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Developing the Wetland Awareness Scale Through Children's Eyes and Example Application

İbrahim UYSAL[1*], Neda ŞAYAN[2], Batuhan Ege UYSAL[3], Kerem TEMEL[2], Aycan UYSAL[4]

ABSTRACT

Wetland losses and pollution in water resources, which are increasing on a global scale, affect biodiversity and sustainable ecosystem structure. The most important trigger of this extinction, which will cause wide-ranging ecological problems, is human activities, and necessary steps must be taken quickly to protect its viability. In the study, it was aimed to develop a measurement tool that measures the awareness level of children about wetlands in a valid and reliable way. In the descriptive study, data were obtained from three different groups. Participants consist of secondary school students between the ages of 9-15 studying in Turkey. Explanatory factor analysis was performed by applying the 26-item candidate scale questions to 245 secondary school students. Then, confirmatory factor analyzes were carried out with the data obtained from the participation of 201 students. SPSS 26.0 and AMOS statistical software were used in the analysis of the data. Evaluations of secondary school students' awareness of wetlands were examined on a group of 446 people. As a result of the validity analyzes made with the data obtained from the application, it was determined that the scale consisted of 14 items with two factors. This structure was confirmed by confirmatory factor analysis. The reliability value of the entire scale was 0.891; 0.704 for the wetland awareness factor in terms of bird species diversity; The importance of wetlands and the awareness of the problems experienced factor was determined to be 0.895. There was no significant difference between gender, age, and having taken wetland lessons before and wetland awareness (p: >0.05). It was determined that there was a significant difference between whether they went to a wetland in the region they lived in before and the wetland awareness of the children (U=15052.5 and p: <0.05). Wetland awareness was found to be higher in students who had gone to wetlands before. It was concluded that the scale developed according to these results in the context of the participants in this study, which was carried out with secondary school students, measured the wetland awareness levels of children in a valid and reliable way.

Çocukların Gözünden Sulak Alan Farkındalığı Ölçeği'nin Geliştirilmesi ve Uygulama Örneği

ÖZET

Küresel ölçekte giderek artan sulak alan kayıpları ve su kaynaklarındaki kirlilik, biyoçeşitliliği ve sürdürülebilir ekosistem yapısını etkilemektedir. Geniş çaplı ekolojik sorunlara neden olacak bu yok oluşun en önemli tetikleyicisi ise insan faaliyetleridir ve sürdürülebilirliğin korunması konusunda gerekli adımların hızla atılması gerekmektedir. Doğa koruma bilincinin oluşturulmasında bütüncül bir yaklaşım gerekmektedir ve atılacak öncelikli adımlardan biri toplumda farkındalık yaratmaktır. Farkındalık, bir canlının çevresinde gelişen olayları bilme, algılama ve duyumsama becerisi olarak tanımlanmaktadır. Yapılan çalışmada çocukların sulak alanlar ile ilgili farkındalık düzeylerini ölçen bir ölçek geliştirilmesi amaçlanmıştır. Betimsel olarak yapılandırılan araştırmada veri toplama aracı olarak geliştirilen aday ölçek maddeleri araştırmacılar tarafından hazırlanmış ve uzman görüşleri doğrultusunda oluşturulmuştur. Katılımcılar, Türkiyede öğrenim gören 9-15 yaş arasındaki ortaokul öğrencilerden oluşmaktadır. 26 maddelik aday ölçek soruları 245 ortaokul öğrencisine uygulanarak açıklayıcı faktör analizi yapılmıştır. Daha sonra 201 öğrencinin katılımından elde edilen verilerle doğrulayıcı faktör analizleri gerçekleştirilmiştir. Verilerin analizinde SPSS 26.0 ve AMOS istatistik yazılımı kullanılmıştır. Ortaokul öğrencilerinin sulak alanlara yönelik farkındalıklarının değerlendirmeleri ise 446 katılımcıdan elde edilen verilerle gerçekleştirilmiştir. Yapılan ilk uygulamadan elde edilen verilerle yapılan geçerlik analizleri sonucunda ölçeğin iki faktörlü 14 maddeden oluşan bir ölçek olduğu tespit edilmiştir. Bu yapı doğrulayıcı faktör analizi ile doğrulanmıştır. Ölçeğin tamamının güvenirlik değeri 0,891; kuş tür çeşitliliği açısından sulak alan farkındalığı faktörü için 0,704; Sulak alanların önemi ve yaşanan sorunlar farkındalığı faktörü için 0,895 olduğu belirlenmiştir. Yapılan örnek uygulamada cinsiyet, yaş ve daha önce sulak alanlarla ilgili ders almaları ile sulak alan farkındalığı arasında anlamlı bir fark bulunmamıştır (p: >0,05). Daha önce yaşadığı bölgedeki bir sulak alana gidip gitmemeleri ile çocukların sulak alan farkındalıkları arasında ise anlamlı bir fark olduğu tespit edilmiştir (U=15052,5 ve p: <0,05). Daha önce sulak alanlara giden öğrencilerde sulak alan farkındalığının daha yüksek olduğu bulunmuştur. Ortaokul öğrencileri ile gerçekleştirililen bu araştırmada yer alan katılımcılar bağlamında bu sonuçlara göre geliştirilen ölçeğin çocukların sulak alan farkındalık düzeylerini geçerli ve güvenilir biçimde ölçtüğü sonucuna ulaşılmıştır.

