

THE VICUÑA

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Chapter 8

Environmental Education as a Tool in the Sustainable Management of Vicuña in the Altiplano of South America

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8.1 Introduction

Conservation biology and wildlife management are based on practical experience as well as the application of scientific knowledge of behaviour and ecology (Gibbs et al., 1998); as such science must be integrated with contributions from non-biologists, especially local people, who need information and training to build their capacities for action. With this in mind, when developing the Manejo Sostenible de Camélidos Silvestres (MACS) project, environmental education (EE) was included as the “glue” to paste the scientific research into the Andean communities, in an attempt to change the Andean people from receivers of information and research findings to actors in the process, mapping out their own future in the sustainable use of wild camelids.

Environmental issues are complex, and the issues addressed by the MACS project have been no exception. These are: a) the situations involved are risky and uncertain b) several ethical values are in dispute; c) the product involved is valuable, d) decisions are urgently required; e) research is not only based on curiosity but is also issue-driven; and f) there is a possibility of uncontrolled or runaway consequences of intervention (Funtowicz and Ravetz, 1993; Fontowicz et al., 1998). Management of wild and vulnerable species, including actors from the natural and socio-cultural worlds, needs what Fourez (1997) called “an interdisciplinary island of rationality”, meaning a simple interdisciplinary model with knowledge coming from both scientists and the members of the communities.

The MACS project, which simultaneously looked at the ecology of vicuña, the fibre market, Andean culture, biodiversity, equity, household economy and welfare of vicuña, employed environmental education to ensure that the results of the research did not lose their importance to the Andean communities. EE also helped to create a link between the vicuña and Andean teachers and children who now recognise not only the potential of the species for sustainable use but its impact as a grazer in the ecosystem, its conservation history, its importance in terms of the indigenous vision of the environment as well as subjective appreciation of the beauty and elegance of these animals. Thus, the vicuña was used as a flagship species for promoting attitudes and values towards the local environment in the Puna ecosystem.

8.2 Environmental Education

The term environmental education was initially used in 1965 by the Royal Society of London, with a definition associated with the preservation of life systems (Gayford and Dorion, 1994). EE was officially defined in the Tbilisi Conference (UNESCO-UNEP):

A basic aim of environmental education is to succeed in making individuals and communities understand the complex nature of the natural and the built environments resulting from the interaction of their biological, physical, social, economic and cultural aspects, and acquire the knowledge, values, attitudes and practical skills to participate in a responsible and effective way in anticipating and solving environmental problems, and the management of the quality of the environment. (Intergovernmental Conference on Environmental Education, Tbilisi U.S.S.R. 1977. Final report).

EE is education in (Van Matre, 1979), about (Hungerford and Volk, 1990) and for (Fien, 1993) the environment and must be understood as an educational process through which to learn about, understand and act upon environmental problems or situations. Given the complexity of environmental problems, it is important that EE should include: a) systematic vision (Torres and Cotes, 1995; Catalan and Catany, 1996; Bonilla, 1997); b) an interdisciplinary approach (Hungerford and Peyton, 1985; Leff, 1999); c) cross-sectoral implementation in formal education “Greening the curriculum” (Yus, 1996; Garcia Gomez, 2000; Garcia and Nando, 2000); and d) and as most of the EE educators agree, constructivism as a framework (Posner, 1982; Ausubel et al., 1989; Furió, 1995).

8.3 History of the Ideas and the Need for EE

After many years of treating nature as an enemy that has to be tamed and dominated, many societies, particularly in the developed world, see the environment as being victimised and needing help to survive. The concept of the environment defines what different actors identify as environmental education (Table 8.1).

