

Grasslands are my home: An innovative primary school program developed for remote Chinese villages

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Abstract. Environmental education is a useful tool for changing the mind-set of people and it has been developed over many years and in many countries. This paper reports the environmental education program funded by World Bank/GEF pastoral development project in northwest China. The involved writing training materials for students and teachers, teaching in classroom, practicing in field, and interactions with parents. The purpose of the environmental education program was training a student to influence the whole family, educate a class and help manage a community. The result showed that the environmental education program had positive impact on student attitudes toward environmental protection.

Keywords: Environmental education, Grassland, China, attitudinal change.

Introduction

Environmental education (EE) aims to produce a citizenry that is knowledgeable about the biophysical environment and its associated problems, aware of how to help solve these problems, and sufficient motivation to put solutions into practice (Stapp *et al.* 1969). Many countries started their environmental education initiatives in the 1970s which have continued to evolve as notions of environmental education have developed over the decades (Sarkar *et al.* 2007; Van Petegem *et al.* 2007). The guiding principle of EE emphasizes considering the environment in its totality— nature and culture, technology and society. This holistic approach was a major shift from programs that focused only on the natural environment which failed to understand the role of human decisions and actions in causing ecological problems (Hungerford and Volk 1990; Ballantyne and Packer 1996; Payne 2006). In China, EE was launched in primary school and middle schools in 1990s. However, there were few EE courses in remote village schools, especially in the pastoral area in north-west China (Yi *et al.* 2010). Where rural schools that did establish EE programs they were centred on urban issues such as air and water pollution, waste management, gas emission delivered in classrooms rather than focusing on their grassland environment where practical knowledge about rangelands, livestock, wildlife and conservation principles can be taught through in the field.

In 2004, World Bank and the Global Environment Facility (GEF) launched the Gansu and Xinjiang Pastoral Development Project (<http://www.worldbank.org/projects>) to improve livestock production efficiency, protect biodiversity and develop eco-services from grasslands. Capacity building for herding communities was an important project

component which an EE program developed by the project official, consultants, and teachers who were involved in the project area (Squires 2010). This paper reports on the goals, processes and output of the EE program in Gansu GEF project area.

Goals of Environmental Education

There are three quite different aspects of environmental education – ‘about’, ‘in’ and ‘for’ the environment (Lucas 1991). The framework about, in and for the environment is a popular way of organizing the experiences within an EE program.

Education about the environment focuses on students’ understanding of important facts, concepts and theories (environmental awareness)

Education in the environment involves students in direct contact with a grassland, forest, river or street to further develop awareness and concern for the environment.

Education for the environment aims to promote a willingness and ability to adopt lifestyles that are compatible with the wise use of environmental resources (land, water, vegetation, wildlife) and to modify land use practices that contribute to land degradation.

Based on the understanding of the concept of environmental education, the EE program of Gansu GEF project had three main goals: (1) to foster clear awareness of, and concern about, economic, social, political and ecological interdependence in the Gansu GEF project areas; (2) to provide students with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment; and (3) to create new patterns of behavior of individuals, groups and society as a whole towards the environment.

Process of Environmental Education program of Gansu GEF project

The needs assessment and volunteer training for environmental education

The forming of teams and volunteer training

The trainer team consisted of the volunteers who were undergraduate and graduate students of Northwest Normal University. To improve the environmental knowledge level, skill of making multimedia courseware and education delivery, professional experts in Northwest University in a series of modular workshops. The volunteer training short-course on the theory of ecological environment was designed to ensure a common understanding on form, structure and function of the ecological environment. This also included discussion of measures to control environmental degradation. We also trained the trainers (volunteers) course development and presentation skills such as making courseware, blackboard writing and lecture techniques. Practical training was arranged for volunteers to experience the living conditions of herders in different areas, to visit a local elementary school with World Bank/GEF project officers and to inspection rangeland and wetland in various degradation states. Through this process, all volunteers acquired the qualifications to effectively deliver the EE programs based on a good theoretical understanding, possession of appropriate skills and empathy with remote herding communities.

