



**Geep** GLOBAL ENVIRONMENTAL EDUCATION PARTNERSHIP

*Sharing ideas to create a more just and sustainable future through the power of environmental education*

## CASE STUDY

# University of Botswana and Molepolole College of Education

## *Water and Biodiversity Project*

Molepolole, Botswana

### CONTRIBUTORS

[M. J. Ketlhoilwe, Associate Professor, University of Botswana](#)

[Isabella Ntsabane, Molepolole College of Education](#)

[Spar Mathews, Teacher Education Department, Ministry of Education and Skills Development](#)

GEEP is a partnership of the U.S. Environmental Protection Agency, the Environmental Protection Administration of Taiwan, and the North American Association for Environmental Education.



## University of Botswana and Molepolole College of Education — *Water and Biodiversity Project*



GOALS KEY

[United Nations Sustainable Development Goals](#) addressed

### Overview

This case study describes a collaborative effort to integrate environmental and sustainability education into teacher education at a college experiencing water scarcity.

Key aims of the Water and Biodiversity Project at Molepolole College of Education in Botswana were to: 1) establish a site for teaching natural and social sciences to student teachers, and 2) develop multidisciplinary teaching and learning resources to support environmental and sustainability education at the college. Central to this work were the installation of an on-site wetland; rainwater and grey water harvesting systems; and indigenous trees, shrubs, and plants – all of which supported water conservation measures while serving as resources to support teaching, learning, and research among student teachers.

#### **This case study illustrates how:**

- Establishing on-site environmental education resources fostered new teaching, learning, and research opportunities
- Student teachers were empowered by opportunities to plan, implement, and monitor their own research projects—an experience that enhanced their teaching and learning skills
- Cost savings from water conservation projects made funds available to address other goals

Photo: © University of Botswana and Molepolole College of Education



# Background

Botswana, as a member of the global village, is a signatory to various international environmental agreements and declarations, including the declaration of [United Nations Decade of Education for Sustainable Development \(UNDESD\)](#).



One of the national policies in Botswana is to infuse and integrate environmental education across the curriculum. Various colleges of education, including Molepolole College of Education, have collaborated with the [University of Botswana](#) to integrate environmental education into their teacher education programs.

Molepolole College of Education (MCE) is a public teacher training institution, fully sponsored by Botswana Government. The College is located in the southern part of Botswana in Kweneng District, where the climate is dry with erratic annual rainfall from October to February. The college has lush gardens, but their maintenance is not environmentally and financially sustainable.

With the guidance of the faculty of education from the University of Botswana's Environmental Education Unit, MCE received financial assistance from [USAID](#) in partnership [Wildlife and Environmental Society of South Africa \(WESSA\)](#) for a project that could simultaneously address these water scarcity issues alongside environmental education goals.

## Evaluation Plan

**In partnership with stakeholders, MCE has developed a monitoring and evaluation plan to assess the process and results of the Water and Biodiversity project.** Project implementation plans were developed during the initial workshop, consolidated with the advice from University of Botswana, and submitted to WESSA for funding.

**The project team has identified the following areas for evaluation:**

- Student teachers' participation in the planning and execution of the project
- Changes in pedagogical practices and activities among teacher educators and student teachers
- Progress toward institutionalizing the project
- Possibilities for replicating the project in other teacher education institutions
- Viability of implementation plans
- Project impacts, including the approaches and instruments used, generation of new ideas, and professional networking and collaboration
- Opportunities and prospects for realizing the goals of the project
- Factors that hinder successful implementation, if any
- Effective use of the project to enhance teaching and learning by different disciplines
- Reductions in water usage in the college (i.e., by comparing pre- and post-project bills)
- Usage and visitation of the wetland by college staff and students

The evaluation is mainly formative, although there are some summative aspects as the project stages get completed. The summative aspect will focus on the progress made regarding the implementation of planned stages of the project.

## Approach

At the outset of the project, the University of Botswana (UB) identified Molepolole College of Education (MCE) as a potential collaborator. UB consulted with the Ministry of Education through the Department of Teacher Education. They next approached college management at MCE, who accepted the idea.

MCE staff and students formed a multidisciplinary committee to develop a project proposal and budget. Along with MCE staff, the committee participated in workshops supported by UB and WESSA. They also conducted a curriculum audit to identify opportunities for infusing environment and sustainability topics and practices. The committee developed a teaching manual for MCE's lecturers, which was first introduced to the college management team (e.g., heads of academic departments) and major stakeholders (e.g., the Student Representative Council). The committee set a target that 10% of final year student research projects would relate to environmental education topics.



Photo: © University of Botswana and Molepolole College of Education

Funding from USAID and WESSA supported several initial environmental projects on-site at MCE, known as the sustainability commons, which included the installation of a manmade wetland, a rainwater harvesting system, and the planting of indigenous plant species that were better suited for the region's harsh climate. These projects were envisioned as new environmental learning resources that could support student-developed investigations. Further, they were a means conserving resources and decreasing the MCE's operations costs by reducing watering needs, while also increasing biodiversity and improving the aesthetic appearance of the college.

Future plans include the extension of the wetland and additional plantings of local trees and shrubs that can become additional resources for teaching, learning, and on-site research. Water for the trees and other plants would be harvested from building roofs into tanks, and used when necessary. The wetland would be recharged through the grey water system using natural filtration. The site would be used for teaching subjects such as biology within the college, reducing the need to take student teachers off-campus for outdoor experiential learning and research opportunities.