1. INTRODUCTION

Wetlands are ecosystem environments that have common characteristics and are suitable for a wide range of terrestrial and marine life [1]. Wetlands, which have the richest biodiversity after rainforests, contain 40% of all species and 12% of all animal species in the world [2]. Wetlands, where biodiversity and production are much higher than terrestrial areas, provide important ecosystem services for the sustainability of the ecosystem [3]. Wetlands, one of the world's most productive and valuable ecosystems, provide a wide variety of economic, social, environmental and cultural benefits [4]. These services include maintaining water quality and supply, regulating atmospheric gases, sequestering carbon, protecting coastlines, maintaining authentic local biota, and providing cultural, recreational and educational resources [5].

However, in wetlands, which are one of the ecosystems where human influence is intense, it is stated in many studies that biological diversity and therefore sustainability are damaged [1]; [6-

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9]. This shows that people are not sufficiently aware of the ecosystem they live in and the ecosystem services that wetlands offer to people. The destruction of wetlands around the world and the consequent deterioration of ecosystem services will cause significant losses in human well-being and biodiversity, as well as lead to negative economic and social effects in the long run. In this respect, wetlands should be recognized and protected in terms of their hydrological characteristics, biodiversity and physicochemical characteristics. Sustainable protection, management and transfer of these resources to future generations are of great importance [10].

Bird species that have attracted the attention of people throughout history with their colors, songs and flying abilities can be used to monitor wetlands and their healthy structure. Birdwatching is a form of wildlife observation in which bird watching is a fun activity or citizen science [11]. Based on this interest of human beings in bird species; we can use bird watching in raising awareness of nature, creating awareness of ecosystems, monitoring and protecting wetlands. Conservation and restoration of wetlands is essential for the future sustainability of the planet, and provides safety nets for emerging issues such as global climate change, food production for the growing world population, disturbance regulation, clean water and the general well-being of society [3].

One of the primary steps in raising awareness of nature conservation in sensitive ecosystems such as wetlands is to raise awareness in society. Awareness is defined as the skill of knowing, perceiving and sensing the events developing around a living thing. Although the activities related to the protection of our water resources and wetland ecosystems are increasing today, it is not possible to measure the awareness levels and evaluate the effectiveness and diversity of the activities carried out.

The aim of environmental education is to raise citizens who are knowledgeable about the biological environment and its problems, aware of the strategies that can be used to cope with these problems, and actively work for their solution [12]. Traditionally, environmental education has focused on teaching children about "pristine" environments or "wild nature" [13].

Every step to be taken to prevent the extinction and destruction of our wetlands and water resources today is extremely important for children who will face problems that may arise in the future. Increasing the awareness of children, who are the future guardians of wetlands and our water resources and preparing environments where they can contribute to conservation activities will be effective in raising awareness of nature conservation. In the literature review, wetland perceptions of infants and children [14], awareness levels of university students about water resources [15], recognition and protection value of wetlands among primary school students [16] and wetland It has been observed that there are studies on subjects such as education and public perception [17]. However, it has been determined that there is no measurement tool for children's wetland awareness.

The aim of the study was to develop a scale to measure children's awareness of wetlands and to evaluate the wetland awareness of children by making an application example.

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2. MATERIAL AND METHOD

This research is a descriptive research in terms of the evaluation of the technical features of the developed scale and the sample application.

