

## Students' Awareness of Endangered Species and Threatened Environments: A comparative case-study

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**Abstract.** *The purpose of this comparative-case study is to investigate children's awareness of endangered species and threatened environments in four countries. 5th – 7th grade students in four schools, each from Turkey (n=16), Bulgaria (n=40), Romania (n=22), and USA (n=11) constituted the sample of the study. Each group of students under the guidance of their teacher was asked to select one endangered specie and threatened environment (e.g. lake) in their neighbourhood. During the study, the students went on field trips which complemented indoor discussions during club time. Student achievement was measured with five different data collection instruments each of which pertains to knowledge, skills, attitude, and behaviour. The findings indicate that students developed a global awareness from these experiences, which resulted in motivation to develop action strategies for protecting the endangered species. Student conceptions were divided into three groups; egocentric, guardianship and eco-centric.*

**Keywords.** environmental awareness, endangered species and threatened environment.

### 1. Introduction

Nature studies with the children have long been reported in the literature to increase

students' awareness of ecological processes (e.g. food chain, water cycles...etc) in the natural environment. These studies also help the children understand the language of the nature. Studies in the literature report that there are lots of ways of developing one's environmental knowledge and awareness such as media, family and the schools (within and out-of-school). Field trips (Neal, 1994) and case studies (Matthews & Riley, 1995), as cited in Yerkes & Haras [4], community inventory projects, community action projects are mentioned in the literature as school activities [5]. Further, school garden activities can be added to this list. As claimed by Bryjergard, 2001 [4], school gardens are excellent places for introducing the concept of environmental awareness to the students. Another way of introducing environmental issues to students is to infuse studies about the environment into a traditional course offering (Wagner, 1997). In addition to these methods, outdoor activities (field trips...etc) provide teachers and the students with opportunities [4] to study environmental issues first hand, and this approach has been effective in helping students develop an awareness of the environment [6,5].

#### 1.1. Purpose of the study

The purpose of the study was to investigate children's concern for and awareness of

endangered species and threatened habitats. This paper presents in-depth analysis of findings of a comparative case study including the perceptions of children from Turkey, Bulgaria, Romania and the USA.

## 2. Method.

This study was designed as a comparative case study seeking for in-depth information on a small group of participants [1]. Patton [2] believes that studying a small group, with a wealth of detailed information, can help the researcher(s) understand the cases in depth. However, he further claims that this reduces generalizability. Furthermore, qualitative inquiry helps the researcher carefully scrutinize the targeted sample [3]. The findings presented here are the results of the second year of the Unique and Universal Project.

### 2.1. Sample and Sampling

Eighty-nine students in grades 5 to 7 participated in this study. They came from four different schools and each school was in a different country as shown on the list that follows.

Table 1. Students from each country

Country	Number of the students
Turkey	16
Bulgaria	40
Romania	22
USA	11

Fourteen 5th and two 6th grade students at METU Foundation School in the urban area of Ankara constituted the Turkish sample in the study. The group included 11 and 12 year old girls and boys.

Forty 1st to 6th grade students between the ages of 8 and 11 from Vasil Aprilov Elementary School in Bulgaria constituted the Bulgarian sample of the study. These students only participated in the second year of the U&U Project.

Twelve 5th grade and ten 6th grade students at School Number 5 in Satu Mare in Romania constituted the Romanian sample of the study.

Six 6th grade and five 7th grade students from Roland Park Country School in the USA

constituted the American sample of the study. Since this school is for the girls, all students in the study were girls.

### 2.2. Data Collection Instruments

The Unique and Universal project has several objectives which address different dimensions of student learning. These dimensions include the cognitive, affective and psychomotor dimensions of the learning. Thus, in order to measure participants' development regarding these three dimensions, five different data collection instruments were developed by considering findings from the existing literature and the level of the students. Only the knowledge test, the attitude test and the picture form were given to the students in Bulgaria, Romania and the USA. Before administering the instruments, they were translated into the students' own language (Turkish, Bulgarian, Romanian and English). Each of the instruments is briefly described below:

#### a. Knowledge Test

This test aims to investigate students' knowledge about endangered species and threatened habitats. Further, it also aims to determine the source of students' knowledge on the topics investigated. In the test, the students are asked to rate the importance of some precautions to be taken to protect these species and habitats. Both open-ended and Likert' type items are included in the knowledge test.