The present situation of environmental education in project area and needs assessment

To ensure that the EE program meshed with the local environment context within project area and a needs assessment was conducted by surveying primary and middle school students in eight project areas as well as officials and herders via a questionnaire covering more than 40 topics including: environmental knowledge, understanding of environmental issues, the hometown environmental problems, the cause of environmental problems. Ideas were canvassed about how environmental problems could be solved. The analysis of the results provided a clear understanding of environmental problems in the different grassland ecosystems (ranging from desert steppe, alpine meadow) and among ethnic and socio-economic groups. The results were stratified according to EE priorities of children and adults, cadres and farmers, and householders who were project beneficiaries, and those who were not. The field work provided the basis for the EE plan which reflected the real life of primary and middle school students, focused on the present environment situation and problems, developed love of nature and enhanced the ability of children, their parents and neighbors to participate in community-led eco-protection projects.

Writing materials for environmental education

The investigations and research on the problem of environment in the project area

Investigations to identify environment problems involved collection of data and graphics in the project area about animal husbandry, social economy, population, natural scenery, local customs and practices. Information was

extracted from existing records such the statistical year-book, statistical summary of the township government, county annals and brochures prepared by tour operators (where appropriate). This information was compiled, analyzed and summarized to give clear picture of key characteristics of the grassland resources, and the impacts of their use primarily by grazing livestock on culture, society and the economy.

Materials writing

From the field survey, data collection and analysis we distilled several key problems to highlight in the Teacher's Manual and the textbook. Under the guidance of specialists, the members of the trainer's team developed an EE outline that included four aspects: (1) eco-environment basic knowledge; (2) knowledge about love of hometown and grassland, steppe, meadow and forest; (3) participatory social practices and activities; and (4) steps to facilitate participatory community EE. The first draft including the Teaching Plan, supporting reference materials (text, pictures), electronic teaching aids and a program of social practice activities was further development through workshops, peer review and on-going group discussions.

The improvement of materials writing

Project officers and teachers from the schools in GEF project area were invited to attend the seminars about teaching materials, and the members of the training team had an internal communication about training materials and plan that were guided by project officers and education specialists. The teaching materials went through several modifications before being used in the school. There was also on-going refinement made by teachers delivering the course in project schools.

Developing the teaching material

The student's book

The team developed two EE books, "The Rangelands of the Hometown" and "Love My Hometown" for students which included the following:

Hometown description: Information about the hometown's geography, climate and topography were compiled and documented (including photos and drawings) with student's help.

Resource description: land resources, the biological resources, water, mineral resources, and tourist resources compiled and documented (including photos and drawings) with student's help.

The main ecological environment problems in hometown: For example, water shortage, water quality, desertification, rangeland degradation, soil erosion, and water pollution. These were identified by the students, with teachers as facilitators, and documented with plenty of charts and photos.

Reasons of the ecological environment problems: Analysis of the causes of environmental deterioration and evaluation of natural and socio-economic causes from the perspective of the students.

Discuss countermeasures: The book and the EE classes guide students to protect the ecological environment by taking the following factors into account: protection of na-

ture and the ecological environment; reasonable utilization of natural resources; and optimization of agriculture production mode. By raising awareness in the school we hope to form a good habit of protecting environment from childhood onwards

Teachers' guide book

Influenced by the mode of training teachers for primary and middle school, teachers in NW China were generally lacking knowledge of the importance of environment protection. However, these aspects were strengthened in the process of compiling the Teachers' Handbook. The teaching materials mainly included: geographical and environmental background of Gansu Province, the ecological/ environmental problems in the GEF projects areas, their causes and countermeasures, as well as practical skills. The curriculum included basic knowledge about protecting the environment, especially rangeland and wetland ecosystems.

The materials for student practices

Based on the existing environmental problems in the GEF project areas, the knowledge level specific to the students, age structure and hobbies, and the specific conditions of the school, the volunteers designed about 20 practicals on topics such as: (1) understanding plants; (2) collecting and preserving plant specimens; (3) observing the growth of plants; (4) observing the degeneration phenomenon; (5) investigation for family animal husbandry and crop production situation; (6) collecting garbage and sorting the household garbage; (7) refuse reclamation; (8) making blackboard newspaper; (9) pasting the banners; (10) environmental knowledge quiz; (11) speech contest; (12) watching dust and sandstorms; (13) observing remedial environmental projects; (14) value and exploitation of mineral resources; and (15) flood situation (hazards, mitigation measures). Each school could choose which to use according to local conditions.

