (Public Works, Housing, and Energy and Mineral Resources Service), *BBWSSO* (*Balai Besar Wilayah Sungai Serayu Opak*) (Major Service Agency of Serayu and Opak Rivers), *Dinas PUPKP* (*Pekerjaan Umum, Perumahan dan Kawasan Permukiman*) (Public Works, Housing and Settlements Service), *BAPPEDA* (*Badan Perencanaan Pembangunan Daerah*) (Regional Development Planning Agency). Together with community representatives, the facilitators held socialization, communication, and auditions to present the program to those parties and lobbying so that the river area development program obtained their supports, especially financial support. An encouraging result, in the form of gradual funding to the program, was achieved. The details were as follow: In 2013, the river protection retaining wall was built, and the *Migunani* waste bank was in its early phase. Thus, 2014 saw that the Winongo River festival was held, and the second phase of construction of the residential retaining wall commenced. In 2015, a retaining wall and an access bridge to the opposite area were constructed. The construction of rainwater ditches and road paving started in 2016. And a communal IPAL (communal wastewater facilities for processing waste) was put into realization in 2017.

4. Contributions of the River School

The river school brings meaningful benefits to the lives of community members, especially benefits from or related directly to rivers. These meaningful benefits manifest in improving positive community behavior, economic impact, environmental management, fish conservation, and community involvement.

4.1. Positive Improvements in People's Behavior

SSW has a positive influence on changes in the behavior of community members. In the northern, central, and southern rivers, the surrounding communities are all aware of the importance of environmental preservations. For example, during *biotilik* learning, whose learning target is school-aged children, it was revealed that they were aware of the urgency of maintaining water quality. This awareness stemmed from the lesson itself, which educated the children to at least be able to identify the changes in the physical water resulting from water quality damage, such as changes in water cleanliness, changes in color and odor, and the existence of living fauna species. Their knowledge was revealed during the evaluation results of the *biotilik* learning process, as conveyed by the *biotilik* learning guide, Wad:

"The children presented the results of the river tracking. Initially, they collected data, for example, how many fish were there in clear water, how many were in the murky water, on different locations ... They wrote in their notes, as exemplified by the *biotilik* guide, the types of fish, the factors turning the water to be murky, the impact of garbage ... "

River school activities also impact the enthusiasm of school-aged children for fish seeding activities. The fish that were released are endemic in rivers in Java, such as *uceng* (*Nemacheilus fasciatus*), *sidat* (*Anguilliformes*), and *bulus* (*Amydacartilaginea*). The children enthusiastically wanted this activity to be conducted on a regular basis because, aside from providing fun and enjoyment, when the learners released fish, the river school activities opened the learners' horizons about the animal potentials in their environment. According to Wind, the river school manager in the northern part, "children often ask for more activities of releasing fish in the river". This also occurred to children living around SSW in the city of Yogyakarta. When interviewed by researchers, those children felt happy when they saw how clean the river water they often used to play, such as swimming together and a green open environment that they could play together every day.

Changes in insight were also experienced by the community members who fished in rivers for living or other causes. Following the appeal not to fish in harmful ways and ban it, such as using drugs/poison and electrocution, people possessed an awareness to fish legally. Fer, the manager of the river school in the Turi area, stated that patience and education instilled awareness within the people about the importance of preserving the river and the continuity of the existence of various types of fish. Those people monitored the behavior of community members and prohibited the

community's acts that may be detrimental to the river, for example, throwing garbage into the river.

The educational interactions established by managers with the community were also able to instill community awareness to preserve the river. This resulted in the community starting to realize and understand the importance of the benefits of rivers if those rivers were treated properly without destroying them. This public awareness was shown by the number of acts of throwing garbage into the river, which tend to drop, managing household waste without polluting the river, environmental management, and using vacant lands along the river banks, such as in *Dusun* (hamlet) Mraen, Mlati. Such awareness was also shown within hamlet communities in the Bantul area. The communities already realized the significance of water conservation. SSW provided knowledge in the form of training to community members to cultivate lemongrass plants that have a good ability to retain water underground, in addition to its good economic value to add income. Locals, both collectively and personally, grew this plant in their yards. Unfortunately, later, this plant was considered not to last long, and the sales revenue was susceptible to the market price fluctuations. Another program came into fruition, creating individual trash holders in the form of making garbage pits at home, which was carried out by the community to collect trash and not dump it directly into the river.

