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Education4Conservation, an evolving international program and 14-year curriculum of environmental education

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Abstract – Education4Conservation evolved from an environmental education program in Balikpapan Bay, Indonesian Borneo, after its critical evaluation. The initial goal of the program was to support the development of future conservation leaders who would join the ongoing efforts to conserve proboscis monkeys (*Nasalis larvatus*) and their coastal forest habitat in Balikpapan Bay. We realized that to achieve this goal, we would need to work with students from the age of 4 years and continue to educate them for many years. We also realized that we needed to focus more on mentoring teachers and incorporating their feedback into the curriculum. The new program, which is in line with the new Indonesian national curriculum (Kurikulum Merdeka), has proved attractive to teachers and has spread from Kalimantan to other Indonesian islands and countries outside Asia. The curriculum continues to improve through regular monthly revisions that incorporate feedback from teachers, while teachers' pedagogical skills have improved through guidance provided by responses to each of their reports. We have been following and supervising participants since the Education4Conservation program began in 2022. Although a preliminary evaluation seems to indicate substantial improvements over the earlier program (in terms of high participation, positive teacher response, improved reporting skills, and increased clarity and applicability of the curriculum), it remains to be seen whether the program ultimately achieves its primary goal to help raise some of the students into conservation leaders.

Keywords – DRC, environmental education, Indonesia, Madagascar, Uganda.

Origin of the Education4Conservation program

In 2006, the corresponding author of this article initiated a project focused on the conservation of a large population of proboscis monkeys (*Nasalis larvatus*) in the coastal forests of Balikpapan Bay (Atmoko *et al*., 2024). This ongoing program (which we internally refer to as the Balikpapan Bay Conservation Movement) involves and integrates wildlife research, environmental monitoring, patrolling, and environmental advocacy at the policy and implementation levels. The program can be classified as citizen conservation (defined as "people who take an active role in protecting species and the natural environment through a range of conservation activities" by Conservation Volunteers Australia, Anonymous, 2024) as it mainly involves citizens of Balikpapan City and Penajam Paser Utara Regency. The local citizens

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were welcomed to join the program as volunteers with no restrictions on their professional background or formal education but were required to work under the close supervision of experienced senior team members. They formed a strong, highly motivated, cohesive, and skilled team without being formally recognized as a single organization. While the core team fluctuated around a dozen members, the broad membership reached more than a hundred supporters during major campaigns, which included opposition to controversial projects such as the expansion of an industrial area (Mutterback, 2012), the construction of a provincial road along the coast (Gokkon, 2017), or some aspects of the development of the new capital of Indonesia (Gokkon, 2023, 2024). While the basic wildlife and environmental monitoring activities in Balikpapan Bay received international support from zoos and NGOs, most of the team members involved in campaigns and environmental advocacy participated on a volunteer basis. Through their commitment to environmental stewardship, this team has become a key player in local conservation efforts.

Initially, many of the team members were young, unmarried students or young professionals. They had an abundance of time and enthusiasm to devote to this conservation movement. However, as the team members aged, an increasing proportion of them married or secured higher-paying jobs elsewhere. Some team members left the area, often moving to other islands, or becoming overwhelmed with other responsibilities. Those who left the team were replaced by their friends and colleagues, and the team maintained its size for many years. However, this resulted in the creation of an aging generational cohort. Intergenerational differences in perceptions and values can make the conservation efforts of the older generation less meaningful to the younger generation (Maleknia *et al*., 2024), which can lead to a spiral of recruiting even fewer younger members. The rate of membership renewal in the Balikpapan Bay Conservation Movement gradually became insufficient to sustain conservation efforts. More formalized forms of recruitment would not be in line with the principles of the community group, which emphasizes voluntary participation. We realized that to ensure the long-term stability of the team and the viability of the program, we needed to do more to motivate the younger generation.