2.1. Research Group

All applications were carried out with secondary school students. In the descriptive study, data were obtained from three different groups. Explanatory factor analyzes (EFA) were conducted with data obtained from a group of 245 secondary school students. Confirmatory factor analyzes (CFA) were conducted with data obtained from a group of 201 secondary school students. Evaluations of secondary school students' awareness of wetlands were examined on a group of 446 people. Participants consist of secondary school students between the ages of 9-15 studying in Turkey.

Participation in the research was on a voluntary basis. Therefore, the sample in the study can be evaluated in the context of purposive sampling [18]. Different opinions in the literature were taken into account while determining the size of the study group in scale development studies. Gorsuch (1974) emphasized that the number of questions should be at least five times the number of participants [19], while Everitt (1975) stated that "the number of participants should be at least ten times the number of items [20]. In line with this information, care was taken to include five times or more participants than the number of items in the measurement tool. Demographic characteristics of the participants in the two groups are given in Table 1.

Table 1. Demographic data of the participants

	EFA Group			CFA Group	
	Variant	**f (%)**		**Variant**	**f (%)**
Gender	Male	100 (40.8)	Gender	Male	99 (49.3)
	Female	145 (59.2)		Female	102 (50.7)
Age	Average (9-15)	11.64	Age	Average (9-15)	11.98

2.2. Data collection tool

In the light of the information obtained from the literature to determine the candidate scale form elements of the data collection tool developed within the scope of the research 'Wetland Awareness Scale Through Children's Eyes-WASTCE', a question pool was created by the researchers for the candidate measurement tool. The items in the created question pool were presented to expert opinion. Opinions were received from two academicians working in the field of biology, an academician working in the field of measurement and evaluation, and an expert working in a non-governmental organization related to nature conservation. Expert opinions were taken as "appropriate, not appropriate and should be corrected" for the 26 candidate scale items that were corrected. Consistency between expert opinions was examined with the Krippendorff Alpha coefficient [21] and a consistency of .84 was determined. This coefficient indicates a high level of consistency. Detailed information about the analyzes made as a result of the trial application is explained in the "results" section. As a result of the analysis, the final version of the scale was determined as 14 items and 2 factors. As a result, two different total scores are taken from the scale and comments are made on these total scores.

2.3. Implementation of the Data Collection Tool

The candidate scale form was applied to secondary school students with the letter of T.R. Çanakkale Governorship Provincial Directorate of National Education, numbered E-60305806-44-21667935 and dated 04.03.2021. and with the letter of T.R. Fethiye District Directorate of National Education, numbered E-40068571-604.01.01-20426923 and dated 10.02.2021.

Due to the pandemic process, the link created online via google. Forms was sent to the phones of the students' parents and after the parent's approval, it was asked whether the student volunteered to participate. While students who did not have parental consent or did not volunteer to participate did not participate in the study, only the students who volunteered to participate in the study were included in the study.

2.4. Analysis of Data

SPSS 26.0 and AMOS statistical software were used in the analysis of the data. First of all, it was determined that there was no missing data in the data set. Kaiser Meyer Olkin (KMO) Test and Bartlett's Test of Sphericity, which are important criteria of factor analysis, were examined. KMO between 0.801 and 0.900 is considered very good, and above 0.901 is considered excellent. In the sphericity test, the result is expected to be significant ($p<0.05$) [22-24]. The factor structure was revealed by the principal axis factoring (PAF) method. It is a preferred factor extraction method for newly developed scales whose theoretical structure is unknown [25]. "Varimax" axis rotation was performed to clarify the factors. The reference values in Table 2 were taken into account when deciding on the fit indices obtained in confirmatory factor analysis [22, 24, 26-34]. In order to obtain proof of reliability, the Cronbach Alpha reliability coefficient, which shows reliability in terms of internal consistency, was calculated.

Table 2. Confirmatory factor analysis reference values.

Decision	RMSEA	GFI	AGFI	NFI	IFI	CFI	X^2/SD
accept	$0{,}05 \leq RMSEA \leq 0{,}08$						$2 < X^2/SD \leq 5$
excellent	$0 \leq RMSEA \leq 0{,}05$	0.90 and above	0.90 and above	0.95 and above	0.95 and above	0.95 and above	$0 \leq X^2/SD \leq 2$

With the scale developed within the scope of the research, a sample application was made with the data of 446 participants. Comparison tests were applied according to the variables obtained with questions such as demographic (age, gender) characteristics of the participants and whether they had ever taken a course on wetlands before, whether they had ever been to a wetland before. In the analysis of the data, descriptive statistical analyzes were made using the SPSS program. The Kolmogorov-Smirnov Test was applied to decide which of the parametric or nonparametric tests to use in the comparison tests. In addition, it was decided to use parametric techniques in data sets where the other preconditions, such as homogeneity of variances and whether there was a minimum of 30 samples, were met. It was decided to use nonparametric techniques for data where the prerequisites could not be met [32, 35].