Table 8.1 Concepts related to the term “environment” (modified from Sauve, 1996; Santo et al., 2000)

Environment	Relation	Characteristics
As nature	To be appreciated and preserved	Strict conservation
As a subject	To know, to research	Scientific work
As natural resource	To be managed	Collective inheritance
As a problem	To be resolved	Pollution, deterioration, threats
As a place to live	To take care	Nature with its social and technological components
As a biosphere	To be shared	Interdependence of live beings with abiotic objects.
As a community project	To be involved	Political participation

Table 8.2 The chronological order of events related to environmental education (mostly from international programmes)

Year	Institution	Event	Place
1965	Royal Society, UK	First use of EE concept	London
1971	UNESCO	Creation of MAB	
1972	UN	Conference on Human Environment	Stockholm
1974	UN	Creation of UNEP	
1975	UNEP	Creation of IPEE	Belgrade
1977	UNESCO-UNEP	Intergovernmental Conference on Environmental Education	Tbilisi
1982	Assembly of the Council of Europe	Include Environmental Education within the educational programs of member countries	
1992	UN	Conference of the United Nations on Environment and Development	RIO
1992	UNESCO-UNEP	World Congress for Education and Communication on Environment and Development	Toronto
1992		I Congress of Latin America on Environmental Education: a strategy towards the future	Guadalajara
1993	Indian Environmental Agency	International Conference on Environmental and Development Education	
1997	UNESCO	Education for a sustainable future: an interdisciplinary vision for coordinated action	Thessaloniki
1997	UNESCO	II Congress of Latin America on Environmental Education	Guadalajara
2000		III Congress of Latin America on Environmental Education	Caracas
2002	UN	Johannesburg Summit	
2003		IV Congress of Latin America on Environmental Education	Havana (Cuba)
2005–2014	UN	Decade of education on sustainable development	

In the 1960s the concept of environmental education was associated with the beginning of the environmental movement, particularly in developed countries (Reboratti, 1999). This raising of awareness has its roots in events, publications and media that alerted the general public to the fragility of the environment (Table 8.2). These events, the different actors involved and the goals they pursued, generated a spectrum of environmentalism from the deep ecologists to anthropocentric environmentalism including the environmental justice movements, ecofeudalism, green racism, indigenous environmental groups, neoliberalism and feminist ecology, with a confusion of terms, words, meanings and situations (Reboratti, 1999). The unifying factor in many of the relevant ideologies is that EE is the best tool to achieve change.

The general objective of UNESCO's MAB Program, which started in 1971, was to "develop the basis, within the natural and the social sciences, for the sustainable use and conservation of biological diversity, and for the improvement of the relationship between people and their environment globally, as well as to predict the consequences of today's actions on tomorrow's world, increasing therefore the capacity of man to effectively order the natural resources of the biosphere".

More recently, the Conference of the United Nations on Environment and Development was convened in Rio de Janeiro in 1992 and used the term "sustainable development", which appeared for the first time in 1987. Two documents came out of the Rio Conference: The Earth Letter and Agenda 21. One of the most interesting contributions of the Earth Letter is the proposal to develop the Agenda 21 that incorporates, as a necessary element, citizen participation, which in effect derives from education and awareness which are central pillars of environmental education. At a parallel meeting, not within the official sphere of Rio92, non-governmental organisations (NGOs) had their own meeting in which they presented 16 points related to EE as a citizen's right. This denied the "neutrality" of EE and stated that EE is ideologically based, holistic and must follow ideals of solidarity, respect for different cultures, right of citizens to acquire environmental information through the media, ethics and politics.

In 2002 the World Summit on Sustainable Development was convened in Johannesburg. In this meeting the decision was taken to instigate a decade of education for sustainable development. As a result, in December 2002, resolution 57/254 on the United Nations Decade of Education for Sustainable Development (2005–2014) was adopted by the General Assembly and UNESCO was designated as lead agency for the promotion of the Decade.