To achieve the goal of team renewal and continuity, we chose to work with secondary schools, hoping that these older students will soon be studying at universities and perhaps considering their professional careers in conservation. Since 2015, we have visited 30 middle (junior secondary) and high (senior secondary) schools. We have given 51 presentations to about 600 students aged 12-18, trying to cover all the villages and suburbs along Balikpapan Bay. However, we gradually realized that most of these schools were not truly interested in working with us. Many local teachers lacked enthusiasm for their profession. Without constant encouragement from their teachers, none of the students became involved in the citizen conservation movement.

We also observed that we were compromising the quality of the program for the sake of numbers. We visited each school at most twice a year and met with most of the students only once. We realized that if we wanted to provide a more formative experience and encourage students to become young conservationists, we needed to meet with them multiple times, more regularly, and from an earlier age than 12-18 years, even if it meant limiting the number of participants in our program.

In addition, we gradually realized that our program was more of a campaign than an educational program. We were very focused on changing students' attitudes, and we simplified the complexity of environmental issues due to the limited time available for each class. Campaigns serve to increase the certainty and conviction of certain attitudes to facilitate a clearly defined behavioral change in a large number of respondents. However, this focus on the simplicity of the message sacrifices an understanding of the many facets of the issue and its broad context, something that may be necessary for lasting change in a complex and dynamic environment. In our case, the students enjoyed the presentations on the life and ecology of

proboscis monkeys and our efforts to save the species from extinction, and we likely increased their compassion for the animals and their opposition to ongoing environmental degradation. But this change in attitude was not enough to engage the students. There was no simple change they could immediately make in their daily lives to help protect the monkeys, and the connection between our conservation efforts and their future lives and careers remained too obscure to keep the students interested in the long term.

In 2018, we decided to change our strategy. We selected only four schools, including two primary, one junior secondary, and one senior secondary (86 students, 9-18 years old), all located in the same area (Mentawir), which we considered the most strategic for long-term education efforts due to the combination of high biodiversity, relatively healthy ecosystem, and only mild threats with less urgency for immediate conservation action. We hired a freelance teacher and her junior assistants to work with professional teachers in each school to deliver the activities. We asked the teachers in each school to select a group of the most enthusiastic students, and our team met with each of these groups every month. During these monthly meetings, the students learned a broader curriculum that included primates and other animals, plants, ecosystem science, and sustainable living. Lessons focused less on presentations and more on games and hands-on experiences. We successfully followed the students for 2.5 years, even as they graduated and moved on to the next level of education. However, we again found that none of the students who graduated from secondary school went on to study a conservation-related discipline, and none of them went on to volunteer for an NGO or citizen conservation movement. Perhaps most importantly, we found that teachers who participated in the program developed a teaching routine rather than a deeper interest. We believe these two problems are related. We had focused more on developing the content of the curriculum than on supervising the teachers who were using this tool. We have gradually come to realize that teachers who see teaching the curriculum as a task to be completed, without truly sharing our enthusiasm and vision, will not become good motivators for their students, and that motivating teachers beyond just doing their job may be the key to bringing about change in their students. This is supported by several studies that highlight the role of motivated teachers as models of the desired behavior in changing their students' views, for example, from an anthropocentric to an ecocentric perspective (Smith, 2020).

In 2020, the COVID-19 pandemic hit Indonesia, and the schools where we worked were closed. Online education did not work well in rural schools, and our freelance teachers lost contact with students in remote villages. Our environmental education program collapsed during the pandemic, giving us several years of experience and time to thoroughly evaluate and reflect on the program's successes and shortcomings. The result of this evaluation was a new program, which we named Education4Conservation, and which has been running since 2022. As some of the teachers pointed out, the Education4Conservation curriculum converges on important aspects with the new national curriculum, Kurikulum Merdeka. Both curricula emphasize soft skills and character development (student-centered teaching) and flexible interdisciplinary learning with a focus on essential concepts. The implementation of Kurikulum Merdeka in Indonesia has been challenging, in part due to inadequate training (Asrifan *et al*., 2023; Marthana Yusa *et al*., 2023), so some of the teachers appreciated that the Education4Conservation program provided detailed guidance on some of the new teaching principles. In addition, some of the teachers and schools were motivated to join the Education4Conservation program because it may increase their chances of successfully participating in a highly prestigious Adiwiyata Green School program sponsored by the Indonesian government (Prasetiyo *et al*., 2020). There are important differences between the Education4Conservation programs, most

notably that Adiwiyata is perceived as competitive while Education4Conservation is not. However, both programs strongly focus on introducing sustainability principles and practices into the real daily life of the school.

