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Pupils' environmental awareness of natural protected areas: The case of Zakynthos Island

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ABSTRACT

This study presents the results of a questionnaire-based survey, conducted in primary and secondary public schools of Zakynthos Island during 2013, referring to environmental awareness as well as pupils' perceptions and attitudes on specific environmental issues. The main aim of the study was to determine the knowledge and awareness that local pupils about the Loggerhead sea turtle (*Caretta caretta*) and bird species that are migrants and/or endemic in the National Marine Park of the island. The study area was selected because the percentage of pupils not attending compulsory education is one of the highest in Greece.

Introduction

The natural environment is susceptible to various environmental problems, which pose an immediate threat to its sustainability. Many of these problems are the result of the environmental behavior and human activity on the planet (Gardner & Stern, 2002; Vlek & Steg, 2007; Winter & Koger, 2004). The change in human behavior could contribute to more efficient management and resolution of many environmental problems. Systematic research has accumulated rich knowledge on the necessity of sustainable environmental resource management, ecosystem services, and the reasons why adult citizens must commit to environmental protection (Bamberg & Moser, 2007). Responsible and environmentally sensitive citizens can only originate from environmentally aware young people. However, knowledge about the behavior and perceptions of young people is limited (Cheng & Monroe, 2012; Collado & Corraliza, 2015; Manoli, Johnson, & Dunlap, 2007). Furthermore, our knowledge regarding the causes that influence the environmental behavior of young people is also limited (Evans et al., 2007). People involved in the ecological aspects of the natural environment and who gain experience close to nature

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strengthen their willingness to preserve precious natural assets. Further knowledge and understanding of environmental processes and ecosystems can be achieved when people have repeated experiences in nature (Kaiser, Hartig, Brugger, & Duvier, 2013; Wells & Lekies, 2006). In addition and according to recent studies, the contact of young people with nature influences their environmental awareness and behavior toward the natural environment (Cheng & Monroe, 2012; Collado et al., 2013).

Indeed, the achievement of the management objectives for a protected area is based on environmental awareness and education (Jacobson, 1999; Oates, 1999). According to Graziani, Cabral, and Santana (2013), protected areas are ideal places for environmental education focused on young people, because they understand experientially the need to protect and preserve the natural and cultural resources for future generations. Similarly, Ormsby (2008) argues that the creation of environmental education schools in the peripheral zone of protected areas has very important results, because young people come into direct contact with the natural and cultural wealth and understand its importance, thus helping them to shape environmental attitudes and behavior throughout their lives. According to Worsley and Skrzypiec (1998), pupils from rural and agricultural areas were more concerned and showed more optimism about environmental issues, than those in urban areas. This is probably due to the fact that pupils of schools in rural and agricultural areas have the opportunity to engage directly and experientially with the natural environment. Also, the link between a school and a neighbouring protected area can bring very positive results, as regards the awareness of pupils and the local community, because pupils may disseminate their knowledge and experience to other members of the family. Indeed, family discussions play an important role in improving young people's attitudes and perceptions toward environmental protection (Abeliotis, Goussia-Rizou, Sdrali, & Vassiloudis, 2010; Chan, 1996; Chawla and Flanders-Cushing, 2007; Papanastasiou, 2002).

Several studies have been conducted in Greece in order to determine and evaluate the environmental attitudes and knowledge related to the natural environment. Malandrakis and Chatzakis (2014) conducted a study in Crete about pupils' perceptions with respect to animals, energy, pollution, recycling, water, and general environmental issues. Paraskevopoulos, Padeliadu, and Zafiroopoulos (1998) have also shown that children's knowledge about the environment is influenced by their immediate experience as well as by the content of their textbooks. However, these studies focused only on primary school pupils. A study quite similar to ours is that of Dimopoulos and Pantis (2003), who examined the knowledge of pupils about sea turtles in Zakynthos. However, our study differs as it does not focus merely on sea turtles but on seabirds as well, and the sample of the current study includes both elementary and secondary education pupils.