8.4 EE in the Development of Community-Based wildlife Management

There are basic aesthetic and moral arguments to be made for wildlife protection but there are also very strong scientific ones based upon the sustainable use of ecological resources (Bolton, 1997). Humans see the world through the spectacles of culture, and thus nature is transformed into resources (Simmons, 1977). When the resource is fauna, the species often causes problems for the rural community; for example, if the species is an herbivore, the usual complaint regards competition for forage with livestock, or if it is a carnivore, the problem is predation of domestic animals. If the species, such as the vicuña, has had a history of potential extinction, and has subsequently increased in numbers, much of this is because the people living in its habitat have respected the laws that have been put in place to protect the animal. This is a strong argument for why wildlife management must be rooted within the community that lives with the animal and scientists can advise, facilitate and teach local communities about the species management, but cannot be the only actors since EE is the best way of cementing the link between people and management.

While there are several projects in Latin America that emphasise the association between conservation and environmental education, EE is usually directed towards people's action, and so is frequently not reported in published papers. However, several EE initiatives have generated publications aimed at local stakeholders. For example, in the forest area of Bolivia (Izozog) a group of educators worked with biodiversity scientists and a local community (Kaa-iyá project, 1998) to publish two books: one was a list of species (Manual de la fauna Izoceña) with pictures drawn by local artists and information about natural history and use of each species; the other (Educación ambiental en el Izozog) was a guide for teachers working in the area. These projects usually include NGOs, governmental agencies, education authorities and an international source of funding and their main objective is developing EE material for children with the emphasis on conservation. In the Andean area, there are similar initiatives, such as the publication "La Huallata" in the Salinas Blancas Reserve in Arequipa, Peru, a joint activity between governmental agencies and international cooperation. In Chile, a booklet on vicuña welfare has been published (Bonacic and Baliero, 2002). There is no systematic research on the follow-up to evaluate the impact these publications have had on the communities, though usually their impact is lost if they are not associated with EE courses.

In the wild management of vicuña in Cieneguillas, Jujuy, Argentina, it was very important to include informal environmental education activities that expose the close relationship between conservation and economic development. Conservation leads to an increase in vicuña numbers and as a consequence the ability to capture and use the vicuña for economic gain, given that sufficient attention is paid to the care and welfare of the population (Vilá et al., 2004). Teachers and children from the "Puna Argentina" school in Cieneguillas participated in the capture of wild vicuña. The older children were actively involved in the final enclosure of the vicuña and the younger children were afterwards allowed to come inside the capture facilities. This interaction with wild animals has led to children wanting to be veterinarians or biologists in the future, which is extremely encouraging as is very rare in the Puna to find children who express a wish to go to university.

8.5 The EE and the Puna school

Teacher training and the conditions within schools do not always allow the application of the EE's theoretical concepts in the real world. Usually the "real" EE is a mix between what should be done (theoretical model), the classroom/local reality and what can actually be done (concrete action). In schools in the Puna, the attempt to incorporate EE has run into a number of difficulties; for example, social problems (malnutrition, poverty, domestic violence) emerge as the urgent problems that need tackling now. Most teachers feel that EE is a luxury. However, it is important to put across that good management of the environment can have an ameliorative effect on some of these immediate social issues. We also found that teachers were unable to provide an EE curriculum because of the lack of content, teaching methods and awareness of environment.

As a first step in the development of an environmental education programme it is important to determine what the students know about the environment. Children in the altiplano have their particular vision and beliefs and also, in some Latin American countries across that ecosystem, their own language (aymara or quechua). Although not usually speaking these native languages, most of the children and adults in the Argentinean Puna speak a Spanish dialect that is not used in the classroom. Children are thus limited in expressing their feelings, ideas and preconceptions in the formal teaching environment (Vilte, 2000). This can create a real challenge. What is the previous knowledge about camelids of a child who is a son of a llama herder? This is not always what one might expect. For example, children can have a very preconceived idea about wild vicuña, believing that they eat much more than a llama (which is not true). Therefore, we can create an intellectual conflict between what the child says and the facts about camelids grazing, which is not simply speaking “different languages” but also brings information from outside the Puna (Vilá, 1995, 1996, 2001).

Although most of the Puna schools are in natural surroundings and most of the children have their houses in the open fields, this does not guarantee that they have positive feelings towards nature and children have to be led into experiences with nature that are deep, subtle and create awareness and understanding (Cornell, 1989).