Despite all the conceptual changes, the goal of the new Education4Conservation program remained the same as at the beginning of our environmental education efforts in Balikpapan Bay, i.e. to promote the development of future conservation leaders, but we have largely redesigned the entire program based on the lessons learned from our previous unsuccessful efforts. Our initial goal was to continue environmental education in Balikpapan Bay, but we offered our new curriculum to some of our colleagues outside of this area. There were many more schools interested in joining our program than we had anticipated, first in Indonesia and then in other countries. In response to this demand, we have broadened the goal of the Education4Conservation program from its initial focus on securing the future of the Balikpapan Bay Conservation Movement to providing the same curriculum and guidance in other areas where it can help develop future conservation leaders in other environmental programs. At the time of writing this paper, the program involves schools in Indonesia, Madagascar, Uganda, and the Democratic Republic of Congo, and we are in the process of negotiating with teams from other countries. The renewed program is now in its third academic year.

The aim of this paper is to present the current concept of the Education4Conservation program as it has evolved from a trial-and-error approach to a more systematic and robust tool that is now being applied not only in Indonesia but also in other countries. Many details of the program will continue to evolve, but we believe that the basic concept has been established. However, our goal of recruiting future conservation leaders cannot yet be measured. The Education4Conservation program is therefore presented as a hypothesis for a promising approach to environmental education that is currently in the slow process of being tested and validated.

The current state: program design

Education4Conservation is a loose network of professional and volunteer teachers, with no larger organization governing the whole network. The coordinator (corresponding author of this article) provides teachers with the latest version of the curriculum and close guidance every month, but otherwise, each team of teachers acts as an independent unit, following its own goals and organizational rules. The curriculum was designed to be flexible and adaptable so that the autonomy of each team would not hinder its implementation. Teachers are recruited to the Education4Conservation program mainly through a "snowball" effect, as teachers involved in the program and other colleagues tend to invite new schools to join each year. We encourage teams to try the curriculum for at least a month before deciding if they want to be long-term participants in the program. The only requirements for working with us are that each team consists of at least 2 adult teachers (since each activity requires the presence of at least 2 teachers) and meets with one or more groups of the same students each month to teach the curriculum. Beyond that, there is no strictly prescribed model for organizing the work. Teachers can be professional teachers employed by the school, freelance teachers, NGO staff, or local citizens interested in environmental issues. Teaching can take place at the school or elsewhere. It is the responsibility of each team to ensure that their activities comply with the official regulations applicable in their area, as well as social and cultural rules.

The Education4Conservation curriculum begins in kindergarten (preschool level). Most students are about 4 years old when they join the program, which is much earlier than in our previous program. There is a growing body of research that demonstrates the importance of environmental education at a very early age (Ardoin and Bowers, 2020). One of the major changes and challenges of our current program is that the curriculum is designed to last 14 years. Our goal is to follow as many of the preschool children as possible to higher levels until they graduate from secondary school and enter university. This extended time frame

will give the children the opportunity to grow and develop. We believe that in education (as opposed to campaigns), a slower, more gradual approach is more effective (we refer to the concept of Slow Learning; Doghonadze, 2016). We expect that most students will not complete the 14-year course. Some students will leave the program before completing secondary school, while others will enter the program in a higher grade rather than kindergarten. However, we believe that the limited number of students who complete the course can become exceptionally skilled and motivated conservation leaders, while those students who experience it for only a few years will still be significantly influenced by the program.