Multimedia courseware of the environmental knowledge

The team created multimedia courseware with special software to explain the relationship between hometown environment issues and global environmental problems. The multimedia courseware included descriptions of global environmental problems such as global warming, water pollution, biodiversity loss, as well as rangeland degradation, soil erosion, wildlife protection.

The implementation of environmental education

With the cooperation local government officials, GEF project staff, school principals and project officials, a deputy team leader was appointed for each school to work with the volunteers and the teacher to make work regulations and clarify the tasks, work plan, and then set up the coordinating mechanism.

Training for teachers and local project officers

Capacity building of teachers was an important guarantee for conducting the EE program smoothly (Ballantyne 1995). Experts trained teachers and local project officers in two ways. First, residential workshops were conducted for teachers and project officers at Northwest Normal University in 2006-2007 on two occasions. Training on the theory

and practice of EE was the primary theme and how to effectively use courseware, activities and media to popularize science via new teaching skills. Specialist teachers were invited to Northwest Normal University to give special lectures. Second, experts visited the project area and organized a number of EE activities, explained the steps of EE and organized students and teacher in on-the-job training in using the new methodologies to raise awareness among students and to engage with their own households.

Clarifying the tasks

In the process of developing the EE program, the cooperation of volunteers, local officials and teachers of the primary and secondary was very important, so clarifying the tasks of the managers is helpful to specify the tasks of teachers and students, the teaching time, teaching place, and group practicals.

The task of the volunteers. They needed to understand the present condition and requirements of EE, be willing to collect local knowledge, and compile the teaching materials of "Love My Home" according to the environmental characteristics of the project area. Other tasks included making EE CD, training primary and secondary school teachers, guiding the setting up and conducting practical activities and facilitating class-meetings on the "Love our home" topic, and finally writing the report (with others) on ecological environment education methods and practice in western pastoral area.

The task of project officers in GEF project office. They need to coordinate with project headquarters, and ensure that the EE equipment is in place on time. They need to coordinate, guide and supervise the EE program, provide basic working and living condition for volunteers, provide the necessary funds and facilities for every school, and evaluate performance of each participating school and their respective written reports.

The tasks of the teachers. They need to familiarize themselves with the philosophy and process of the environment education, master the methods of using electronic textbooks and organize the education courses, class-meeting and group practical sessions, at the same time, guide the students to work for a better environment

Make the EE plan

According to the detailed scheme put forward by the EE team, special meetings were held with the project officials to ensure the smooth implementation. The tasks of teachers and students, the teaching time, teaching place, teachers and the group practicals were specified. The teaching of EE in GEF counties in Gansu Province was done based on the coordination of teachers, school principals, local project officials and EE team at North West Normal University in Lanzhou.

The activities of EE

Education about ecology and the environment. Students learn more about our earth, atmosphere, geology, ecology, hydrology and biodiversity. However understanding the impact of both global change and local use on the environment helps students and their families realize that environmental protection should 'take action from me, start from now'. The effectiveness of EE in this project was evi-

dent students and adults establishing their own projects in their local area, even simple projects like an anti-littering campaign.

Environmental education on rangeland in hometown. Combining classroom education and practice, the volunteers, together with teachers and students, discussed the impact of climate change such as rising temperatures, erratic precipitation, river runoff, and the trend of long-term runoff. 'Rangeland in Hometown' guided teachers and students to understand the impact of future changes on their hometown environment, including loss of vegetation and biodiversity. Combined with production and improved living conditions, it assists students to know the relationship between environment change and human activities, and aroused enthusiasm and motivate teachers and students to take responsibility for and participate in caring for the environment.

Group practical activities. The volunteers organized teachers and students to participate in the training and made them understand the basic methods of social survey, conduct the investigations on assigned topics, use the outline and the survey table, and guide students to complete each questionnaire with the participation of their parents.

Theme class meeting and learning corner. We selected the courseware according to the different circumstances in every project area, and conduct theme class meeting by knowledge Q & A, games and quizzes. We publicized the purpose and meaning of EE to the students in order to attract more teachers and students to participate in the activity by conducting some learning courses and blackboard newspapers.