#### b. Attitude questionnaire

This questionnaire aims to investigate the attitudes of students toward endangered species and threatened habitats. There are 13 closed-ended items on a 4 point Likert-type scale (1-strongly disagree, 2-disagree, 3-agree and 4-strongly agree). In addition, the students are also asked to respond to reasons behind their tendencies / responses.

#### c. Picture form

Each group of students focused on a different endangered species. The picture form aims to determine to what extent the students know the characteristics of the endangered species they are studying. In the picture form, the students are required to draw a picture of the specific endangered species, and also to identify the characteristics of that species.

#### *d. Field trip tests (two different)*

These tests include two different instruments. The first one aims to determine students' knowledge about the scientific experiments carried out during the field trip. The second aims to determine the students' knowledge of the endangered species they are studying.

### **2.3. Data collection process**

A strong communication ensured that the partner schools initiated the study simultaneously. However, this connection weakened toward the end of the spring semester due to the heavy schedule of the partner schools and the teachers. This study of the second year of the U&U Project was initiated within the schools in the fall semester of 2006-2007. The study teams were formed and the aims of the project were explained to the project teams. In order to collect data from the participants, the instruments were administered at the beginning, middle and end of the study. In the first meeting with the students, at the beginning of the project, in order to determine the initial knowledge and attitudes of the students, a knowledge test, an attitude questionnaire and a picture form were administered to the students in each country. Then, regular meetings took place with the students during the semester.

The students went on field trips (selected by the students) to a study site near to their school. Two field trip tests were given to the students before and after each field trip and observation activities. The first field trip test was given to the students to determine their initial knowledge of water monitoring parameters before and after the water parameter experiments. The second field trip test was given to determine students' knowledge of characteristics of endangered species before and after their observation of the endangered species they selected to investigate. These two tests were only given to the students in Turkey, but not the ones in Bulgaria, Romania and the USA. At the end of the study (end of spring semester), a focus group interview was performed with only Turkish students. Also, the picture form and attitude questionnaire were given to all students in four of the countries.

### **2.4. Data Analysis**

Once all the data was gathered from the participants, the data analysis procedure could

begin. In order to analyze the data, not only quantitative but also qualitative data analysis procedures were used. Since the attitude questionnaire includes closed ended items, the responses given to those items were analyzed by use of descriptive statistics, particularly mean, standard deviation, percentage, and frequency. On the other hand, the responses given to the open ended questions were analyzed by the use of content analysis.

## **3. Results.**

The results gathered from the students through the use of different types of data collection instruments revealed students' concern, awareness and perceptions of endangered species and threatened environments.

### **3.1. Turkish Students**

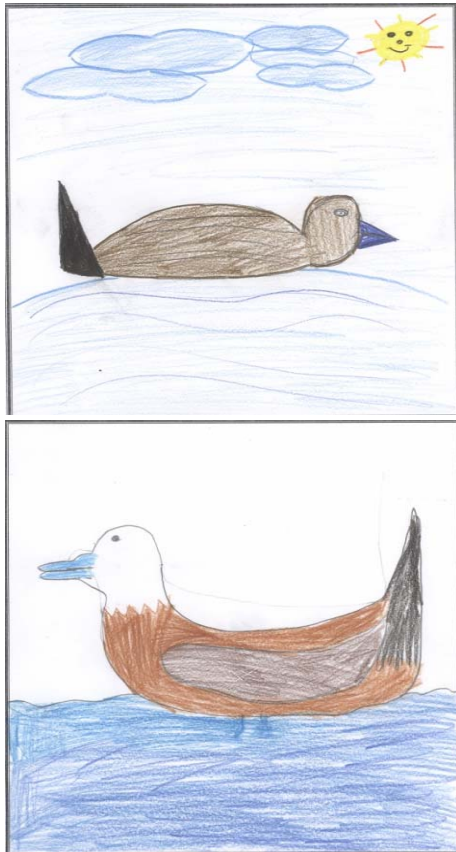
Turkish students believed that an excessive amount of hunting, water and air pollution, changes in the climate as a result of global warming, construction of factories in the natural areas and uncontrolled waste management and sewer are the main environmental problems directly influencing the loss of endangered species and threatened habitats. They also believed that the precautions and protection measures taken to deal with these problems have not been sufficient in either Turkey or worldwide. They were more concerned about individuals' unconscious attitudes and behaviours for engaging in protecting these species and regions.