3. RESULTS

The data obtained from the application with the participation of 245 secondary school students were included in the explanatory factor analysis. Result of the primary analysis, it was determined that the scale has a 10-factor structure with eigenvalues exceeding 1. It is generally accepted that there should be at least three questions in each sub-dimension (factor) in scale development [31]. The item-total correlations and exploratory factor analysis input load values of some items were not at the desired level (0.300 and above) in the literature [35]. However, as a result of the analysis, 2 factors of the scale were found to be very prominent. Eigenvalues are very high in these 2 factors. In the logic of scale development and factor analysis, many variables are explained by reducing them to a small number of factors [32]. From this perspective, it was decided that it would be suitable to conduct factor analysis in a way that would gather under 2 factors. The KMO and Bartlett's Test of Sphericity values for the re-applied factor analysis are given in Table 3.

KMO and Bartlett test results are at the level suggested by the literature, as explained in the data analysis title. As a result of factor analysis, it was determined that 12 items (1, 2, 3, 6, 9, 10, 11, 13, 16, 18, 22 and 23) in the measurement tool could not reach the item-total correlations and factor analysis input load values suggested by the literature. These items were not including to scale. As a result of factor analysis, "Varimax" axis rotation method was used to determine under which factors the items would be grouped. The item total correlations, variance explained by the factors, factor names, input load values and Cronbach Alpha reliability values of the remaining items are given in Table 4.

It is seen that the input load values of the remaining 14 items in the scale vary between 0.216 and 0.703, and the item-total correlations vary between 0.396 and 0.707. According to the literature, these items were determined to be suitable for the scale. The reliability value of the entire scale was 0.891; 0.704 for the wetland awareness (IWAP) factor in terms of bird species diversity; The importance of wetlands and the awareness of the problems experienced (WAITBSD) factor was determined to be 0.895. According to the literature, these values are high reliability levels [32]. The variance explained by the first factor is 38%, and the variance explained by the second factor is 17%. Together, the two dimensions explain 55.112% of the variance in children's awareness of wetlands. This rate is considered low for some sources in the literature [32, 36], sufficient for some sources [35], and between 40% and 70% for some sources in the literature [25]. The scree plot for 14 items and the two-factor structure is shown in Figure 1.

Table 3. KMO and Bartlett values

Kaiser-Meyer-Olkin (KMO)		,910
Bartlett Test of Sphericity	X^2	1584,293
	SD	91
	p	,000

Table 4. Factor analysis results

Items	Factors		Factor Analysis Item Input Load Value	Item Total Correlations	Factor Name	Variance Explained by the Factor in the Varimax Rotation Result	Factor Cronbach Alpha Confidence Value
	1	2					
S7	,834		,700	,685			
S5	,795		,642	,657			
S4	,783		,635	,674			
S15	,773		,643	,707			
S12	,754		,610	,684	Importance of Wetlands and Awareness of Problems (IWAP)	%38,277	0,895
S14	,657		,565	,688			
S24	,647		,550	,671			
S26	,632		,449	,585			
S25	,618		,426	,566			
S8	,550		,384	,547			
S17	,377		,216	,396			
S21		,838	,703	,354	Wetland Awareness in Terms of Bird Species Diversity (WAITBSD)	%16,835	0,704
S19		,724	,637	,591			
S20		,700	,556	,516			