Making environmental protection art works. We guided the students to make EE works, such as drawing, writing and handwritten posters, extracurricular practice and homework. These activities make the students aware that taking action as an individual can be important such as "Think globally, act locally".

Monitoring and Evaluation of Environmental Education

During the process of developing and delivering EE in GEF project area, an independent monitoring and evaluation team was set up to investigate the quality of EE program and recommend ways to improve the EE program. As part of the evaluation, the team invited local government officials, the school principal and parent representatives to participate in a summary meeting after the end of the EE activities to record the main achievements and problems.

Discussion and Conclusions

The effectiveness of the EE program in primary and middle school in the rural areas needs to be monitored and to maintain momentum of the program we need to build a reasonable evaluation system (Crohn and Birnbaum 2010). At present, good progress is being made in China's EE but over the long term, due to various constraints, the quality and sustainability of the EE program cannot be guaranteed. We must make greater efforts to foster environment protection and ecosystem management protection. Because of the long term consequences of environmental degradation it is important that we raise awareness not only of the impacts

of neglect but also engender hope that individuals can make a difference.

The "Rangelands of the Hometown" and "Love My Hometown" EE curriculum allowed the students in their hometowns to: (1) experience and learn about the ecological environment; (2) understand the effects of environment changes on their town's production and living conditions; and (3) stimulate student learning about environment protection. A combination of classroom teaching and group practicals overcame the current lack of EE (Sobel, 2004). The approach is very efficient and effective. Our experience proves that the scientific evaluation, classroom teaching and group practical activities combine using teaching methods in a scientific way that is suitable for EE in primary and middle school students in the western region of China. Most of western China is characterized by low economic development, a fragile grassland environment, and complex ethnic relationships with a strong cultural and religious overtone.

The EE program achieved its primary goal to "train a student to influence the whole family, educate a class and help manage a community." The enhancement of environmental awareness of students has influenced the people in these remote communities with 93% of the students 'very willing' to promote environmental protection measures. The EE teaching materials developed for "Rangeland of Hometown" has become the main source of environmental knowledge for farmers and herdsman of the project regions. The EE concept, technical content and delivery mode have been praised by many of the local technical training agencies for its effectiveness in changing the mind set of students and local land users.

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Reference

- Ballantyne R (1995) Environmental Teacher Education: Constraints, Approaches and Course Design. *International Journal of Environmental Education and Information* **14**, 115-128.
- Ballantyne R, Packer J (1996) Teaching and learning in environmental education: Developing environmental conceptions. *The Journal of Environmental Education* **27**, 25-32.
- Crohn K, Birnbaum M (2010) Environmental education evaluation: Time to reflect, time for change. *Evaluation and Program Planning* **33**, 155-158.
- Hungerford HR, Volk TL (1990) Changing learner behavior through environmental education. *Journal of Environmental Education* **21**, 8-22.
- Lucas A (1991) Environmental education: What is it, for whom, for what purpose and how. *Conceptual Issues in Environmental Education* **28**, 25-45.
- Payne PG (2006) Environmental education and curriculum theory. *The Journal of Environmental Education* **37**, 25-35.
- Sarkar SK, Saha M, Takada H, Bhattacharya A, Mishra P,

- Bhattacharya B (2007) Water quality management in the lower stretch of the river Ganges, east coast of India: an approach through environmental education. *Journal of Cleaner Production* **15**, 1559-1567.
- Sobel D (2004) Place-based Education: Connecting Classroom and Community. Great Barrington, MA: Orion Society.
- Squires VR, Hua LM, Zhang DG (Eds.) (2010) Towards sustainable use of rangelands in North-West China. Springer, Dordrecht. 358 p.
- Stapp WB, Bennett D, Bryan W, Fulton J, MacGregor J, Nowak P, Swan J, Wall R, Havlick S (1969) The concept of environmental education. *Journal of Environmental Education* **1**, 30-31.
- Van Petegem P, Blicck A, Van Ongevalle J (2007) Conceptions and awareness concerning environmental education: a Zimbabwean case - study in three secondary teacher education colleges. *Environmental Education Research* **13**, 287-306.
- Yi Z, Heping Z, Fengsheng L (2010) Research Advances on Rural Environmental Education in China in Recent Years. *Chinese Agricultural Science Bulletin* **17**, 094.