4.2. Revenue Improvement

The river school existence also impacts the economic aspects of the community around the river school, especially in the Bener, Kricak, Pekuncen, and Bambanglipuro areas. Economic changes took form in the emergence of economic activities. For example, there were small-scale food stalls that helped meet the economic needs of the community. Another example took place in Bener and Kricak Kidul. With the existence of a secretariat and the construction of playground facilities as a physical manifestation of the attention of the city government, Bener and Kricak Kidul attracted people to build food and drink stalls that functioned as places to chat, gather, and play for residents. This economic activity was seen as beneficial for families living around the riverbank, as revealed by a manager's wife who obtained her additional family income from her simple food stall. She confirmed that her business more or less improved her family income.

Similarly, in Pekuncen, Yogyakarta City, the river area was planned to become a trading zone, where some shops, for example, *angkringan* (food chart stall) business, a Javanese noodle shop, and a grocery shop, were run by several residents. According to a seller, this economic activity attracted a sufficient income for an individual, although it still had not reached a significantly enormous level. It was a different story to the people in the northern part of the Winongo River area in Giriker to Turi, where economic activities did not appear in the community. The reason behind this different progress was because the river school activities' priority was the gradual development of environmental awareness in the community. Development of physical infrastructure that allows the presence of new economic activities for the community was still beyond the river managers' consideration.

4.3. Conservation of Endemic Fish

The empowerment carried out by the river school showed another result: the Winongo local fish, and other aquatic animals such as *encang-encang*, crabs, *wader*, and shrimps, started to breed in the river again. Eels, *uceng* (barred loach (*Nemacheilus fasciatus*)), catfish, and other fish were also reported to multiply again. The appearance of various types of fish, especially endemic fish such as wader fish in the Winongo River, brought joy to the community. Those animals' re-emergence or multiplication signaled the relatively good water quality. According to Yud, the prohibition of destructive fishing enabled many fish to multiply, and in turn, those fish could be caught by the community. In addition, Mul stated that the re-emergence of fish was used as a learning resource for children to find out about various local fauna, so the children realized that fish conservation was very important in the future. Believing his own statement, Mul collected various types of fish that he caught, either by using a fishing rod or fishnet, in an aquarium as a medium of education for children to love the environment.

4.4. Physical Environment Arrangement

Community in Pekuncen felt that the existence of SSW was beneficial for the rearrangement and development of an attractive, healthy, and orderly environment. The environmental arrangement took form as several public infrastructures, such as building roads accessible to two-wheeled vehicles and pedestrians, bridges between regions that facilitated access to the community, river safety retaining walls for protection against floods and landslides, a communal wastewater management installation (*IPAL*) as a means of processing household waste, and livable and healthy houses. These facilities provided community members with an accessible road to the river, transportation to other areas, reduced risk of flooding, and orderly settlement arrangements. More encouragingly, the environmental arrangement resulted in the general public's change of view. Initially, people viewed the area of Pekuncen, especially *RW* 10, as a slum area. The arrangement, however, shifted this negative view as people now could see it already having been transformed into a healthier and more orderly area and attracted the attention of people from outside the Yogyakarta area.

Beautification of environments also took place in the Bener and Kricak Kidul areas. Such environmental improvement provided green open space (*RTH*), roads alongside the river, meeting pavilions, gazebos, outdoor educational game facilities, and plant arrangements in areas around the river. Various public facilities provided a place for socialization for the community and a place for playing for children. A good arrangement conjured up a good impression of the beautiful and fun environment, as testified by End, who confirmed that the environment there was used by kindergarten students around to play. When the afternoon fell, many people came and used the playground. The community also experienced no difficulties in accessing the road to the Yogyakarta downtown as they could use the bridge connecting the two hamlets and/or use the road access to the south built along the river. Additionally, the local community's meeting hall was readily available for various purposes, such as *RT* (neighborhood) meetings, *arisan* (a social gathering at a fixed interval to rotate savings), and other activities.