# Outcomes

Initial outcomes of the Water and Biodiversity Project have included:

- **Development of a teaching manual to support environmental education across the teacher education curriculum.** The multidisciplinary committee developed a teaching manual for Arts, English, Science, Guidance, and Counseling. The manual was designed to assist lecturers in infusing environmental and sustainability issues into the college curriculum, and to facilitate the use of the new sustainability commons (i.e., the wetland, water harvesting system, and native plantings) around the college.
- **Exceeded target for environmental education-related student research projects.** Student teachers exceeded the 10% target set for environmental education related topics in final year research projects in both 2014 and 2015. Students developed lesson plans on water, wastewater management, water conservation, biodiversity, specific plant species (e.g., their adaptation, conservation, and uses), and wetlands as habitats for other living organisms. Others were interested in research related to indigenous ecological knowledge based on information and knowledge acquired through the project.
- **Identification of existing faculty development needs.** An audit of faculty understanding of environmental and sustainability education issues suggested that MCE lecturers' understandings remained limited in comparison with their colleagues at the University of Botswana (UB) (Schrage, 2015). Further faculty development efforts could help to address this discrepancy.
- **Identification of research needs regarding pedagogical transformation.** The relationship between the introduction of the new teaching manual and faculty application of new teaching approaches at MCE was not apparent. Further investigation of whether and how faculty are transforming their teaching to integrate environmental education and sustainability are needed.
- **Development of new collaborative partnerships.** It is hoped that MCE's continual training and interaction with UB and WESSA will promote the expansion of pedagogical practices that support the integration of environmental education and sustainability into MCE's teacher education program.

In light of these observations, next phases of the project will seek to address some of the identified gaps. Once the project is completed, the college aims to be a point of reference for other schools and interested institutions. Further, the project is likely to promote environmental education through project based-learning approaches by the college graduates. It is also hoped that the project-based teaching and learning approach from the college would graduate teachers with a sense of strong sustainability and agency in environmental education practice.

In the future, the project also could lead to: sustainability practices extending into the homes of staff and students; environmental education reaching the future classrooms of student teachers; opportunities for micro-teaching exercises and practice by student teachers with visiting school students; visits to the college by other teachers and field excursions to learn good environmental and sustainability education practices.

## Lessons Learned

Key lessons learned from the initial implementation of the project included:

- **A consultative approach and offering assistance were valuable for initiating project.** During the project planning and consultation period, prospective partners were motivated by the University of Botswana faculty's commitment to the project and its execution. The consultative approach during the early stages of the project won the confidence of the college management and the student teachers. For MCE staff, having access to external assistance to set up the project motivated more lecturers to participate in environmental education.
- **Initial resistance to change was possible to overcome.** When the project began, some lecturers were not eager to participate, while others claimed that they were already integrating environment and sustainability issues in their courses. However, after meetings and workshops, some developed new interest and showed willingness to take leadership in project activities. Some who were initially indifferent or skeptical saw the relevance of the project to their content areas, and came to see it as a missing link to the practical aspects of their disciplines. They also appreciated that the project saved them time, as the outdoor learning sites and resources were easily accessible to all at any time.
- **Instructor receptiveness to environmental education helped motivate student interest.** Lecturers who were receptive to new teaching approaches that integrated environmental education helped motivate student teachers to choose research topics on environmental education
- **Student teachers appreciated practical, hands-on approaches to learning.** All of the student teachers were aware that they would be required to integrate environmental education as teachers in future. Their participation in the planning and implementation of the project motivated them to think about how they would use the project in their assignments, teaching practice, and future lesson planning for environmental and sustainability education.
- **A common instructional resource still allowed space for varied pedagogical practices.** Those lecturers who made use of the multidisciplinary manual varied their pedagogical practices in teaching environmental education.
- **The project yielded simultaneous educational and financial benefits.** The new teaching and learning resources available at MCE in the forms of newly installed wetlands; rainwater and grey water harvesting system; and indigenous plantings reduced college expenses both in terms of field excursions and water bills.

Photo: © Arne Larsen. Mopane worm



# Resources

## **Online Strategic Documents**

- Mainstreaming education for sustainable development in Botswana: A case study research in teacher education institutions. Masters thesis by Jesse Schrage (2015).  
<http://uu.diva-portal.org/smash/get/diva2:840248/FULLTEXT01.pdf>
- UNESCO Education for Sustainable Development  
<http://en.unesco.org/themes/education-sustainable-development>
- United Nations. Transforming our World: The 2030 Agenda for Sustainable Development  
<https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>
- How to Build a Water Garden  
[http://watergarden.com/pages/build\\_wg.html](http://watergarden.com/pages/build_wg.html)

## **Contact**

MJ Ketlhoilwe, University of Botswana  
[ketlhomj@mopipi.ub.bw](mailto:ketlhomj@mopipi.ub.bw)

Isabella Ntsabane, Molepolole College of Education  
[isabellapaeyaentsabane@yahoo.com](mailto:isabellapaeyaentsabane@yahoo.com)

Spar Mathews, Teacher Education Department, Ministry of Education and Skills Development  
[sparmat@gmail.com](mailto:sparmat@gmail.com)