8.6 Process and Implementation of the EE in the MACS Project

The results of the research on management of vicuñas (in terms of conservation, welfare, environment and equity) generated by the MACS project had to be translated into the local language and practices of the Andean communities. Therefore, EE became more than an added extra, but the link between the project and the local communities. During the MACS project we worked on three aspects of EE: a) running an informal course for adults on vicuña capture and management in Cieneguillas; b) implementing informal activities for school teachers and children (with participation in the captures) in Cieneguillas; and c) running formal courses for in practice teachers and professors.

The course on vicuña management was directed to the local community before our first attempt to capture vicuña in the Cieneguillas area. This was a joint activity between MACS members from Argentina and Chile and participants from the local community. Previous experience of captures in Chile was presented in a video, and the strategy for driving wild vicuña into the capture facility was proposed. This was followed by recommendations on animal welfare and how to hold and manipulate the animals. After that we practised in the field and captured a small number of vicuña, took samples and marked the animals. Later, because it was winter, the animals were released without being shorn. The informal educational activities within the Cieneguillas school included suggestions for naming the school “Puna Argentina” (which had a number but no name), talks before each field trip about

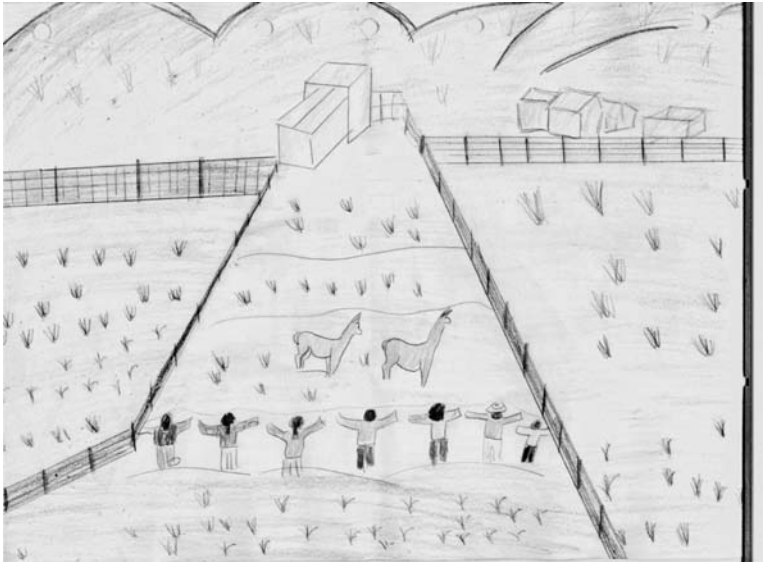


Fig. 8.1 Child's drawing of the capture in Cieneguillas

research results, hypothesis, findings and questions that emerge, and an invitation to teachers and children to participate in the captures. After the capture we worked with the children who wrote texts and made drawings (Fig. 8.1) about their experience, the conservation of vicuña and their use.

Recently, a young student of Cieneguillas school won a contest “Being a journalist” with the article “Cieneguillas, pueblo de vicuñas” (Cieneguillas vicuñas’ town) in a national agronomics journal “El federal” widely distributed in the country.

These activities took place at a local scale. The main goal of the EE programme was to work on a regional Andean level in the four countries, so we developed training courses for in-practice altiplano teachers and professors. Unfortunately, the political instability in Bolivia meant that we had to abandon the proposed courses in that country, but we did work in Argentina, Chile and Peru.

8.7 The EE Training Courses for in-practice Teachers in Altiplano Schools

The local school is one of the most widely distributed and important institutions in the Puna and most of the children in the region attend school not only for learn but also to eat and receive sanitary and medical care. In NW Argentina some children live at the school from Monday to Friday, while others have four meals a day in school but go home to sleep. As a consequence, the teachers have a new role almost

in the “curricula” of Education Ministries training for teachers. This allowed the teachers to be absent from their schools for a week and to gain credits for attending the course. This prerequisite required us to prepare the paperwork several months in advance since in Latin America most of the provinces or regions have their own bureaucracy.