The responses of the students indicated that their own knowledge about the number of the other endangered species and regions had been very limited at the very beginning of the project. However, their knowledge of these topics increased toward the end of the study.

Students reported that they obtained environmental information about the endangered species and threatened regions mostly from their school, the projects they were involved in (eco-school projects, tree planting...etc), and the Internet. As a source of knowledge regarding the topics, the students claimed that course textbooks were not sufficient, but the classroom instructions and activities were somewhat perceived as adequate.

Students' pictures of Dikkuyruk (Oxyura Leucocephala) and their explanations regarding

this bird showed that their knowledge of selected endangered specie was quite limited at the very beginning. Their second picture of the species at the end of the project indicated that they drew the picture of the organism in detail and identified its basic characteristics (head, tail, living area...etc). Two of Turkish students' drawings of Dikkuyruk are given in picture 1.



**Picture 1. Turkish Students' Pictures of Dik Kuyruk (Oxyura Leucocephala).**

Some of the explanations of the students on Dikkuyruk are given below:

*"It has blue bill. Its tail is strait. Its head is white. It lives in Eymir Lake. It is endangered"* (Deniz S.)

*"It is a diving duck. It is called as white-head (Akbaş). It is forbidden to be hunted. Its tail is black"* (Burak B.).

*"It has brown fur/hair".* (Aleyna K.)

Students believed that passing new laws, fining people in case of their destructive behaviours, constructing new habitats for the species, holding conferences and seminars, and putting more information about the endangered species and threatened regions in the textbooks

are the most effective ways to prevent the extinction of endangered species and threatened environments. They reported that prohibiting people from entering the endangered habitats would not be an effective precaution.

Turkish students' attitudes toward the endangered species and threatened environments seemed to be quite positive both at the beginning and at the end. They indicated their willingness to take any action to protect the endangered species, because they believed that these animals and plants are becoming rare and endangered. They also valued that the endangered species are living organisms like human beings. Thus, students felt they have their own rights and need to be protected. For that reason, they reported that the natural resources should be carefully used. Their self-efficacy/internal locus of control appeared to be high, because they believed in their own ability and intrinsic motivation to take responsible actions.

### 3.2. Bulgarian Students

Bulgarian students believed that hunting, human activity and factories, destruction of the natural habitats, lack of food, release of waste water in water basins, and harmful / poisonous emissions of gases in the atmosphere are the main environmental problems causing the loss of endangered species. Similarly, they reported several environmental problems threatening the natural environmental region such as tourist activities in and around the region, wrong use of the area for scientific investigation, and loss of habitat and species around the region. They more concerned about the species they investigated during their field trips and reported that hunting is the most severe problem threatening the Black Kormoran.

The Bulgarian students believed that the protection studies were not sufficient in the World in general, since people do not pay adequate attention and pollute the environment which causes the extinction of species. However, they believed that the protection studies were somewhat sufficient since such protection studies have been carried out by the schools, and poachers are fined in Bulgaria.

They obtained information about the endangered species and threatened environment mostly from the project they were involved in, their school, TV, books, and the Internet. Nearly, all of the students indicated that subject taught in

the classroom and classroom activities were a bit sufficient whereas the topics covered in the textbooks were not enough to be knowledgeable about the endangered species and threatened regions.

Two of the students' drawings are given in picture 2. Their pictures of Black Kormoran indicated their average knowledge of characteristics of this species.

They reported that imposing fines, putting new laws, creating special areas for the plants and the animals located in the threatened areas, and integrating much more information about these topics into the textbooks were rated as the most influential ways of solving the problems with these species and areas. Furthermore, they suggested that the laws be changed, fines be charged and stronger punishment be given.



