

Dolphins and Children: A Blueprint for Marine Environmental Education in Peru

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To complement legislative measures protecting cetaceans and other marine animals, the Peruvian Centre for Cetacean Research in the period 1993–2000 implemented an environmental education program at the kindergartens, primary and high schools of several fishing towns and in Lima, Peru. This program included environmental classes based on selected thematic videos and educational booklets, creative “marine” workshops, art competitions, guided visits to the Museo de Delfines’ in Pucusana and other public events. Approximately 1,920 and 2,135 pupils attended at least one environmental class in 1998 and 1999, respectively. Between September 1997 and February 2000, nearly 1,700 children visited the museum. Five hundred and twenty-three children from Pucusana and Cerro Azul participated in workshops in 1998. In 1999, this number increased to 579 for Pucusana alone. In May 2001, personal interviews were conducted with 55 children in the sixth grade of a primary school in Pucusana to evaluate their knowledge on the conservation themes tackled during the classes. A mean of 77% (min. 40%–max. 98%) of the pupils answered correctly 16 questions on the basic biology of aquatic animals and their environment. The material displayed in the museum was well to very well remembered by 87.3% of the children. Forty-nine (89.1%) of those pupils thought that it is necessary to protect aquatic animals and 54 of them (98.2%) wished to receive more environmental classes and to visit the museum

again. Children and adolescents from Pucusana and Cerro Azul, the villages where the program has run for the longest period, displayed an increasing interest, knowledge, and awareness for cetaceans and other protected marine species. The same tendency was noted in the more recently visited fishing towns of Chancay and Chimbote. We believe that our environmental education program is efficiently complementing existing legislation protecting cetaceans, sea turtles, penguins, sea lions, and other marine wildlife in Peruvian waters.

INTRODUCTION

Dolphins and porpoises have been taken in incidental and directed fisheries in Peruvian coastal waters at least since the early 1970s (Van Waerebeek & Reyes, 1994). Their meat has been sold for human consumption, fresh or salted and dried, the latter form being an expensive delicacy known as “muchame” (Van Waerebeek & Reyes, 1994; Van Waerebeek et al., 1994, 1997). Scientific monitoring of the small cetacean fishery, started in 1984, revealed that an estimated 10,000 dolphins and porpoises had died along the coast of Peru in 1985 (Read et al., 1988). This number increased to an estimated 15,000–20,000 per annum in the period 1990–1993 (Van Waerebeek & Reyes, 1994). Dusky dolphins (*Lagenorhynchus obscurus*), long-beaked common dolphins (*Delphinus capensis*), bottlenose dolphins (*Tursiops truncatus*), and Burmeister’s porpoises (*Phocoena spinipinnis*) were the species most affected by the fishery. There is mounting, albeit indirect, evidence that the population of Peruvian dusky dolphin may not be able to sustain the high removal rate imposed by the fishery (International Whaling Commission, 1994; Van Waerebeek, 1994, 1996). Small cetaceans have been legally protected in Peru since 1990 (Ministerial decree No. 569-90-PE, 29 November 1990) but the law was poorly enforced before August 1994 when a second Ministerial Decree (321-94-PE, 5 August) was enacted reiterating the prohibition on the capture, trade, and consumption of small cetaceans and their products. Law No. 26585 of 29 March 1996 and

accessory “decreto supremo” No. 002-96-PE of 15 June 1996 fully protected the five most exploited marine small cetaceans and the two freshwater (Amazon) dolphin species. Despite these measures, mortality of small cetaceans in fisheries still ranges from moderate to high. Besides being used for local consumption, dolphin meat and blubber are also used to bait long-lines and gillnets (Van Waerebeek et al., 1999, 2002). The olive ridley turtle (*Lepidochelys olivacea*), green turtle (*Chelonia mydas agassizii*), leatherback turtle (*Dermochelys coriacea*), hawksbill turtle (*Eretmochelys imbricata*), Humboldt penguin (*Spheniscus humboldtii*), South American sea lion (*Otaria byronia*), and South American fur seal (*Arctocephalus australis*) are also officially protected in Peru (Ministerial Decrees # 01065-76-PE, 009-76-PE, 103-95-PE, 01082-1990-AG and 013-99-AG). However, marine turtles are still caught and killed in large numbers and their meat is commercialized for human consumption (Alfaro-Shigueto et al., 1999, 2001). Penguins are taken accidentally in gillnets and consumed locally (CEPEC, unpublished data). Sea lions are commonly culled by fishermen because of the habits of some animals to break nets and take fish (Arias-Schreiber, 1993).