Zakynthos Island hosts one of the two National Marine Parks of Greece including the protected area of Strofades Islands. According to the National Statistical Service of Greece, the percentage of pupils not attending compulsory education in the region of the Ionian Islands, where Zakynthos belongs, is higher than in other prefectures. The percentage of pupils quitting school in Greece is 11.4% while the percentage

of young people (1824 years old) from the study area that have prematurely left school is 16% and constitutes the third highest score at a national level (Eurostat, 2012). Intertemporal progress shows that it is not feasible to achieve the objective to reduce the corresponding rate to 9.7% by 2020. Another problem encountered in the region of the Ionian Islands is the low rate (1.1%) of young adults participating in Life-Long Learning Programs, while the corresponding rate for Greece and the European Union (EU) is 2.9% and 9%, respectively. In addition, the Ionian Islands region seems to have a low percentage of people belonged to the higher education level. Only 14.7% of the population (25–64) hold a university degree in the Ionian Islands, which is the lowest rate among all Greek prefectures (26.1% and 27.7% for Greece and the EU, respectively, according to Eurostat (2012)). The low educational level of people in the region of the Ionian Islands and the even lower level identified for Zakynthos Island, which hosts one of the two national marine parks of Greece, are the main reasons for selecting this area for a case study.

Taking into account the environmental and socioeconomic features of Zakynthos, we conducted a questionnaire-based survey, in which primary and secondary school children were asked to participate. The objectives of the study were:

- to examine the level of environmental knowledge and awareness of primary and secondary education pupils, as well as the differences that may exist between pupils from different areas;
- to identify gender-related differences that may exist regarding the willingness to deal with environmental issues;
- to examine whether the role of local natural protected areas is important in enhancing the environmental knowledge and awareness of pupils;
- to investigate differences in environmental knowledge and awareness among pupils in the capital of Zakynthos, agricultural, mountainous, and submountainous areas; and
- to determine the knowledge and awareness that local pupils about the Loggerhead sea turtle (*Caretta caretta*) and bird species that are migrants and/or endemic in the National Marine Park of the island.

Methodology

Study area

Zakynthos is located in the Ionian Sea, between Greece and Italy. The island covers an area of 406 km² and has a population of about 42,000 people (Fig. 1). The National Marine Park of Zakynthos (NMPZ) includes the Gulf of Laganas and the Strofades Islands, which means terrestrial, coastal, and marine ecosystems. It was established as a Marine Park in 1999 and the tourism industry is its biggest challenge (Kokkali & Edwards, 2011; Togridou, Hovardas, & Pantis, 2006). Moreover, the NMPZ constitutes an important nesting habitat for significant marine animal species of international conservation value such as the Loggerhead sea turtle (Mazaris, Matsinos,



Figure 1. Map of Zakyntos Island where zones of study area are depicted. Natura 2000 sites are also shown.

& Margaritoulis, 2006) and Scopoli's shearwater (*Calonectris diomedea*; Karris et al., 2017), a pelagic seabird. The mountainous area of Zakyntos is also ideal for eco-tourism; it offers significant natural and cultural heritage zones, and a landscape with a unique combination of mountains and steep-cliff coastal areas.

When an area is established as protected, the local community usually has to change its behavior, as natural resources that were formerly used may become off-limits (Stevens, 1997). This was the case in Zakynthos because the area was already used for mass tourism when the NMPZ was established. The attitudes of locals and their interactions with the protected area as well as the level of local participation and possible conflicts are important issues that relate to the effectiveness of the management and protection of an area (Brandon et al., 1998; Kramer et al., 1997; Ormsby & Kaplin, 2005; Pimbert & Pretty, 1995). Nowadays the tourism industry in the area of the NMPZ is extremely developed and tourists that are interested in the sea-sun-sand tourism experience have to coexist with eco-tourists. Indeed, as several researchers have pointed out (e.g., Hovardas & Stamou, 2006; Machairas & Hovardas, 2005), tourism is one of the few tools left for local development in protected areas. But this tool can only be used if the locals become environmentally aware and this is feasible if the new generation receives proper education.