The Education4Conservation curriculum is currently available in 3 languages, English, French and Indonesian, and we plan to create a Spanish version as well (the latest version of the curriculum is available upon request from the corresponding author). Unlike our previous educational materials, the Education4Conservation curriculum does not have a specific focus on primates, although students will learn about primates during several activities. The curriculum represents a compromise between cross-continental applicability and a focus on local issues. Therefore, some of the activities are only broadly defined and teachers are required to adapt them to the local context. For example, there is a given structure of a story to be read or a drama to be performed, but teachers can decide on the location of the fictional story, the species of animals that are featured, or specific environmental issues that are addressed in the story. Although our primary goal is to educate future conservation leaders, we do not expect most of our students to become biologists or conservationists. Because we believe that caring for our environment is a right and responsibility of all citizens, and because most human jobs have an environmental impact or component, we hope that the Education4Conservation program will help students become environmentally literate and motivated citizens. The curriculum pays special attention to the intersection between ecology and other aspects of our lives to help students see the intersection between environmental issues, their current interests, and their possible future careers. We do not try to teach the children a lot of facts, because we believe that today information is relatively easy to access through the internet and other resources. Instead, we find it more important to stimulate interest in nature and the environment, provide personal experiences, train practical skills, and demonstrate how to implement sustainability principles in our daily lives. We teach broad concepts, including those that are well established in most educational programs, such as waste management or organic farming (Kusumandari and Sukirman, 2017), as well as those that are still largely omitted from environmental education in Indonesia, such as the regulation of invasive species. Rather than providing all the details, we aim to motivate students to learn more on their own and encourage them to find answers to their questions through their observations, reading reliable sources, and talking to other people. We hope to encourage students to think critically about issues that do not have a simple "wrong" or "right" answer, such as planting mangroves, using palm oil, keeping animals at home, or killing animals. Our main teaching method is play, which gradually evolves into projects as the students get older.

Although the design of the Education4Conservation curriculum is primarily based on our previous experience and feedback from teachers involved in the program, we have implemented many principles and aspects from several broader theories. Meaningful Learning theory shifts the focus from the subject to the learner and prioritizes critical thinking and problem-solving skills over memorizing information (Vargas-Hernández and Vargas-Hernández, 2022). The Slow Learning movement recommends shifting the focus away from targets and conventional measurable outcomes, such as test scores, to allow for more thinking, creativity, value development, and enjoyment (Doghonadze, 2016). The theory of conceptual change focuses on challenging misconceptions, which in turn can change a wide range of attitudes and behaviors (Agilande *et al.*, 2015). Experiential Learning emphasizes with the importance of real-world, hands-on

experiences in building interest, empathy, and concern, and places experience as the first step in the learning cycle (Bartle, 2015; Dernova, 2015). The concept of Emotional Engagement emphasizes the role of emotions as a means, not just an outcome, of environmental education (Reis and Roth, 2010). Finally, Cognitive Load Theory (Uzun, 2021) provides guidance for presenting new information in a non-overwhelming way that facilitates comprehension and long-term learning, such as starting with simple tasks and isolated examples, using different modalities to present the same information, and gradually increasing the complexity and relevance of activities in the context of learners' previous experience and current expertise. While none of these theories has been strictly followed in the development of the curriculum, together they cover and explain most of our principles.

The focus of the Education4Conservation program is not on teaching the students (that is the responsibility of each team), but rather on mentoring the teachers. In addition to the curriculum, we guide all teacher teams via WhatsApp groups and send feedback on all reports (see below). In our Facebook group, teachers can watch videos of other teams teaching the same activities. The benefits of this information sharing are mutual and not limited to teacher support and training. One of the most important principles of our new program is to incorporate feedback from our teachers into revised versions of the curriculum. The curriculum is a living document that we continually improve to reflect feedback from the teams. At the end of each activity, teachers write detailed reports that include photos and usually videos of the activities. These reports provide critical insight into how to improve the curriculum. Depending on the specific feedback, this may involve better clarification and a more detailed description of the activities, but also removing some details in favor of more flexibility and space for teacher creativity and invention or providing several alternative versions of a particular activity so that teachers can choose the one that suits them best. While there is no payment for teaching per se, we do reward teams of teachers with a payment of approximately US $22.00 per report in appreciation for writing the report. At the end of each month, we incorporate the teachers' feedback into a revised version of the curriculum. Thus, the curriculum is based on the experience of those who implement it under a variety of local conditions and circumstances. We believe that the fact that the development of the Education4Conservation curriculum is primarily driven by feedback from the teachers who implement it is the most distinctive element of this program.