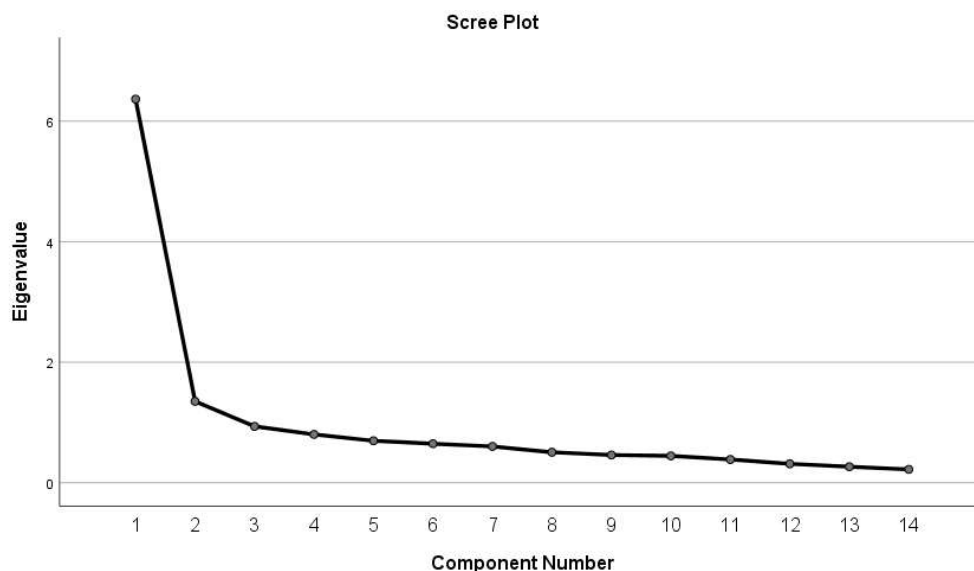22 Items Together (All Scale) Cronbach Alpha Reliability Value = 0,891

Figure 1. Scree plot of the structure of the Perception of Wetlands in Children's Perception Scale with 2 active 14 items.

After the explanatory factor analysis applied as explained above, a scale structure consisting of 14 items and 2 factors was reached. Another piece of evidence for the validity of this construct

is the confirmation of the construct. For this reason, a 14-item scale was applied to 201 different students. Confirmatory factor analysis was carried out on the obtained data. Fit indices are shown in Table 5 and the diagram is shown in Figure 2.

Table 5. CFA fit indices

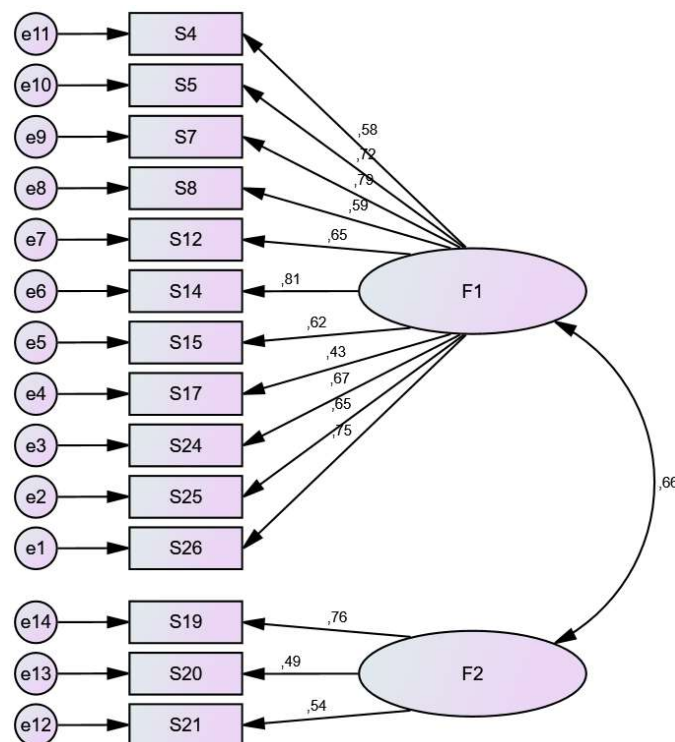| X^2/SD	GFI	AGFI	NFI	IFI	CFI	RMSEA
1,998	0, 909	0,874	0,870	0,930	0,930	0,071

Figure 2. Confirmatory factor analysis diagram of middle school students' wetland awareness scale (standardized values).

The confirmatory factor analysis results are at an acceptable level in the light of the information explained in the data analysis title. It has been concluded that the scale developed according to these results in the context of the participants in this research measures the wetland awareness of secondary school students in a valid and reliable way.

In the sample application made with the children's wetland awareness scale developed within the scope of the research, the awareness of secondary school students towards wetlands was determined. The descriptive statistics of secondary school students' responses to 14 items in the scale are given in Table 6.