Beside the legislative measures, effective protection of cetaceans and other protected aquatic animals in Peru also depends on the way they are perceived by fishermen and their families as well as by potential consumers. Although traditional customs of fishing and perception of marine animals are deeply embedded in the adult’s mind and rather difficult to modify, children represent a much more receptive and sensitive public. Their education in conservation matters is very important as they will form the

next generation of fishermen. Children from the middle- and high-income groups who used to eat muchame and turtle meat represent the other end of the dolphin and turtle trade and are also very important to target. More generally, environmental education of Peruvian children is fundamental to developing their awareness and care for their country's fauna and flora.

Located in Pucusana on the central coast, the Peruvian Centre for Cetacean Research (CEPEC) is dedicated to the conservation of dolphins, porpoises, and whales and accomplishes this goal through scientific monitoring of the take of small cetaceans, research, and education (Reyes & Van Waerebeek, 1991; Van Bressemer et al., 1996). Its efforts resulted in the legislative measures protecting small cetaceans in Peru. In 1993, CEPEC started a long-term environmental education program at the secondary school of Pucusana, a fishing town where dolphin and porpoise mortality used to be very high. This program was subsequently expanded to the kindergarten and primary schools of Pucusana and other "dolphin fishing towns" like Cerro Azul, Chancay and Chimbote (Van Bressemer et al., 1996; Van Waerebeek & Reyes, 1994; Van Waerebeek et al., 1994, 1997). The aim of this program was to develop the interest and respect of children for dolphins and other aquatic wildlife, and to involve them in the conservation of fauna and flora. Here we present the environmental education program and its results for the period March 1993 to February 2000. In 1995, Pro Delphinus, a small nongovernmental organization based in Lima, helped to expand this program to other fishing communities along the northern coast of Peru.

THE ENVIRONMENTAL EDUCATION PROGRAM

Environmental Classes

Each educational session was attended by an average of 40 students (although in some cases

there were more than a hundred attendees) from kindergarten, primary, and high schools, and consisted of an introduction to a relevant environmental subject, followed by the projection, with commentary, of a relevant video and a peer-guided discussion. Movies like *André the Seal* and *Free Willy* were selected because they celebrate amicable bonds between children and sea mammals, thus proposing to the pupils another kind of interaction between man and these animals other than the lethal one. Alternately, classes were based on educational booklets (see later; Figure 1) or "marine" puppets. During the visits posters composed by the CEPEC team and explaining the basic biological characteristics of cetaceans and sea turtles and reasons for their protection were given to each classroom. Finally, since September 1997 guided visits to the "Museo de Delfines" were offered to pupils and professors (see later).

Educational Booklets

To heighten the knowledge of fishermen's children about cetaceans and other endangered marine animals, and strengthen their bonds to these species, the CEPEC team produced three comic booklets. The first booklet narrates the life and adventures of a young dusky dolphin ("Colita"), the species most heavily exploited in Peru (Van Waerebeek & Reyes, 1994), and its aquatic friends. The second ("Clara and Cometa") relates the story of the friendship between a Peruvian girl and a bottlenose dolphin, and her struggle to protect dolphins. The third comic, "Kenzo and Alicia in the World of Aquatic Animals," relates the conservation problems faced by aquatic animals in Peru through their friendly encounters with two high school students. Numerous drawings illustrate the stories, emphasizing the basic biological features of dolphins and other endangered marine animals, and reasons for their protection. The booklets were distributed and read to 7–12-year-old children during environmental classes (Figure 1). Small prizes rewarded the



Fig. 1. Pupils from the primary school of Cerro Azul exhibiting the booklets "Colita" they had richly colored.

children who had done the best job in coloring the line drawings of their booklets.