Data collection

Zakynthos has a total of 22 primary and 11 secondary schools and a stratified random sampling was adopted so as to combine the simplicity of random sampling with the potential increase of survey reliability (Levy & Lemeshow, 2008). More specifically, schools of Zakynthos Island were divided into three groups-strata located in submountainous, agricultural, and urban areas, and the sampling was performed separately within its group. According to this sampling frame, we selected a significant sample of schools (13 out of 22 primary schools and 9 out of 11 secondary schools) in order to reflect, as much as possible, the different interests and levels of environmental knowledge and awareness of pupils. The areas the schools are located in are marked on a map in Fig. 1. Some areas have more than two schools.

For the survey we applied a quantitative research technique that was based on a questionnaire. More specifically, the research team visited each school of the island on a typical school day after making the appropriate arrangements with the school's principal and the teachers. Each principal selected the classes of the school that would participate in the study so as to ensure the required representation of pupil characteristics. The questionnaire was presented to all pupils of the class, who had to complete it according to the teacher's instructions. However, the pupils were not obliged to participate in the survey by filling in the questionnaire.

As it was previously mentioned, the main aim of the study was to determine the knowledge and awareness that local pupils have not only about the Loggerhead sea turtle but also bird species that are migrants and/or endemic in the area and are protected by the NMPZ. The structure of the questionnaire was also based on the fact that specific nature conservation projects have been implemented in the study area during the last years, offering environmental awareness opportunities to the local school community.

The questionnaire included 17 questions divided in 3 sections. The first section had five questions and addressed personal characteristics, such as age, nationality, gender, educational level, as well as the activities of the pupils. The second section had eight questions about the environmental knowledge of the interviewed schoolchild. More specifically, the first question referred to a possible past visit to the NMPZ. The second question aimed at finding out whether the pupils knew that Zakynthos constitutes an important stopover site for migratory birds. The third question asked about the main environmental problems of the island. The fourth question referred to the adoption of a green way life (e.g., recycling, energy saving, reducing the water footprint etc.). The fifth question was about the participation of the corresponding schoolchildren in educational courses about the environment. The next question was about their willingness to attend a formal educational curriculum about the environment. The seventh question was related to the knowledge of specific environmental legislation of the island and the last question of the section asked pupils about how often they discussed environmental issues within the family. The last section contained four questions about their knowledge of local seabirds and the actions that should be taken to promote public awareness, targeting this avifauna group.

The results referred specifically to Zakynthos so as to serve the aim of the study. Zakynthos was selected due to the fact that it was the first area in Greece with an established public Management Body for the NMPZ. The recognition of the NMPZ as a protected area and the establishment of the relevant Management Body created several conflicts of interests because the conservation measures for sea turtle protection were in contrast with mass tourism activities in the Gulf of Laganas. The validity and reliability of the results are confirmed by sufficient representation of all schools of the island in the survey. Furthermore, the participants of the survey in each class were selected so as to ensure a diversity of pupil characteristics (e.g., gender). The validity of the answers of the students was confirmed by making comparisons between related questions. For example, the question about whether the children talk to their family about local environmental issues can be cross checked with the extent to which children adopt a green way of life.

Possible limitations

The pupils that participated in the study were selected by the principals of the schools. However, they were not obliged to participate in the survey. This is a limitation of the method as some of the students did not show willingness for participation to the survey. A possible improvement of the particular study would be to expand the sample in order to include families of the students and not just the students. This way, the results collected from the students in schools could be cross-checked with the results collected from their families.

Statistical analysis

A number of hypotheses were made using 25 possible pairs of selected responses to the questionnaire that could be treated as cause-effect pairs (Table 1).

Table 1. Hypotheses that were statistically checked based on 25 possible pairs of selected responses of the questionnaire that could be related.