4.5. Community Participation Rising

In the social dimension of social life, SSW has developed participative attitudes and behaviors in the community for development. For example, the activities of *mertikali* were carried out in a spirit of togetherness and cooperation. Although the government initiated the *mertikali*, volunteering citizens also flocked to help and participate in*mertikali* and *biotilik* activities, clean the rivers from trash, and plant trees near the riverbank. Groups of *dasawisma* (ten families) were also involved in the *mertikali* by coordinating consumption for the event, ensuring it ran smoothly. Another change in the community was observable in the Pekuncen area, where community involvement in the 3MK program was able to improve the understanding of healthy environmental management, as well as to drive people to willingly dispose of garbage to the space provided and participate in the vegetable cultivations on limited spaces of land. The head of *RW* 10, Anl, clearly stated that:

"The waste bank makes the people here understand how to adopt a clean and healthy lifestyle… Now they voluntarily sort their trash and then deposit it to the waste bank as their savings. They have long been planting vegetables and flowers in pots or polybags"… (Interview, 25/9/2020).

Not only during the empowerment did the community participate. Communal participation was also observable when people enjoyed the results of their works. Locals, especially in Bener and Kricak areas, spent their free time in the gazebo, green open spaces, meeting hall, and other public facilities to play and converse with others. Those facilities became a means of learning and playing for the nearby early childhood learners to learn about nature firsthand.

5. Existing Obstacles

It was not easy for SSW to develop public awareness, which drove the community to restrain themselves from environmentally destructive behaviors. Obstacles were hindering the development of awareness. The first hurdle was the individual negligence toward the environment that was still apparent in life. An example of such negligence was acts of polluting the river. Particularly in Pekuncen, people still threw garbage directly into the river and farmed fish in *keramba* (floating cages), all of which might clog the river flow. A similarly improper act by many residents in Samben, who dumped their livestock's manure to Winongo tributary, served as another example of environmental negligence mentioned previously. Secondly, the shortage of human resources negatively impacted the SSW work area coverage. Target areas of SSW were areas along the Winogo River. This large area could not be handled by a relatively small number of SSW personnel, not to mention that their voluntary service was only temporary and not subject to a permanent work bond.

Moreover, the staff's skills were not all similar to those people who obtained their skills from their experiences, not prior and proper training. Third, funding was the determining factor for the institution that resulted in the slow implementation of community development activities. So far, the institution, to manage its educational or empowerment activities, sought external funding supports, either through grants or donations. Lastly, developing riverbank areas to be healthy environments proved to be a difficult task due to the incomprehensive, less integrative, and less coordinated regional developments. For example, in Pekuncen, the inexistence of collective waste disposal in the neighboring *kelurahan* (urban village) of Ngampilanled many residents to throw garbage on the banks of the Winongo River.

6. Discussion

A community development organization managed independently by the community, SSW aims to develop disaster awareness and disaster awareness behaviors, love of rivers, and preservation of the river environment. The river school independently carried out various educational and empowering actions that led to achieving these goals. The empowerment activities carried out sufficiently varied in the forms of education or direct empowerment activities such as environmental learning, community awareness, physical environment arrangements, conservation of nature and riverbank environments, and fostering community economic activities. These activities, implemented based on the needs or problems faced by the target group, were

carried out by optimizing the participation of the target group and other parties in the form of funding, ideas, and personnel. This result proved that the river school, as an organization managed independently by community groups, was able to take participatory community development actions and retained independence on how it used its resources. The active role of community organizations in disaster mitigation is very much needed, especially in high disaster potentials, as an effort to create resilience (Suratman, 2016; Davies & Davies, 2018; Ochiai, 2014).