The evaluation of the Education4Conservation program is mainly qualitative, based on the comments and recommendations included in the teachers' reports. To minimize the competitive element of the activities and stress, there are no formal tests. However, certain elements of quantitative evaluation are embedded in some of the activities. For example, after learning about human and animal faces, students completed an activity in which they prepared face masks of different animals; we could then count the number of details painted on these masks. After listening to a story about a crab that lost a leg and grew a new one, students are asked to draw a picture of the crab; we then count how many legs the crab had to assess how well students paid attention to the story, and we also assess how students colored the crab to determine whether they think of crabs as naturally colored living animals or rather as a red-colored cooked meal.

The current state: experience from teaching

At the time of writing (June 2024), there were 16 teams actively involved in the program. This includes 79 teachers and 1244 students in 20 schools in 4 countries (table 1). Approximately the same number of teams, teachers, and students were involved in the network for more than 3 months between 2022 and 2024 but left for various reasons (see below). The presence rate of individual students during activities shows a bimodal distribution, with a high proportion of students being present for most activities, but also with many students joining the activities only occasionally. The proportion of

Table 1. Age distribution of students active in the Education4Conservation program in July 2024.

Country	# Schools	# Students in each age category								Total
		3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years	
Indonesia	7	1	13	23	73	61	43	6	8	228
Madagascar	6	1	166	74	92	77	13	6	0	429
Uganda	6	40	143	118	148	77	16	19	11	572
DRC	1	2	11	2	0	0	0	0	0	15
Total	20	44	333	217	313	215	72	31	19	1244

students dropping out of the program in the second or third year is higher in Indonesia, where kindergartens and primary schools are different institutions, than in Uganda and Madagascar, where preschool students continue in the same school once they reach primary school age. The total cost of the program for one year was US $7861.00 in 2023. It mainly covered the rewards paid to the teachers for submitting their reports, with only a small portion used to purchase some of the materials, such as fruits and vegetables to learn about healthy eating or tree seedlings to plant. These costs were fully covered by the Ústí nad Labem Zoo and the Czech Coalition for Biodiversity Conservation (CCBC), but a new fundraising strategy will be needed if the program continues to grow.

Major difficulties faced

Most teachers were able to implement the curriculum and most students enjoyed the activities at the kindergarten level. However, some of the minor difficulties we observe at this level may become more serious at a more advanced stage when the activities become more difficult and demanding for both students and teachers.

Education4Conservation program requires active student participation and is a challenge for teachers to keep students interested. The solution at the preschool level is to divide each activity into 2-4 different parts so that students do not get bored easily. At the elementary level, however, students need to focus on a single activity for 60 minutes. In some schools, teachers must deal with too many students in the class. While the recommended number of students for the Education4Conservation activities is 5-20, some classes may have as many as 55 students. The system of splitting classes and sending multiple reports was tried and abandoned after one year because it tempted some of the teachers to start calculating the reward and even abused the system to get more frequent payments. At the preschool level, we prefer to offer participation in Education4Conservation to all students. In higher grades, we advise teachers to reduce the number of students by making participation voluntary based on their interest. But in practice, most schools choose to teach the curriculum to all students even at the primary level.