1	There is no difference between the residence areas (mountains, urban, etc.) as to whether pupils have been previously involved in another program of environmental education.
2	There is no difference between the residence areas (mountains, urban, etc.) as to whether pupils would wish to have a separate course in school for environmental education.
3	There is a difference between the residence areas (mountains, urban, etc.) as to what pupils know about the protection status of Zakynthos.
4	There is a difference between the residence areas (mountains, urban, etc.) as to whether pupils know about the importance of Zakynthos for bird migration.
5	There is no difference between the residence areas (mountains, urban, etc.) as to whether pupils talk to their family about local issues for the environment.
6	There is no gender difference as to whether they know about the importance of Zakynthos for bird migration.
7	There is no gender difference as to whether they have been previously involved in another program of environmental education.
8	There is a gender difference as to whether they want a separate course in school for environmental education.
9	There is a gender difference as to whether they talk to their family about local issues for the environment.
10	There is a difference between pupils of secondary and primary education as to whether they know about the importance of Zakynthos for bird migration.
11	There is a difference between the pupils of secondary and primary education as to whether they want a separate course in school for environmental education.
12	There is no difference between the pupils of secondary and primary education as to whether they know about the protection status of Zakynthos.
13	There is no difference between the pupils of secondary and primary education as to whether they talk to their family about local issues for the environment.
14	There is no difference between Greek and foreign nationality pupils as to whether they would wish to have a separate course in school for environmental education.
15	There is no difference between Greek and foreign nationality pupils as to whether they have previously participated in another program of environmental education.
16	There is a difference between pupils who have or have not visited the NMPZ, as to whether they talk to their family about local issues for the environment.
17	There is a difference between pupils who have or have not visited the NMPZ, as to whether they would wish to have a separate course in school for environmental education.
18	There is no difference between pupils who have or have not visited the NMPZ, as to whether they know about the protection status of Zakynthos.
19	There is a difference between pupils who have or have not previously participated in another program of environmental education, as to whether they discuss with their parents about local environmental issues.
20	There is no difference between pupils who have or have not previously participated in another program of environmental education, as to whether they wish a separate subject in school for environmental education.
21	There is no difference between pupils who have or have not previously participated in another program of environmental education, as to whether they know about the protection status of Zakynthos.
22	There is a difference between pupils who have or have not previously participated in another program of environmental education, as to whether they wish to participate in voluntary environmental programs.
23	There is a difference between pupils who declare or do not declare interest in programs of environmental education, as to whether they actually participate in such programs.
24	There is no difference between pupils who declare or do not declare interest in programs of environmental education as to whether they participate in voluntary actions for the environment.
25	There is no difference between pupils who know or do not know about the conservation status of Zakynthos, as to whether they wish a separate course in school for environmental education.

Note. NMPZ = National Marine Park of Zakynthos.

All collected data have been assigned to categories while the sum of the tested variables was normally distributed according to standard residual values in Crosstabs. Statistical analysis of the collected data was based on the Monte Carlo simulation method using IBM SPSS statistics 20 software. The initial thought to use the Chi square test as an independent test for the collected data was abandoned because in

Table 2. Distribution of schools in Zakynthos participating in the questionnaire-based survey in 2013 according to their geographical position and level of education.

Area	Schools of primary education	Schools of Secondary education
Urban areas	3	3
Submountainous areas	3	2
Plain and agricultural areas	7	3
Evening school	0	1

some tested associations more than 20% of the cells have an expected frequency count of less than 5%. Additionally, the sample of pupils was 439 individuals, hence $n > 250$, and several researchers have argued that this test is a sensitive statistical criterion, particularly when it is applied to extremely small samples ($n < 25$), or very large samples ($n > 250$) as in this case (Champion, 1981). The Monte Carlo method was used for testing associations between different categorical variables, setting the confidence interval and number of samples at 95% and 100,000, respectively.

The Bonferroni correction was used in order to address the problem of multiple comparisons in our analysis process so as to proceed to acceptance or rejection of a null hypothesis (García-Arenzana et al., 2014; Simes, 1986). More specifically, we calculated the critical value (α) for an individual test by dividing the familywise error rate (here 0.05) by the number of tests. For example, testing associations of four variables (Region, Education level, NMPZ visit, and Past environmental education experience) with the level of knowledge of Zante protection status, the critical value for an individual test would be $0.05/4 = 0.0125$. Thus, we only consider individual tests with $P < 0.0125$ to be significant for this specific group of multiple comparisons and possible relevant associations.

