



## COLLABORATION FOR ENVIRONMENTAL EVIDENCE

### SYSTEMATIC REVIEW NO. 57

#### WORKING TITLE: EFFECTIVENESS OF ENVIRONMENTAL EDUCATION INITIATIVES FOR THE CONSERVATION OF THE ANDEAN BEAR IN THE ANDES MOUNTAIN RANGE

#### REVIEW PROTOCOL

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## 1. BACKGROUND

The Andean bear (*Tremarctos ornatus*) is threatened throughout its distribution range due to ongoing poaching and deforestation activities. The most important conservation activities have been forested areas protection and laws enforcement to prevent poaching and commercial activities (Rodríguez & Rojas-Suárez 1999). However, due poaching and deforestation threats have an important social and cultural component, the success of these conservation action dependent of the communities' understanding of the Andean bear's conservation problems, and on the benefits that can be generated from the preservation of its habitat (Yerena et al. 2007).

One of the tools that is most frequently used by conservationists to make communities aware of the problem is environmental education (Bizerril 2004; Reading & Kellert 1993). However the effectiveness of these educational measures have recently been questioned as most have only distributed propaganda that have increased the public's general knowledge of the species but have not altered general views on the Andean bear's conservation problems (Blumstein & Saylan 2007; Reading & Kellert 1993; Trehwella et al. 2005). In this sense, the carrying out of short but sustainable educational projects has proven effective for the conservation of the species (Bizerril 2004, Engels & Jacobson 2007).

In Black and Brown bears (*Ursus americanus* and *Ursus arctos*), long-term educational programs have also proven useful to manage populations of these species. Even though many of the black and brown bear populations are not threatened, the continuous conflicts with humans are serious problems that may be resolved through environmental education. An example of the latter is a program that was carried out in Alberta, Canada by the *Fish and Wildlife Division* (FWD) which was able to make the public (urban and rural residents, farmers and hunters) carry out a bigger effort to prevent conflicts with brown bears, by firstly removing rubbish and attractive food elements, and secondly reporting to authorities the presence of problematic animals (Gunter et al. 2004).

With respect to the Andean bear, a considerable number of non-governmental organisations, zoological associations and interested groups have for the last 20 years carried out environmental education projects directed at different groups of people (school pupils, rural and urban communities, non-governmental organisations) using a variety of different methods (workshops, radio, television, newspapers, leaflets, exhibitions, etc.) (Ford 2004; Otálora 2007; Torres 1999). The contribution of such campaigns to the creation and enlargement of protected areas in the Andean region has been recognised as considerable (Yerena, 1994). However the effectiveness of such campaigns to change the attitudes of targeted communities so that the direct threats to the species may be mitigated (reduction of the poaching and/or the advancement of agricultural borders) has so far not been assessed (Yerena et al. 2007). The evaluation of a number of education tools in one case study showed the improved attitudes of a few rural communities in Colombia towards the Andean bear. However, opinions could not

be changed in communities where the general view was that the Andean bear is considered to be a harmful species (Otálora 2007). Similar and even negative results attained in other carnivores have reported the ineffectiveness of environmental education as a conservation tool. For example in Michigan (United States), it was found that the knowledge level of people with positive attitudes towards the wolf (*Canis lupos*) was equally as high as those who had negative views. The only difference was that the former used their improved knowledge to rationalise and strengthen pre-existing attitudes rather than changing them (Kellert et al. 1996).

Using the systematic review approach, we propose to assess the effectiveness of the environmental education initiatives aimed at the Andean bear, to encourage positive attitudes that will reduce the threats to the species and establish which are the determinants of success.

## **2. OBJECTIVE OF THE REVIEW**

Assess the effectiveness of environmental education as a strategy to generate positive attitudes in human target populations, in order to mitigate poaching and deforestation activities, considering the following questions:

### **2.1 Primary question**

Have the environmental education initiatives directed at mitigating poaching and habitat deforestation activities been effective at generating positive attitudes in human target populations?

### **2.2 Secondary question**

How do the (1) type of target population, (2) educational strategy used, (3) academic background of project designer (4) project duration and (5) relevant subject of the project on which the initiative is based, influence the environmental education initiatives directed at Andean bear conservation?