Teaching the Education4Conservation program requires certain pedagogical skills. We cannot provide pre-training for all teachers, and the new skills must be acquired through "learning by doing". The most common weaknesses of the teachers include a lack of knowledge of biology and ecology, lack of preparation for the lessons, or lack of experience and confidence in outdoor activities. Some of the teachers felt frustrated that they had to collect most of the materials around the school instead of shopping. Adapting the curriculum to the local context was also challenging, requiring creativity and knowledge. Teachers often found it challenging to adapt to different roles in different activities, such as drama, art, science projects, sports, or gardening. However, a large proportion of teachers found these challenges inspiring and continued to improve their knowledge and skills, developing new teaching habits within the first 1-2 years.

Recruiting schools for the program was not without complications. The "everyone gets a chance to join" system has helped us engage highly motivated teachers from remote areas.

On the other hand, it carries the risk of suddenly being overwhelmed with dozens of reports, which may exceed our capacity to process the data and pay the fees for the reports. This happened twice in the first 2 years. In both cases, it was the initiative of a current member who invited too many other schools to join. A simple solution that seems to work well was to limit the number of new members that each of our current network members can invite to no more than 5 new schools.

Another challenge is keeping teachers involved in the program over the long term. This is not a major problem when the teams are formed from professional teachers employed by the school. However, some of the teams are managed by local NGOs rather than the school, and these NGOs often delegate teaching to undergraduate or graduate students who have joined the NGO as interns or volunteers. They often see their involvement in the program as a way to temporarily increase their income and gain experience during their studies. However, they may lack a sense of responsibility for the program and may easily leave without considering a replacement. For this reason, we no longer accept teams composed entirely of university students, even though their reports have often been excellent. The students can still participate in the program, but only as assistants.

A major challenge is keeping students involved in the program as they move up to higher grades, especially if this means changing schools. This is a serious problem, especially in Indonesia, where students can study in up to 6 different schools between the ages of 4 and 18, which means the curriculum is taught in multiple institutions. The previous program in Balikpapan Bay showed that the most challenging part of maintaining program continuity was with the teenage group, especially in the city, due to the multiple choices of secondary schools available to students. Some of the schools that have joined the Education4Conservation network offer a study program from kindergarten to junior or even senior secondary school, which increases the chances that students will learn the full Education4Conservation curriculum as part of their study program. As data accumulate, it will be possible to predict the magnitude of the loss of students in higher grades. This modeling will help us to target the minimum size of the initial cohort of students (4 years old) that would guarantee that some of them will remain in the program until they graduate from senior secondary school 14 years later.

The fact that the program is designed to coincide with 14 years of education means that the most important expected outcome (training future conservation leaders) can only be fully evaluated after considerable effort and resources have been invested. To justify the investment, we also need to focus on short-term goals, such as developing and continually improving the curriculum. Our current intention is to develop a curriculum that would be widely applicable in several tropical regions. To achieve this goal, we need feedback from teachers in all major regions of the tropics. Now, however, the Education4Conservation network does not cover the tropics very evenly. All the Asian teams are in Indonesia, and there are no teams in Latin America. We are still in the process of recruiting teachers from other areas, and we hope this article will help us in that effort.

Major lessons learnt

Thanks to the Education4Conservation program, we have discovered a tremendous hidden potential in local teachers from rural areas. Many of them improved their teaching practices and increased their enthusiasm after joining the network. It is important to understand the reasons why many of the teachers have not used their full potential in the past. It is likely to be a combination of a lack of information, resources, and recognition, which can be demotivating to the teachers. Understanding these factors may lead to significant improvements in education in general. With more data in the future, we may be able to better analyze these factors.

Discussion

The Education4Conservation program in its current form is now in its third academic year. Since the main objectives are long-term, it is too early to make a final evaluation. In terms

Table 2. Indicators of success of the project (1: least success; 5: highly successful).