Results and discussion

Characteristics of pupils

Questionnaires were distributed to 22 primary and secondary education schools throughout Zakynthos (Table 2). In total, 439 questionnaires were filled in, of which 259 were answered by the 5th and 6th grades of the elementary schools in Zakynthos, 156 questionnaires by all grades of high schools in Zakynthos and 24 by pupils of the only night school of the island. The sample of elementary schools corresponded to 47% of female and 53% of male pupils, whereas, the respective percentages for high schools were 43% and 57%. Regarding the nationality of the pupils that participated in the survey, Greeks corresponded to 83% of the sample, while the rest were from other countries, mainly from Albania. Tables 2, 3, and 4 also present information regarding parent occupation and pupil activities.

General aspect of specific findings

The Monte Carlo simulation analysis into the testing of the 25 null hypotheses that were initially drawn, revealed the following findings (Table 5) according to our

Table 3. Distribution of parents' occupation according to the students that participated in the survey.

Parents' Occupation	Percentage
Employee in private sector	30
Employee in public sector	9
Self-employed	14
Individual enterprises	17
Farmers	11
Unemployed	16
retired	3

collected data while only significant correlation and/or differences are further presented as follows:

Impact of region on knowledge of the local natural environment

The percentage of pupils that were unaware of the nature protection status of Zakynthos was 27% for rural areas and 23% for urban areas. Pupils from mountainous and semimountainous areas did not present the same pattern in terms of knowledge about the importance of Zakynthos as a stopover site for migratory birds (Table 6). More specifically, a large percentage of children in mountainous and semimountainous areas (81.6% of 115 children) know that Zakynthos is very important for migratory avifauna species. The corresponding percentages for pupils in urban or plain areas are 66.7% and 70.4%, respectively.

The knowledge of pupils is mainly due to the stimuli they get from the environment in which they live, close to the NMPZ. This is in accordance with relevant findings suggesting that pupils living close to a protected area that attracts interest at national and international level may participate in several educational activities that take place regularly (Graziani, Cabral, & Santana, 2013; Ormsbay, & Karlin, 2005; Yurttas & Sülün, 2010). The highest percentage of children of mountainous and semimountainous areas that appreciate the importance of Zakynthos for migratory birds can be attributed to the daily experience of great habitat heterogeneity and a lower rate of human disturbance, which enhances the biodiversity of birds (Littledyke, 2004).

Gender differences

It appears from our results that girls are more sensitive to environmental issues (Table 7). Girls are not only interested in environmental issues to a greater extent

Table 4. Rate of pupils' activities and interests.

Pupils' activities	Percentage
Sports	25
Computer games and television	40
Activities related to the environment	10
Traditional dance	10
Voluntary work	10
No answer	5

Table 5. Results of study into the testing of the 25 null hypotheses that were initially drawn using the Monte Carlo simulation analysis (* = significant associations). According to Bonferroni correction, critical value (alpha) for an individual test was calculated by dividing the familywise error rate (here 0.05) by the number of tests per examined variable characterized as effect. The dashed lines separate the tests per examined variable characterized as effect.