## **3. METHODS**

### **3.1 Search strategy**

Researchers currently involved or in the past on projects dealing with environmental education initiatives for Andean bear conservation will be contacted directly, as well as governmental and non governmental organization (NGO) focus in the Andean bear conservation across his range, to request for grey literature and enquire about unknown practitioners and data sources. Leads from these enquiries will be then pursuit in the same way. In addition, searches will be carried out on recognized scientific search engines (e.g. ISI Web of Knowledge), specialized websites (e.g. [www.carnivoreconservation.org](http://www.carnivoreconservation.org)) and

webpages of relevant institutions (e.g. electronic catalogues of key universities libraries). All the hits obtained on each search will be examined, but for those obtained through web search only the first 100 hits will be evaluated. Finally, the cited literature of each of the documents found will be scanned through.

The following searches will be performed:

#### 3.1.1 General database searches:

- ISI Web of Knowledge
- EBSCO HOST Research Data Bases ERIC
- EBSCO HOST Research Data Bases ASP
- Science Direct
- Cambridge Scientific Abstract
- BIOSIS

#### 3.1.2 Specific Searches:

- Environment Ministry in the Andean region
- National Park Institute in the Andean region (e.g. INPARQUES, INRENEA)
- Electronic catalogues of key universities libraries
- Web pages of NGO's in the Andean region related to Andean bear (e.g. Bioparques, TNC, CI, Provita, WCS, WWF, AndigenA, Ecociencias)
- Red *Tremarctos*
- Newsletter of the International Bear Association
- Carnivore Conservation
- Boletín Ukuku
- Fundación Andígena
- World Conservation Monitoring Center (IUCN)
- World Commission on Protected Areas (IUCN)
- Eco-Index

#### Web Searches:

- Google Scholar
- Dogpile
- Excite

3.1.3 We will use the following search terms:

	<b>Terms in English</b>	<b>Terms in Spanish</b>
Subject	Spectacled bear	Oso Frontino
	Andean bear	Jukumari
Intervention	<i>Tremarctos</i>	Oso andino
	Education	Oso de anteojos
	Conservation	<i>Tremarctos</i>
	Environmental education	Educación
	Wildlife conservation	Conservación
	Education initiative	Educación ambiental
	Deforestation	Educación para la conservación
	Poaching	Iniciativas de educación
		Deforestación
		Caza furtiva
		Caza
	Habitat loss	Perdida de hábitat
	Human-wildlife conflicts	Conflictos con humanos
	Conflicts mitigation	Mitigación de conflictos

The above terms will be included in the search both in singular and in plural. We will additionally include new keywords extracted from the studies, and this will be carefully recorded. The data base search will be carried out independently by three researchers and consider the following guidelines:

- 1) In all of the searches, studies that include at least one of the search terms in the title that describes the intervention will be considered (“environmental education”, “conservation education” and “education initiative”). The words that describe the relevant subject of the review (“bear”, “Andean bear”) will also be included in the search.
- 2) With the rest of the keywords, the searches will be performed by combining the words systematically

Additionally, we will contact researchers who have or are carrying out projects dealing with environmental education for the conservation of Andean bear across its distribution. For Google Scholar, we will only examine the first 100 outputs of our search.

### 3.2 Study inclusion criteria

- **Relevant subject:** Local human population
- **Types of intervention:** Environmental education concerning the Andean bear (*Tremarctos ornatus*)

- **Types of comparator:** Attitude of target population prior to the implementation of the educational initiative or in areas where the initiative was not carried out. Variations in the intervention according to Table 2.
- **Types of outcome:** Target population's knowledge of the Andean bear and its conservation problems before and after the environmental education intervention. Target population's attitude (positive, negative or neutral) towards the species and the conservation problems of the latter. Change in attitude pre and post application of the educational initiatives. Number of people who practise alternate methods of sustainable production pre and post application of the educational initiatives. Number of human-bear conflicts and hunting reports pre and post application of the educational initiatives.
- **Types of study:** Quantitative studies of initiatives or educational projects associated with the species that have already been carried out or that may have some preliminary result (intermediate or final phase). The qualitative evidence (reports and interviews) will also be compiled.
- **Potential reasons for heterogeneity:** Country in which the initiative was developed, cultural types or characteristics of the target population, type of organisation that developed the initiative, profession or academic background of the people responsible for the design and carrying out of the educational interventions, duration or intensity of the educational intervention, focus and specific objectives of the different initiatives (ex. associated with the species, habitat, conservation or with the natural history), sample size.

With the objective of filtering the most relevant studies, we will use the following inclusion criteria in three phases:

1. Title and keywords: only those studies will be included whose title and keywords are associated to the objective of this review
2. Abstract: All the abstracts from the selected studies will be revised and only those satisfying the review criteria will be considered.
3. Entire manuscript: All the studies selected above will be read in full to determine which are suitable for data extraction.