Educational actions or empowerment carried out by river schools brought about a positive impact on forming disaster awareness behavior in the target group (Jassempour et al., 2014; Amini et al., 2020; Beyramijam et al., 2020; Bhattacharya et al., 2020). The findings show that educational actions developed disaster awareness behavior in the community, created a healthy environment, increased incomes at the individual level, and helped maintain the quality of river water, conserved river fauna, and ultimately helped people to view the river as a source of life, not a source of disaster. However, the optimality of these positive benefits was strongly influenced by SSW's performance and how well SSW was able to overcome problems or obstacles such as limited funds, human resources, and the recent partial incompatibility of people's culture with SSW's goals. This is in line with the research results that education or community empowerment related to environmental sustainability and disaster awareness is influenced by human resource qualities, social structures, and community culture (Aghaei et al., 2018). Thus, to bring more benefits to the community, the river school needs to develop innovative and meaningful educational actions in accordance with the nature and potencies of the lurking disasters.

Disaster awareness behavior needs to be developed through meaningful disaster education programs at the individual, organizational, and community levels. A meaningful program must be managed properly, which means that the program starts with identifying problems or potential disasters that may occur and have the potential to cause harm to the community, designing participatory education and/or community empowerment programs, using accessible resources, designing performance-based evaluation activities, and creating a condition or an atmosphere that supports the implementation activities that improve disaster awareness. At the initial stage, what needs to be done is to build awareness and commitment of the target group, preparing them to be ready and willing to learn disaster education actions. Developing such awareness is not an easy job as experienced by SSW, whose activities were initially hampered by the difficulty to instantly turn people to be disaster-aware, especially people living on the banks of the Winongo River. Therefore, intensive, objective and open education must be done through structural mechanisms in the society, sustainable cultural approaches, and/or advanced information technology that is persuasive toward the society.

River school directs its attention to the sustainability of its programs, meaning that the river school needs a plan to develop its programs on the improvement of the society member's quality of life for greater benefits. Programs have to be designed to be more in touch with various aspects of people's lives to allow the possibilities of betterment to take place. The betterment expected to happen is the emergence of disaster awareness and disaster-aware behaviors and the improvement of the people's life in the fields of culture, politics, security, and politics. The findings show that not all life changes took place based on well-designed planning. Therefore, it is necessary to carry out integrative and continuous planning towards the programs that will be implemented along the riverbank areas from upstream to downstream.

The implementation of disaster awareness education carried out by the river school will not run well without the cooperation or participation of other parties (Chowdhury, 2011). The findings show that almost all activities such as *mertikali*, tree planting, and the development of physical facilities received positive support from individuals, organizations, and local governments in the form of funding, moral support, and legality of activities or facilities. This means that the involvement of all parties in the behavior development of the community members along the river is imperative.

Mutually beneficial cooperation based on common goals and views needs to be established by the river school to secure the involvement of these parties. The establishment of such cooperation is based on various methods such as publication, discussion, propaganda, and the applications of advanced information and communication technologies capable of conveying educational messages to all levels of community members.

7. Conclusions

As a community-based educational institution, the river school becomes a solution to various river-related environmental deteriorations triggered by community growth and increase needs by the community members. The river school's varieties of educational curricula or community empowering programs directly related to the preventions of disasters, especially flood which proves fatal to the community, are believed to greatly contribute to the disaster-aware behaviors of the communities living near riverbank areas. Such positive transformations are manifested in how the community finally views the river positively, resulting in curiosity toward the river, generating a healthy way of living,

water quality and environmental improvements, and economic activities beneficial to the society. However, such development of the disaster awareness behaviors faces challenges in conservative people who maintain their unconstructive behaviors, minimal funding, limited human resources, and lack of integration with other empowering programs by external parties.

To maintain the building of community resilience to disasters and create a healthy river environment, understanding the benefits river school offers is vital as this information serves as a useful input to developing a suitable disaster awareness program for the community. The optimization of the benefits of the river school can be achieved by developing innovative, variative, and large-scale educational and/or community empowerment programs. The river school education program is developed on objective educational needs as its priority and community-based program management. It is supported by meaningful partnerships with parties concerned with efforts for developing disaster awareness behaviors.

8. Limitations and Further Study

This study only focused on understanding the educational process of developing disaster awareness run by the river school as a local-based educational institution. Future, for being an effective organization, research which is to give treatment could be done by the focus on developing learning, program, and management of the institution.

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Co-authors' Contributions

The authors were involved in conducting research, collecting and analyzing data, creating and reviewing articles under the obligations of research group members.

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