α/α	Group of variables (cause-effect)	N	df	Number of tests	Critical value P after Bonferroni correction	Asymp. Sig. (2-sided)
1	Region–Willingness for environmental education course	438	3	7	.007	.276
2	Gender–Willingness for environmental education course	438	1			.001*
3	Education level–Willingness for environmental education course	438	1			.000*
4	Nationality–Willingness for environmental education course	439	1			.059
5	NMPZ visit–Willingness for environmental education course	438	1			.000*
6	Past environmental education experience–Willingness for environmental education course	438	1			.074
7	Knowledge of Zante protection status–Willingness for environmental education course	438	1			.753
8	Region–Knowledge of Zante protection status	439	3	4	.012	.002*
9	Education level–Knowledge of Zante protection status	439	1			.602
10	NMPZ visit–Knowledge of Zante protection status	439	1			.752
11	Past environmental education experience–Knowledge of Zante protection status	439	1			.382
12	Region–Knowledge of Zante migration birds significance	439	6	3	.016	.041
13	Education level–Knowledge of Zante migration birds significance	439	2			.031
14	Gender–Knowledge of Zante migration birds significance	439	2			.838
15	Region–Past environmental education experience	439	3	3	.016	.054
16	Gender–Past environmental education experience	439	1			.633
17	Nationality–Past environmental education experience	439	1			.415
18	Region–Family impact on environmental education training	439	9	5	.010	.063
19	Gender–Family impact on environmental education training	439	3			.001*
20	Education level–Family impact on environmental education training	439	3			.370
21	NMPZ visit– Family impact on environmental education training	439	3			.007*
22	Past environmental education experience–Family impact on environmental education training	439	3			.000*
23	Past environmental education experience–Participation on voluntary actions	439	1	2	.025	.013*

(Continued on next page)

Table 5. (Continued)

α/α	Group of variables (cause-effect)	N	df	Number of tests	Critical value P after Bonferroni correction	Asymp. Sig. (2-sided)
24	Interest on voluntary actions–Participation on voluntary actions	439	1			.630
25	Interest on environmental education programs–Participation on environmental education programs	439	1	1	.050	.007*

Note. NMPZ = National Marine Park of Zakynthos.

Table 6. Results of study into the level of knowledge of Zakynthos as significant migration stopover site for birds from pupils living in different regions.

Region	Capital city (Zante town)		Significance of Zakynthos for birds migration			Total
			Yes	No	Lack of knowledge	
Region	Capital city (Zante town)	Count	126	9	54	189
		% of Total	28.7%	2.1%	12.3%	43.1%
Plain urban area	Plain urban area	Count	57	1	23	81
		% of Total	13.0%	0.2%	5.2%	18.5%
Semimountainous area	Semimountainous area	Count	115	3	23	141
		% of Total	26.2%	0.7%	5.2%	32.1%
Mountainous area	Mountainous area	Count	23	0	5	28
		% of Total	5.2%	0.0%	1.1%	6.4%
Total	Total	Count	321	13	105	439
		% of Total	73.1%	3.0%	23.9%	100.0%

than boys but they also discuss such issues with their family more often. Jenkins and Pell (2006) found significant gender differences in attitudes toward the environment, which forced them to declare that “there is a surprising level of support, especially among girls, for the notion of the natural world as something sacred that should be left in peace.” This may be related to the different way in which boys set priorities compared to girls regarding their preferences for creative activities. Relevant questionnaire-based surveys have also indicated that girls are more eco-centric than boys (Schreiner & Sjoberg, 2003; Uitto, Juuti, Lavonen, & Meisalo, 2004). Furthermore, according to Graziani, Cabral, and Santana (2013), there is a significant difference for many environmental questions on which girls demonstrated better/higher

Table 7. Results of study into the willingness for following an environmental education course from pupils of different sex.

Sex	Male		Willingness for environmental education course		Total
			No	Yes	
Sex	Male	Count	44	193	237
		% of Total	10.0%	44.1%	54.1%
Female	Female	Count	15	186	201
		% of Total	3.4%	42.5%	45.9%
Total	Total	Count	59	379	438
		% of Total	13.5%	86.5%	100.0%

Table 8. Results of study into the level of knowledge of Zakynthos as significant migration stopover site for birds from pupils of different education level.

			Significance of Zakynthos for birds migration			Total
			Yes	No	Lack of knowledge	
Education level	Primary education	Count	182	5	72	259
		% of Total	41.5%	1.1%	16.4%	59.0%
	Secondary education	Count	139	8	33	180
		% of Total	31.7%	1.8%	7.5%	41.0%
Total		Count	321	13	105	439
		% of Total	73.1%	3.0%	23.9%	100.0%

results. Gender differences may be related to specific behavior that boys and girls show, especially during adolescence, regarding their reaction to discussing issues of general or special interest, although some environmental education activities encourage pupils to discuss environmental issues and actions with their parents or other adults in the community (Ballantyne, Fien, & Packer, 2001).