Phase	Indicator	Success					
		1	2	3	4	5	Not yet known
Design & Implementation	Preparing a 14-year curriculum applicable across tropical regions.						√
	Involving at least 20 schools in all major topical regions.				√		
	Teaching the curriculum on a regular monthly basis in all schools.				√		
	Updating the curriculum monthly based on the feedback from the teachers.					√	
	Following students from kindergarten to higher levels.			√			
	Raising sufficient funds to run the program.				√		
Short-term outcome	Improving teaching skills of the teachers.					√	
	Improving the quality of the curriculum based on the feedback from teachers.					√	
	Active participation of schools.				√		
	Increased involvement of schools in conservation.		√				
Long-term outcome	Improving professional human resources in conservation.						√
	Increasing involvement of the community in conservation.						√
	Increased conservation outcomes related to improved human resources and community involvement.						√

of short-term results, we must highlight the achievements of many teachers. We are also encouraged by the fact that the curriculum continues to evolve without major complications, that we have recruited the desired number of schools, teachers, and students, and that attrition of participants (teachers and students) remains within expected limits. Therefore, at this stage, we consider our program to be very successful (as summarized in table 2), compared to its predecessor, the environmental education in Balikpapan Bay before the COVID-19 pandemic.

Reasons for success

We believe that the most important short-term outcome of the program, improved teaching and reporting performance by teachers, is driven by a combination of providing a curriculum that incorporates their feedback, as well as guidance through regular monthly WhatsApp discussions and financial rewards. Teachers have found the Education4Conservation materials very useful, as evidenced by their positive responses. However, we have also seen various other high quality teaching materials sitting on bookshelves in some of the schools without ever being used. Providing materials alone may not work. Undoubtedly, financial compensation plays an important role, as many teachers in the Global South receive low salaries that do not motivate them to do their best work. In addition, the fact that teachers are required to write a report (including recorded videos) and that they must do so within a certain timeframe to receive their payment, is likely another key to success. The guidance provided by the individual response to each report is also crucial, not only to provide methodological advice but also to make teachers feel valued for their work. All these factors contribute to the active participation of most (though not all) schools, which contrasts with the previous environmental education program in Balikpapan Bay. Since the passive participation of the school was evaluated as one of the

main reasons for the previous program's lack of long-term success, we are optimistic that the current program will lead to better results.

Reasons for lack of success

The main reason for concern, as shown in table 2, is the lack of involvement of the schools in broader conservation programs in their area (except for three schools that were involved in such programs before joining the Education4Conservation network). This may be of concern because this lack of involvement in conservation and ecological stewardship was the main reason why we consider the previous program in Balikpapan Bay to be unsuccessful. However, in the case of the previous program, this lack of involvement was with the senior secondary school students just before their graduation. Here, we are still observing the situation among the kindergarten and youngest elementary school students, where we do not expect them to be involved yet. But there are already signs of improved engagement in environmental stewardship at this stage, in the form of improved waste management or the creation (or restoration) of an organic garden and/or compost site at three of the schools. We believe that these early changes, driven by the Education4Conservation program, mark the beginning of a more significant change that will be observed in the coming years.

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References

Agiande DU, Williams JJ, Dunnamah AY, Tumba DP (2015). Conceptual change as a teaching strategy in environmental education. *European Scientific Journal* 11. Available at: https://eujournal.org/index.php/esj/article/view/6805.

Anonymous (2024). Citizen conservation: an opportunity to save Australia's urban biodiversity. Conservation Volunteers Australia. Available at: https://conservationvolunteers.com.au/citizen-conservation-an-opportunity-to-save-australias-urban-biodiversity/ (Retrieved 2 July 2024).

Ardoin NM, Bowers AW (2020). Early childhood environmental education: a systematic review of the research literature. *Educational Research Review* 31: 100353.

Asrifan A, Ibna Seraj PM, Sadapotto A, Nurhumairah, Vargheese KJ (2023). The implementation of Kurikulum Merdeka as the newest curriculum applied at Sekolah Penggerak in Indonesia. *IJOLEH: International Journal of Education and Humanities* 2: 62–74. DOI: 10.56314/ijoleh.v2i1.130.