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Table 6. The final version of the scale items and the distribution of the answers given in the application example

Item No.	Items	N	$\overline{X}\pm$S. Deviation	I do not agree	Partially Agree	I agree
4	*Today, wetlands are damaged due to human activities.*	446	2.74±0.574	31 %7	52 %11,7	363 %81,4
5	*Wetlands are declining and this is worrying for our future.*	446	2.85±0.455	17 ⅓3,8	35 %7,8	394 %88,3
7	We have to protect wetlands to protect the ecosystem we live in.	446	2.83±0.473	19 ⅓4,3	36 %8,1	391 %87,7
8	*The importance of wetlands is not well known.*	446	2.68±0.570	24 ⅓5,4	93 %20,9	329 %73,8
12	*The fact that there are usually many predators in wetlands negatively affects the animal and plant species there*	446	2.75±0.546	25 ⅓5,6	60 %13,5	361 %80,9
14	*Due to global warming, our wetlands are gradually decreasing.*	446	2.83±0.460	15 ⅓3,4	48 %10,8	383 %85,9
15	*As a result of hunting in wetlands, lead and pellets that settle at the bottom of the water accumulate and affect the wetland ecosystem by causing heavy metal pollution in the future.*	446	2.77±0.509	18 %4	67 %15	361 %80,9
17	*Cutting trees and burning reeds in wetlands cause pollution in wetlands.*	446	2.60±0.666	45 ⓪10,1	90 %20,2	311 %69,7
24	*Our wetlands are rapidly disappearing.*	446	2.80±0.468	13 ⅓2,9	63 %14,1	370 82,9
25	*The number of infectious diseases increases if wetlands are reduced or polluted.*	446	2.72±0.544	21 ⅓4,7	81 %18,2	341 %76,5
26	Wetlands are important in tackling global warming	446	2.79±0.504	19 ⅓4,3	61 %13,9	366 %82,1
19	*If we see many birds in a wetland, this can be considered as an indicator of the healthy structure of the ecosystem in that wetland.*	446	2.62±0.619	33 ⅓7,4	102 %22,9	311 %69,7
20	*The decrease in bird species, diversity and number is evidence of environmental pollution in that area.*	446	2.58±0.685	50 ⓪11,2	89 %20	307 %68,8
21	*If I see or hear a wide variety of birds around me, I think that there is no environmental pollution where I am.*	446	2.38±0.696	55 ⓪12,3	165 %37	226 %50,7
SCALE TOTAL SCORE *(The lowest possible score is 14, and the highest score is 42.)*				$\overline{X}\pm$S. **Deviation = 37.88±0.239**		

The wetland awareness level of the applied group was calculated as 37.88. Considering that the maximum score that can be obtained from the scale is 45, it has been calculated that the participants have a high level of wetland awareness. The item that the students who participated in the sample of children's wetland awareness scale application least agreed was "If I see or hear a wide variety of birds around me, I think that there is no environmental pollution in my area." and "The decline in bird species, diversity and numbers is evidence of environmental pollution in that area." While the items with the highest participation are "Wetlands are decreasing gradually and this is a concern for our future", "Our wetlands are decreasing gradually due to global warming" and "We have to protect wetlands to protect the ecosystem we live in." has been. Demographic characteristics of the participants are given in Table 7.

It was tested whether there was a difference in wetland awareness by gender. Since the normal distribution condition could not be met, the nonparametric Mann Whitney U test was applied. No significant difference was found between the wetland awareness scores of girls and boys (U=24047.5 and *p>0.05*).

Table 7. Distribution data of application sample participants by age, gender and other variables

VARIANT	AVERAGE	MINIMUM	MAXIMUM
Age	11,79	9	15
VARIANT	**CATEGORY**	**FREQUENCY**	**PERCENT (%)**
Gender	Girl	247	55,4
	Boy	199	44,6
Have You Taken Any Course About Wetlands Before?	Yes	244	54,7
	No	202	45,3
Have you ever been to a wetland in the area where you live?	Yes	328	73,5
	No	118	26,5

It was tested whether there was a difference between wetland awareness according to age. It was determined that there was no significant relationship in the kruskal-wallis test result, which was performed to test the difference between age and wetland awareness scores ($p>0.05$).

It was tested whether there was a difference between the wetland awareness scores and whether they had taken a course on wetlands before and whether they had been to a wetland before. There was no significant difference between the previous lessons about wetlands and wetland awareness ($p>0.05$). It has been determined that there is a significant difference between the wetland awareness of the secondary school students according to whether they have visited a wetland in the region they lived in before (U=15052.5 and $p<0.05$). Wetland awareness was found to be higher in students who went to wetlands before.