Education level

A large proportion of primary education pupils do not know about the importance of Zakynthos for the conservation of migratory birds (Table 8). The corresponding percentage of secondary education pupils is significantly lower (18.3%), which shows that as pupils grow they are more effectively informed about bird migration and the relevant ecological significance of Zakynthos. The high percentage of primary education pupils who declared willingness for the introduction of an environmental course in the formal educational curriculum is of particular interest (Table 9).

The differences that were revealed between primary and secondary education pupils may be explained by the fact that secondary education pupils have recently had more opportunities to perceive the importance of Zakynthos and the Ionian Sea in general, through environmental projects such as the LIFE Nature project “Concrete Conservation Actions for the Mediterranean Shag and Audouin’s Gull in Greece including the Inventory of Relevant Marine IBAs”

Table 9. Results of study into the willingness for following an environmental education course from pupils of different education level.

			Willingness for environmental education course		Total
			No	Yes	
Education level	Primary education	Count	21	237	258
		% of Total	4.8%	54.1%	58.9%
	Secondary education	Count	38	142	180
		% of Total	8.7%	32.4%	41.1%
Total		Count	59	379	438
		% of Total	13.5%	86.5%	100.0%

(LIFE07 NAT/GR/000285) as well as the LIFE+ Information and Communication project “Safe havens for wild birds (LIFE11 INF/IT/253)” and other relevant public campaigns to protect migratory bird species during the last decade. These projects focused on protecting and providing environmental awareness on migrating passerines and seabirds.

On the other hand, secondary education pupils start to relate school with their success in higher education and pay more attention to specific typical courses. This fact limits secondary education pupils in their effort to develop skills and critical thinking about the protection and management of common resources such as the natural environment. The study of An and Kang (2015), showing that Environmental Education pupils prefer learning about nature outside the classroom is of particular interest. This alternative way of teaching attracts the interest of many pupils (Bergman, 2016) but is not common during the last years of secondary education when pupils focus on the Panhellenic examinations in order to enter public higher education establishments.

Visit to the NMPZ

A visit to the most important natural protected area of Zakynthos decreases the percentage of pupils that do not discuss environmental issues with their family. Indeed, only 11.0% (32 pupils) had never discussed environmental issues with their family despite the fact that they had visited the NMPZ. The corresponding percentage is doubled (23%) for the pupils that had never visited the NMPZ.

Additionally, a visit to the protected area may change the perception of pupils as regards the necessity of a separate environmental course. Only 9.3% of the pupils who have visited the Marine Park are still unwilling to have a separate environmental course in the school curriculum. The corresponding percentage increases to 22% for pupils that have never visited the NMPZ.

Participation in environmental education courses or other relevant activities seems to enhance the need for discussion of environmental issues within the family. This is probably related to the fact that visiting a very important area of natural heritage, which is under strict protection and being, as a consequence, aware of its natural wealth, creates awareness and increases the need for further knowledge about the natural environment. In our case, this is reflected in an increase of the need of pupils who visited the Marine Park for further knowledge of environmental issues and is in accordance with the findings of Ormsby (2008) who argues that improving local children's knowledge of a protected area can increase relevant community awareness and enhance the significance of specific conservation goals when pupils share their experiences with their family.

Former environmental education experience

Former participation of students in an environmental education course or activity influenced their willingness to discuss environmental issues with their family

Table 10. Results of study into the different family impact on environmental education training for pupils in relation to their previous environmental education experience in formal education.