Some of the contents of an Argentinean MACS-course (8 h a day for 5 days)

- Diagnostic evaluation of knowledge, attitudes and beliefs of the teachers towards the Puna environment.
- EE as an interdisciplinary, systemic and transversal discipline.
- Nature, ecology, environment, ecologism, environmentalism, ecological problems and environmental education are not synonyms (differences between these concepts).
- Some theoretical themes of ecology (with regional examples): energy flow, material cycle, food web, food chain, cultural modification of these processes.
- Natural and artificial selection. Wild and domestic animals. Evolution.
- Camelids and Puna environment.
- The complexity of the environment in the Puna: conceptual map of actors, stakeholders, fauna, flora, institutions, etc...
- Different ways to educate environmentally: papers, music, humour. Examples and creation of Puna environment messages.
- Global and regional environmental problems. Rubbish, mines, local fauna extinction.
- The role of camelids in “recovering” the Puna environment.
- FIELD WORK: We visit a natural place in the surroundings and present the “Flow learning” methodology (Cornell, 1989) for field studies. This method describes a way to use nature-awareness activities in a flowingly purposeful, directional way, guiding step by step through increasingly sensitive activities and deep experiences into a new joy-filled awareness and understanding. We help teachers to organise field visits with their pupils. It is one of the most important activities in the course.
- Evaluation of the teachers: presentation of their productions with local materials or with a local environmental situation, role playing, puppets plays, etc...
- The role of the teacher as environmental educator.
- Greening the curriculum.

In the diagnosis evaluation during the first day of the courses we realised that there was a serious lack of information about the environment. This situation can be observed as most of the teachers had some difficulties in:

1. Identifying and describing the four species of camelids.
2. Identifying the domestic animals with their cultural origin.
3. Identifying the historical changes in the Puna environment after the Spanish conquest (for example, presence of sheep).
4. Using local fauna and flora for exemplification in their classes.
5. Writing a regional food web or chain.

We brought the teachers extra material on fauna and Puna environment, such as: “Fauna Argentina” series journals on Puna fauna (guanacos, condor, flamingos, lizards, toads, vicuñas, pumas and lamas,), the books “Camellos sin joroba”(Camels without humps) Vilá (Ed. Colihue), “La naturaleza y el hombre en la Puna” (Nature and Man in the Puna) Reboratti (1995) and “De hombres y tierras: Una historia ambiental del noroeste argentino” (From people and Hearth: An environmental history of the north west of Argentina) Reboratti (1997) and CIENCIAHOY articles (Vilá, 1989, 1995, 2001; Vilá et al., 2004).

8.8 The “Vicuña: Tesoro del Altiplano” (Vicuña: Treasure of the Altiplano) Book

We received a genuine demand from teachers for contents and methodology for EE in the Puna, so we wrote a book, which was a guide for EE and which included texts, plays, games and activities related with the Puna and the vicuña. The book was divided into chapters, although the main focus was the vicuña. The first five chapters relate to the Puna environment, its history, evolution of camelids, domestication, relation between camelids and Andean society. The last five chapters are based on the vicuña, their ecology, behaviour, history of exploitation, risk of extinction, recovery and management. The book includes relevant information for the teachers, including methodological and didactic aids.

8.9 Conclusions

The reality of the Puna altiplano schools in Latin America is similar to other rural poor areas in the third world countries (Daun, 1997; Hedges, 2002; Bekalo and Bangay, 2002; Chapman et al., 2002); that is, poverty and environmental degradation, if left unaddressed, could result in a situation where unsustainable practices of natural resource use predominate accelerating resource depletion and increase poverty (Bekalo and Bangay, 2002). A programme of EE within a natural resource management strategy can help avoid or reverse this situation. For vicuña, EE should be integral to strategies for poverty alleviation. The “Vicuña: tesoro del altiplano” book has proved very useful in informing people about vicuña and their role in the Puna ecosystem and we also have put a lot of effort into running EE courses. Teachers were selected as the focus of these courses because they are integrated into the world of community traditional experiences and when provided with scientific information they can take on the responsibility of implementing an EE curriculum (Bekalo and Bangay, 2002). EE trained teachers more often engage their students in local environmental activities (Bolscho et al., 1990), especially if they have developed a relationship with the local species (Lindemann-Matthies, 2002). When school students are educated about conservation this has a strong