Creative "Marine" Workshops

Extracurricular creative "marine" workshops were started in January 1998. They were primarily directed to children from the primary schools of Pucusana and took place after school and during the holidays. Their aim was to promote a further assimilation of the environmental themes tackled during the classes and to provide children access to new leisure activities allowing the development of their artistic capacities. During the workshops pupils completed drawings, paintings, wind-chimes, modeling, and games related to the marine fauna or the theme of a previous environmental class (Figure 2).

Art Competitions

Four art competitions were organized for pupils of the primary and high schools of Pucusana, Lurín, Cerro Azul, and Lima. The first one focused on various serious threats faced by the world's oceans (nuclear testing, pollution, and excessive exploitation of marine species). The second and third competitions were centered

on marine animals (Figure 3). The fourth art competition dealt with ocean pollution and its dire consequences for fauna.

Pro-Conservation Demonstration

Together with students of the Pucusana high school, we organized a pro-dolphin conservation demonstration through the streets of the fishing town in November 1994 (Figure 4). The week preceding the march, the children prepared drawings, and slogans requesting more attention be focused on the serious conservation problems affecting small cetaceans in Peru. The demonstration started at the high school, reached the fish market and ended in front of the Municipality. The day's proceedings were covered by *El Comercio*, Peru's leading daily newspaper.

Exhibition on Dolphins and Whales and "Museo de Delfines"

From January to mid-March 1995, an "Exhibition of Dolphins and Whales" was set up in a classroom of a primary school in Pucusana. In September 1997, this exhibition



Fig. 2. Children from Pucusana with their creations during a marine workshop.

was expanded into a permanent exhibit on the CEPEC premises (Figure 5). The Museum presents a selection of skulls from twenty species of Peruvian cetaceans, taken from the scientific reference collection of CEPEC. A full-size sculpture of a long-beaked common dolphin and natural-size but flat wooden models

of the most representative species provide the public with a sense of these animals' dimensions and coloration patterns. Foetuses of Burmeister's porpoises in formalin at different of development as well as a mounted skeleton of a pigmy killer whale (*Feresa attenuata*) and a common dolphin and vertebrae of a



Fig. 3. Presentation of the works to the jury of the 1998 art competition at a primary school of Pucusana.



Fig. 4. Children from the high school of Pucusana on their way to the fishmarket during the pro-conservation demonstration in November 1994.

blue whale (*Balaenoptera musculus*) permit easy comparisons with the anatomy of humans and other mammals. Illustrated explanatory panels, skulls, and drawings of other protected marine animals as well as the shells of leatherback, olive ridley, and green turtles are also exhibited. A recently acquired spotting scope offers children the possibility to watch the lo-

cal marine fauna from the museum's coastal vantage.

Questionnaire

In May 2001, personal interviews were completed with 55 children of the sixth grade of



Fig. 5. Pupils from a primary school of Pucusana during a guided visit at the "Museo de Delfines" in 1999.

one primary school of Pucusana to probe their familiarity with the conservation themes tackled during the classes. These children had received environmental classes since they were in second and third grade in 1997 and 1998, respectively. Of the 25 questions asked, 19 were directly related to their knowledge of aquatic animals and related conservation issues, whereas 6 questions concerned their attendance at, and understanding of, the talks, visits to the Museum, conceptual comprehension of aquatic animal conservation, and appreciation of the environmental classes.

RESULTS AND CONCLUSIONS

The primary and secondary schools of Pucusana, Chilca, Lurin, Lima, and Cerro Azul were the first targeted by our environmental program in 1993–1997, with those from Pucusana and Cerro Azul being visited regularly during these years. From 1998–2000, the program also expanded to schools in Chancay and Chimbote, and included environmental workshops. Classes and marine workshops were given on a regular basis in Pucusana during the school year while workshops were also offered during the holidays. For practical reasons, schools from the other fishing towns were visited less often. About 1,920 pupils from Pucusana, Cerro Azul, Lima, Chancay, and Chimbote attended at least one environmental class in 1998. Forty-three percent of 952 children from Pucusana and Cerro Azul received two classes during that year. In 1999, 2,135 pupils from Pucusana, Chilca, Cerro Azul, Lima, Chancay, and Chimbote were offered one environmental class. Fifty-seven percent of 1,092 children from Pucusana and Chimbote were given 2 to 3 classes during that year. Children from Pucusana had the most intensive training and many of them were followed since their first years at the primary school until their first years in high school. Those children watched several marine conser-

vation videos and received at least one of the three educational booklets.