		Family impact on environmental education issues				Total	
		Very often	Often	Rarely	Never		
Past environmental education experience	No	Count	26	76	96	52	250
		% of Total	5.9%	17.3%	21.9%	11.8%	56.9%
	Yes	Count	31	73	71	14	189
		% of Total	7.1%	16.6%	16.2%	3.2%	43.1%
Total		Count	57	149	167	66	439
		% of Total	13.0%	33.9%	38.0%	15.0%	100.0%

(Table 10). As already discussed, past environmental experiences of pupils may result in increased contact with their parents regarding local environmental issues. Consequently, implementation of programs targeted at adults-parents may be useful to enhance this “at home” environmental education process.

Furthermore, Jenkins and Pell (2006) argue that participation in environmental education activities serves the need for further knowledge, but mostly the need for taking action for the natural environment and other common goods. As a result, environmental education activities may play an important role in growing citizens with creative thinking and willingness for working for the common good by contributing to the conservation of common goods such as water, air, and biodiversity.

The fact that pupils who declared interest in environmental education, showed no general willingness to participate in environmental education activities, may be explained in two possible ways:

1. Pupils who are aware of the environment want to participate in specific environmental educational activities. In such cases, it is recommended that the tutor increase the participation of pupils in the decision-making process regarding the planning of environmental education activities.
2. Sometimes the interest of pupils may be superficial and not accompanied by participation in environmental education activities.

Conclusions

This study reports on a survey conducted in primary and secondary schools of Zakynthos aimed at collecting information on the level of environmental awareness of pupils, as well as their perceptions and attitudes on environmental issues. We investigated the differences in environmental knowledge and awareness among pupils of different educational level, gender, region, and so forth. Finally, an important goal of the study was to investigate the role and contribution of existing protected areas in shaping environmental knowledge and contributing to environmental awareness and education (Graziani, Cabral, & Santana, 2013; Ormsbay, & Karlin, 2005).

The results revealed that the young people of Zakynthos (upland, lowland, rural, and urban areas) and particularly primary education pupils show great interest for the natural environment of Zakynthos, the biotopes and the protected species of the NMPZ. Similar conclusions were drawn in the survey of Ballantyne, Fien, and Packer (2001) who argue that 10-year-old children considered the environment to be an important topic that affected their lives. Furthermore, Jenkins and Pell (2006) showed that both boys and girls disagree strongly with the statement “Threats to the environment are not my business.”

Pupils in cities and plains outclass pupils from mountain areas with respect to their knowledge of environmental issues. This conclusion is confirmed by several studies (Sülün, 2010; Graziani et al., 2013). Indeed, in our study, a large percentage of pupils in mountainous areas are not aware of the existence of the NMPZ. In contrast, children in mountainous and semimountainous schools have more in-depth knowledge of environmental issues directly related to the nature of their island, such as migration issues, and are aware to a greater extent of the ecological importance and role of the island. This result agrees with the relevant findings of Littledyke (2004). Similarly, our study revealed that although several pupils in mountainous areas were not aware of the existence of the NMPZ, they were informed to a larger extent than the pupils of rural or plain areas about the importance of the island for migratory birds. Furthermore, secondary school pupils seem to be more aware of general environmental issues as they are older and have more knowledge of environmental issues. However, primary education pupils favor the introduction of a specific course for environmental education, in their formal curriculum.

The sample reflected that girls are more sensitive to environmental issues than boys (92.5% vs. 81%), which is also confirmed by several other studies recording differences between girls and boys (e.g., Schreiner & Sjoberg, 2003; Uitto et al., 2004). The percentage of girls who never discuss with their family about environmental issues is much lower (15%) than for boys (51%). Indeed, Ballantyne, Fien, and Packer (2001) confirm that girls during adolescence demonstrate greater openness and sensitivity than boys.

Finally, the study confirms the important role of protected areas in environmental education and in improving knowledge and awareness of the environment. Similarly, pupils who have previously attended environmental education programs at their school are more sensitive to environmental issues.

Environmental education is one of the most important aspects of global, national, and local environmental policy and there is great need for further awareness and education. The familiarization of young people with nature enhances environmental knowledge and awareness. For this purpose, protected areas are the most suitable sites for environmental education and experiential learning of young people. The education of pupils opens channels of communication between young people and their families, which may convey the knowledge and benefits to society at large.

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