For selection stages 2 and 3 the following guidelines will be considered:

1. The review will only include those environmental education studies/initiatives that have been completed or that have preliminary results ("paper" environmental education studies will not be included)
2. The only environmental education studies/initiatives that will be considered are those that evaluate qualitatively and quantitatively the target populations attitudes and knowledge of the species

In each of the selection phases, a second reviewer will evaluate a sample of 25% of the studies to determine/verify whether the criteria above mentioned have been clearly defined and correctly used to include or exclude studies. The results will be contrasted using a Kappa analysis. Criteria with a value of 0.6 or greater will

be considered adequate and replicable. If the Kappa values are lower than those of the established limits, the criteria will have to be readjusted, and the studies will then be re-evaluated.

**Table 1.** Definition of the components to be included in the systematic review

<i>Subject</i>	<i>Intervention</i>	<i>Outcome</i>	<i>Comparators</i>
Local human populations	Environmental Education concerning Andean bear ( <i>Tremarctos ornatus</i> )	Target human population's response (negative or neutral attitude) in association with the knowledge of the latter the species and the conservation problems of the latter	Target human population's attitude before the implementation of the education initiative or areas where the initiative was not carried out
		Changes in the attitudes of the target population(s)	Variations of the intervention according to Table 2
		Number of people that practise alternate production methods and sustainable production	
		Number of human-bear conflicts	

**Table 2.** Proposed factors that may influence the effectiveness of an environmental initiative for the conservation of the Andean bear

<b>Factor</b>	<b>Level</b>
1. Target population	a. General public b. School c. Peasants and farmers d. Hunters e. Park ranger
2. Type of message	a. Punishing message b. Enhancement of the natural value of the species c. Capacitation of the sustainable use of natural resources
3. Media	a. Propaganda (television, radio, leaflets, exhibitions) b. Communication (interview, community reunions) c. Education (workshop, courses)

### **3.3 Study quality assessment**

The selected studies will be classified according to the quality of the methods used. So, those studies which the author described the design or an in progress or finished educative program, but not did give any results, will be classified as “narrative”. Those studies, which only reported the author’s opinion as an indicator of environmental education initiatives effectiveness, will be classified as “qualitative”. Those studies that have numeric data from formal like interviews, questionnaires will be considered to be “quantitative”.

The quantitative studies will be assessed to determine the quality of the methodology used in the latter. Possible experimental biases associated to variables such as the scale of the analyses and processes, autocorrelation, pseudo-replication, detection biases, omission biases and possible post-experimental biases will also be considered. Moreover we will consider the professional background of the person in charge of the design and carrying out of the intervention (if this information is available in the reference), the duration of the intervention and the number of communities involved. For each of the possible sources of bias, we will create/establish a code with appropriate indicator variables in order to categorize the quality of the studies quantitatively.

### **3.4 Data extraction strategy**

1. Author:
2. Year:
3. Professional training:
4. Country:
5. Locality:
6. Aims:
7. Methods: methods analysis, with emphasis in sample size, comparison index (before and later), issues evaluated (attitude and / or knowledge), etc.
8. Program duration: application program period time.
9. Strategy used: participants, message transmitted, diffusion methods used.
10. Strategy code (see table 2):
11. Study conclusions:
12. Methods evaluation: numerical field (from 12 to zero 0) that evaluates the methods quality with regard to experimental biases (spatial autocorrelation), strategic biases (pseudo-replies, sample size, comparison index), and detection or omission biases.

### 3.5 Data synthesis

The data will be organized in Table 3

**Table 3.** Table for data synthesis.

Study: reference analyzed. Attitude: average and standard deviation in attitude index used to measure the participant perception and conduct before and later to application of the educational program. Knowledge: average and standard deviation in participant knowledge before and later.

Study	Attitude				Knowledge			
	Previous		Poterior		Previo		Poterior	
	Average	Standard deviation	Media	Standard deviation	Average	Standard deviation	Average	Standard deviation
1								
2								
3								
4								

We initially think that we will find few studies that describe people’s attitudes or knowledge about the species and its threat. We therefore, propose to carry out a synthesis that will encompass the number of people with positive, negative and neutral attitudes and the characteristics of the initiative (Table 2), and to determine whether there is a significant relationship (ANOVA).

If enough comparative studies are found (before and after the education initiative), we will perform a meta-analysis. The estimation of the effect magnitude will be carried out using probability relationships (odds, positive, negative). Furthermore we think that it will be possible to perform a meta-regression using as dependent variable the magnitude of the effect and as independent variables the factors mentioned in Table 2.

#### 4. POTENTIAL CONFLICTS OF INTEREST AND SOURCES OF SUPPORT

None expected.

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