Pupils from primary schools generally represented the optimally receptive target public as they appeared more sensitive to animals and not yet subjected to the troubles and worries of adolescence. Movies featuring animals interested students from both the primary and high schools. The booklets were extremely valuable tools to educate primary school pupils because the biological information was packaged in the form of a tale that was easy to understand and remember. As a result, most children clearly recalled the stories, even in detail, after many months. We also heard of some instances where children pointed out to their parents why they refused to eat dolphin meat served at home. Furthermore, the booklets proved valuable because they became the property of the pupils who could look at them as frequently as they wished and lend or read them to other members of their family, thus spreading the message.

Between September 1997 and February 2000, about 1,700 children visited the “Museo de Delfines” (Figure 5). School obligations were not the only motive for children to come to the Museum. Several returned on their own, some repeatedly, outside the school context, occasionally bringing friends or relatives. Others visited by themselves for the first time on recommendations from friends or relatives. Many children also visited the Museum out of a curiosity to watch through the spotting scope. We believe the Museum’s success is largely due to the recreational aspect of its educational function. Professors and directors of schools not initially included in our agenda also contacted us to solicit a guided visit for their pupils.

Answers to the interview questions allowed a more precise evaluation of the knowledge of pupils from Pucusana on endangered aquatic animals. Fifty-three of the 55 (96.4%) children questioned remembered that the talks specifically referred to dolphins and whales. Other animals (penguins, sea turtles, otters, and/or manatees) were also mentioned by 32 pupils. Forty-two (76.4%) children could cite two to five protected aquatic animals. A mean of 77%

(min. 40%—max. 98% depending on question) of the 55 pupils answered correctly 16 questions on the basic biology of aquatic animals and their environment. The material displayed at the Museum was well (three correct answers) to very well (four to five correct answers) remembered by 87.3% of the children. Forty-nine (89.1%) of the 55 pupils thought it necessary to protect aquatic animals and 54 of them (98.2%) wished to receive more environmental classes and to visit the museum again.

By actively involving the pupils in a recreational and creative way, the marine workshops emphasized the themes covered by the environmental classes and promoted the memorization of the information provided during the classes (Figure 2). They were very well received by the professors and directors of the primary schools of Pucusana who, in some instances, even helped us during these sessions. Several parents also showed a desire to have their children assist with the workshops. Children enjoyed participating to such an extent that on several occasions the number of pupils admitted had to be limited. Moreover, several children of Pucusana approached CEPEC on their own initiative requesting improvised workshops. Five hundred and twenty-three children from Pucusana and Cerro Azul attended the workshops in 1998. In 1999, this number rose to 579 for Pucusana only.

The art competitions were also well received. Between 150 and 250 compositions were submitted and many winners were selected (Figure 3). Dolphins, sea lions, and sea turtles, as well as other aquatic animals were very often present in the compositions, showing the impact the environmental classes had on children and adolescents (Figure 3). The art competitions as well as the pro-conservation demonstration and the preparative activities are likely to have developed children's awareness of some of the conservation issues that exist concerning the marine environment. The march and its media coverage contributed to the 1994 national campaign to protect dolphins and porpoises.

Since the environment education program was established in 1993, children and adoles-

cents from Pucusana and Cerro Azul have displayed an increased interest, knowledge, and awareness for cetaceans and other protected aquatic wildlife. A high percentage of them know that dolphins and porpoises are protected and also know why. Environmental awareness is noted through the pupils' comments on the consequences of some of their routine habits, like littering on land and disposal of plastic bags and other garbage at sea. One girl who received environmental classes at Pucusana's high school in 1993–1994 was later in charge of the library of this fishing town and voluntarily helped us during the workshops. She is part of the first generation of young adults who have received information on marine animals and hopefully will continue promoting their conservation. Although the program was more recently started in Chancay and Chimbote, pupils from these localities also manifested a keen interest for cetaceans and other aquatic creatures. We believe that the CEPEC environmental education program efficiently complements the available legal instruments to better protect cetaceans, sea turtles, penguins, and sea lions in Peruvian waters.

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