Table 8.3 The five courses run during the MACS project are described

Place	Date	Other institutions involved	Number of participants	Professions of participants	Schools	Field visit	Responsible who run the course
MACS-EA1	13–18 May 2002	Jujuy Education Ministry	38	School teachers, Schools directors Natural Parks guards	La Quiaca, Abrampampa, Cieneguillas, Yavi chico, Rinconada, Cusi-cusi, Santa Catalina, Tilcara, La Intermedia,		
La Quiaca, Jujuy (Argentina)		Direction of Natural Resources and Environment of the province.		Veterinary school professors	La Quiaca Vieja and Suripujio	Yavi and Yavi chico	Dr. Bibiana Vilá and Lic. Ana Wawrzyk
MACS-EA2	23–28 September 2002	Catamarca Ministry of education	45	School teachers and directors	Antofagasta, El Peñón, Las Quinoas, Tinogasta, Los Nacimientos and Salar del Hombre Muerto	Laguna de Antofagasta, Los Negros	Dr. Bibiana Vilá and Lic. Ana Wawrzyk
Antofagasta de la Sierra, Catamarca (Argentina)		Environment Secretary of the province		Gendarmerie Green team			
MACS-EA3	27–31 October 2003	Regional government of Ica Education Ministry	35	Secondary professors	Yanac, Liscay, Apostol san pedro, Chavin, San pedro de Hucarpana, Bellavista, Chinca Alta, Chincha	No field visit	Dr. Javier García Gomez, Dr. Jane Wheeler, Dr. Domingo Hoces, Ms. Yolanda Almasifuen

(continued)

Table 8.3 (continued)

Place	Date	Other institutions involved	Number of participants	Professions of participants	Schools	Field visit	Responsible who run the course
MACS-EA4	4–10 January 2004	Chile Ministry of Education. CONAF Quiborax	24	School teachers and directors. CONAF parks guards	Visviri, Ticnamar, Sobraya, Azapa, Lluta, Codpa	Valle de azapa and Lluta.	Dra Bibiana Vilá, Lic Ana Wawrzyk. Lic. Mónica Piña Zepeda and Ms. Pia Bustos
MACS-EA5	20–25 June 2005	Education Ministry IVITA Presidencia Regional Junin	35	In practice school teachers and directors	Tambo Paccha Cachi-cachi Junin, Tarma, Acolla, yantac, Tingo cancha, Oroya	No field visit	Dr. J. Garcia Gomez Dra Jane Wheeler, Dr. Domngo Hoces Ms. Yolanda Almasifuen
Mantero (Peru)							

influence on their commitment to conserving species and habitats (Caro et al., 2003). EE can best be achieved in places where the school is deeply rooted within the surrounding community (Chapman et al., 2002), as is the case in a number of towns in the Argentinean Puna. We worked to get as close as possible to the reality that awaits teachers and children in and after school. Our view is that if teachers are able to provide EE not only at school but also in the community, this would be the most effective way of achieving changes in communities' attitudes to wildlife and nature (Uzzell, 1999).

In Cieneguillas, after MACS project, people started mapping their future, the school has the name the community decided, a name it shares with the ecosystem in which they live. Also, the community embarked on a process that ended in their building capacity for vicuñas conservation and management, and a young girl proud of her community and its vicuñas overcame the challenges of isolation and distance to win a contest. This outcome in just a few years of work showed that we were able to make achieve concrete actions as well as the scientific research towards the sustainability and the conservation of the area (Table 8.3).

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