Atmoko T, Toulec T, Lhota S, Darman (2024). Population status of proboscis monkeys in Balikpapan Bay and their potential survival challenges in Nusantara, the proposed new capital city of Indonesia. *Environmental Monitoring and Assessment* 196: 107. DOI: 10.1007/s10661-023-12252-z.

Bartle E (2015). Experiential learning: an overview. A discussion paper prepared for Professor Joanne Wright, Deputy Vice-Chancellor (Academic) for the Vice-Chancellor's Retreat, March 23rd & 24th, 2015. The University of Queensland. Available at: itali.uq.edu.au/files/1264/Discussion-paper-Experiential_learning%20_an_overview.pdf.

Dernova M (2015). Experiential learning theory as one of the foundations of adult learning practice worldwide. *Comparative Professional Pedagogy* 5: 52–57. DOI: 10.1515/rpp-2015-0040.

Doghonadze N (2016). Slow education movement as a student-centered approach. In *6th International Research Conference on Education, Language & Literature*, pp. 65–73.

Gokkon B (2017). 'Ecological disaster': controversial bridge puts East Kalimantan's green commitment to the test. Mongabay.com. Available at: https://news.mongabay.com/2017/08/ecological-disaster-controversial-bridge-puts-east-kalimantans-green-commitment-to-the-test/ (Retrieved 12 June 2024).

Gokkon B (2023). To build its 'green' capital city, Indonesia runs a road through a biodiverse forest. Mongabay.com. Available at: https://news.mongabay.com/2023/04/to-build-its-green-capital-city-indonesia-runs-a-road-through-a-biodiverse-forest/ (Retrieved 12 June 2024).

Gokkon B (2024). Study: Indonesia's new capital city threatens stable proboscis monkey population. Mongabay.com. Available at: https://news.mongabay.com/2024/02/indonesia-nusantara-

proboscis-monkey-endangered-wildlife-balikpapan-bay-borneo/ (Retrieved 12 June 2024).

Kusumandari RB, Sukirman (2017). Organic village as an environmental education model based community for early childhood in Semarang City, Central Java, Indonesia. *Global Journal of Human-Social Science* 17: 1–7. Available at: https://socialscienceresearch.org/index.php/GJHSS/article/view/2312.

Maleknia R, Heindorf C, Rahimian M, Saadatmanesh R (2024). Do generational differences determine the conservation intention and behavior towards sacred trees? *Trees, Forests and People* 16: 100591.

Marthana Yusa IM, Yusuf M, Rahman A, Aniati A, Supriyanto D (2023). The challenges and opportunities of Kurikulum Merdeka implementation in Indonesian schools. *Indonesian Journal of Education* 3: 364–382. DOI: 10.54443/injoe.v3i2.72.

Mutterback C (2012). Rehabilitated orangutans in danger if industrial project proceeds in Borneo. Mongabay.com. Available at: https://news.mongabay.com/2012/10/rehabilitated-orangutans-in-danger-if-industrial-project-proceeds-in-borneo/ (Retrieved 12 June 2024).

Prasetiyo WH, Ishak NA, Basit A, Dewantara JA, Hidayat OT, Casmana AR, Muhibbin A (2020). Caring for the environment in an inclusive school: the Adiwiyata Green School program in Indonesia. *Issues in Educational Research* 30: 1040–1057.

Reis G, Roth W-M (2010). A Feeling for the environment: emotion talk in/for the pedagogy of public environmental education. *The Journal of Environmental Education* 41: 71–87.

Smith W (2020). The leadership role of teachers and environment club coordinators in promoting ecocentrism in secondary schools: teachers as exemplars of environmental education. *Australian Journal of Environmental Education* 36: 63–80.

Uzun K (2021). Cognitive load theory and its educational implications. In *Proceedings of the 6th international Congress on Life, Social, and Health Sciences in a Changing World*, BZT Academy Publishing House.

Vargas-Hernández JG, Vargas-González OC (2022). Strategies for meaningful learning in higher education. *Journal of Research in Instructional* 2: 47–64. DOI: 10.30862/jri.v2i1.41.