**Picture 2. Bulgarian Students' Pictures of Black Kormoran Bird.**

Students indicated their own ways to solve these problems included taking part in projects and protection studies, taking non-formal biology, ecology and geography classes and cleaning the sea.

Bulgarian students seemed to have positive attitudes toward the endangered species and threatened environment. They believed in the necessity of protecting endangered species in order to sustain the beauty of nature, biological diversity and natural balance. All of them were willing to take part in the project for protecting

endangered species and threatened natural areas since they would like to explore nature, protect these species and regions, and ensure their sustainability. They all agreed that the natural resources should be carefully used, otherwise they would disappear. Furthermore, they agreed that everyone could do something to protect endangered species and take part in protection studies.

### 3.3. Romanian students

Romanian students did not complete the knowledge test, and only completed the picture form and attitude questionnaire. Only the results from these two forms are given here. Romanian students selected the pool frog as their endangered species to study during the project. Their pictures and subsequent explanations of the pool frog showed that they carefully examined this species and their characteristics. Two of the pictures drawn by Romanian students are given in picture 3.



**Picture 3. Romanian Students' Pictures of Pool Frog.**

Some of the explanations of the students on pool frog are given below:

*"It is green. It can jump and swim. It has got four legs, two eyes and long tongue. (It) eats*

*insects, flies and mosquitoes. It lives in water, lakes and pools". (Gulya I.)*

*"...it is endangered. It is eaten by storks and snakes". (Paluca V.)*

*"...it lives in the water, land and swamps". (Huszti J.)*

*"...it sometimes sits on the water lilies. When it is not careful, it is caught by stork, snakes or birds" (Koos E.)*

Their concern for the endangered species and threatened environment was quite high. They were highly concerned about natural resources, extinction of the species, and wrong pesticide usage in the agriculture, hunting of the animals, population growth and urbanization and responsibilities of human being for sustaining the biodiversity in the natural areas.

The students agreed that endangered species and wild animals should be conserved since they all contribute to the natural balance and have their own right to survive.

They believed in the negative effects of unplanned industry, population growth and urbanization on endangered species and natural regions.

They emphasized the importance of protecting natural environments, because otherwise, they will end in the near future

They were willing to participate in the project aiming to protect endangered species and natural habitats, because this would makes them happy, and they like animals and nature.

Regarding their ability to protect species and findings ways to do so, one of the students said that *"If I do something to protect something, I feel protected too"* (Daniel T.).

They believe in their own strength to protect these species and natural regions.

They agreed that everyone on the Earth could do something else to protect these species and regions.

### 3.4. American students

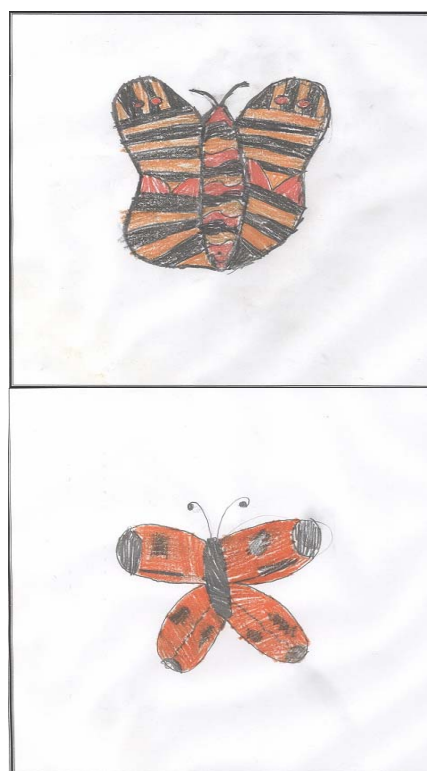
American students believed that chopping down trees, construction of new buildings in the areas where these species live are the main actions threatening the endangered species and their natural regions. They were more concerned about the constructions of new buildings in the natural regions.

Similar to the students in the other three countries, American students' knowledge on the

number of the other endangered species and threatened regions was limited.

TV and the school were the sources that students identified as where they gathered most of their own knowledge on the endangered species and threatened regions. Books and the project they were involved in were also rated as information sources which contribute to their own knowledge.

Students' pictures of the monarch butterfly indicated their knowledge of the basic characteristics of these species. Two of American students' drawings of a monarch butterfly are given in picture 4.



**Picture 4. American Students' Pictures of Monarch Butterfly.**

Some of the explanations of the students on monarch butterfly are given below:

*"It has beautiful orange wings... Their wings can be yellow or orange". (Annie C.)*

*"Their wings are yellow / orange with black on them. They have also antenna and legs". (Georgia M.)*

The American students had positive attitudes toward endangered species and threatened regions. They all believed in protecting endangered species since they are a part of the

ecosystem. They also reported that endangered animals should not be hunted because they are limited, they may be extinct in near future and they also have rights to survive like human beings and other organisms. They were against using pesticides in agriculture since uncontrolled pesticide usage may harm species and the environment. They believed in the destructive roles of unplanned industry, and uncontrolled population growth and urbanization. They were against people constructing new buildings in the natural habitats since this would destroy the homes of many animals. They believed in their own abilities to protect endangered species and threatened environments and were willing to participate in a project aiming to protect these species and environments. One of the students said that "I am a girl who has a huge voice. And can tell people what to do" (Caroline W.). The students agreed that every individual needs to do something to protect endangered species because that way the Earth can be improved for the benefit of all living things.

#### **4. Summary and Conclusions**

This comparative case-study was carried out with eighty-nine 5th – 7th grade students in four schools from Turkey, Bulgaria, Romania, and the USA. Within the study, students' knowledge, attitudes, skills and behaviours were assessed by making use of more than one data collection instrument. Since most of the data gathered were qualitative in nature, the data were subjected to content analysis. During the project, qualitative data rather than quantitative ones were gathered because it was believed that qualitative data could provide in-depth understanding about students' awareness of endangered species and threatened environments (regions).

As far as students' responses to the knowledge test and their pictures were concerned, it can be concluded that students' identified basic characteristics of the species they investigated. Furthermore, they reported their knowledge of problems threatening the species and biodiversity in the natural areas. However, their knowledge of other endangered species was limited. The number of the species they reported was quite limited.

The major sources that students obtained information about endangered species and natural regions from were their own schools (teachers and classroom instruction), the Unique

and Universal Project in which they were involved and the Internet. TV and books were more highly rated by the Bulgarian and American students. However, these two were rated lower by Turkish students. Family, friends and NGOs was not highly rated as information sources by the students. Nearly all of the students reported that classroom instructions and activities were seen as useful sources of information, but textbooks were not seen as including sufficient information about endangered species and natural regions.

The students have positive attitudes toward protecting endangered species and natural regions. They believe in the importance of protection studies to help us know how to sustain the biodiversity in the natural ecosystem. They are against using pesticides in agriculture for increasing the yield. They were against unplanned industry, population growth and urbanization, since they believe that unplanned development can harm the species and can destroy animals' homes and food sources in natural areas. They emphasize the importance of using natural resources cautiously since the resources are becoming less each day. They believe in their own ability to engage in action and take part in projects aiming to find ways to protect these species and natural regions. They suggest other people also do something to preserve the species and natural regions.

Passing new laws to protect the endangered species and natural regions, giving fines to the people who harm the biodiversity in the natural region, and taking the endangered species in the protected / special areas are seen by the students as most effective solutions to protect these species and natural regions. They do not believe that not allowing people to enter these regions is an effective solution. The results of the study revealed the importance of field trips for developing students' awareness of biodiversity in the natural region and ecosystem. Further, the present study shows that if teachers guide effectively during the field trips, students could develop their own solutions to the problems threatening the biodiversity in the natural regions. The study also shows that field trips to natural regions could develop students' knowledge on the diversity of the species within the selected region and understanding the interaction among the organisms in the natural processes. Their attitudes could also be developed through effective field trips. For all

these reasons, field trips and outdoor studies should be considered as extra-curricular activities and also integrated into the school curriculum. American students did not go to the field trips; instead they used schoolyard for outdoor activities. Their activities further point out that a prototype natural habitat can be created in the schoolyards and then these places can be used as instructional purposes.

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