4. DISCUSSION and CONCLUSION

Conservation and restoration of wetlands is essential for sustainability and provides safety nets for emerging issues such as global climate change, food production for a growing world population, clean water, and the general well-being of society [3]. One of the primary steps in raising awareness of nature conservation in sensitive ecosystems such as wetlands is to raise awareness in society. Activities related to the protection of our water resources and wetland ecosystems are increasing today. However, by measuring the awareness levels resulting from these activities, the results of the activities carried out and the effects of their diversity are not sufficiently evaluated.

In addition to facilitating the measurement process, the scales also enable the determination of the quality of the results obtained. Scientific progress is based on measurement, and measurements made with sensitive measurement tools increase this development [37]. In the literature review, it was seen that there is no measurement tool that can be used to measure wetland awareness for children and youth. The aim of the study was to develop a scale to measure children's awareness of wetlands and to evaluate the wetland awareness of children by making an application example.

As a result of the KMO, Bartlett test and factor analysis performed with the data set obtained in the study conducted for this purpose, 12 items (1, 2, 3, 6, 9, 10, 11, 13, 16, 18, 22 and 23) among the candidate scale items were excluded from the scale because the item-total

correlations and factor analysis could not reach the input load values suggested by the literature. These items are as follows; *I have enough information about wetlands, I have enough information about the creatures living in wetlands, Wetlands are the habitat of many living species, The destruction of wetlands around us will not have a negative effect on us, Lessons and practices that explain the importance of wetlands and water should be given more place in schools, The use of pesticides in agricultural activities around wetlands causes pollution in wetlands, If the agricultural lands around wetlands use water uncontrollably, this will adversely affect wetlands, It is very difficult and much more costly to clean up the pollution caused by the disposal of factory and household waste, Wetland The reeds around the areas need to be cleaned by burning, A lot of mosquitoes and insects breed in the wetlands, so the swamp and reeds parts of the wetlands need to be dried, If I see or hear a wide variety of birds around me, that's where I am. I think there is no environmental pollution and We have no connection with our clean drinking and utility water and wetlands in nature.*

After the explanatory factor analysis, a scale structure consisting of 14 items and 2 factors was reached. To verify this structure, a 14-item scale was applied to 201 different students. Confirmatory factor analysis was performed on the data obtained. It has been concluded that the scale developed according to these results in the context of the participants in this research measures the wetland awareness of secondary school students in a valid and reliable way.

Fisman (2005), in his study examining the effects of the urban environmental education program on children's awareness of their local biophysical environment, showed that the program had a significant positive effect on students' knowledge of local environmental awareness and environmental concepts [13]. Anderson and Moss (1993) in their research on wetland perceptions of infants, children and adults; They stated that conditioning negatively affects adults' perception of wetland. In this respect, they stated that it is very important to plan well-planned written and visual media, promotional posters and training programs in order to increase awareness about wetlands and contribute to conservation activities. In addition, within the scope of the research, they determined that one of the important factors that increase awareness for children is technical trips to wetlands [14]. In the study, it was determined that there is a significant difference between the awareness of the wetland according to whether the secondary school students went to a wetland in the region where they lived before (U=15052.5 and *p<0.05*). Wetland awareness was found to be higher in students who had gone to wetlands before. Parallel to this finding, different studies show that constant contact with a particular place improves children's environmental knowledge and anxiety in the best way [38-40].

In his study, the survey study he conducted using the photographs of the biodiversity elements in the environment where the secondary school students live, found that the education of parents, income level of the family, and watching a television program about nature were not statistically effective on the awareness of the students about biodiversity [41]. In the study, it was found that there was no significant difference between wetland awareness by gender, wetland awareness by age, and whether they had taken a course on wetlands before and wetland awareness (*p>0.05*).

Wetland losses experienced today, decrease in biodiversity and pollution in water resources show that we need to reach positive behavioural changes more quickly in order to protect the sustainability of these resources. For this reason, it is very important to increase children's

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awareness of wetlands. Based on the results of the scale application, it is recommended that technical trips be made to the wetlands in their regions for secondary school students on dates such as world wetlands day or bird watching day in order to increase students' awareness of wetlands. Bird watching can be used as an important tool to increase the awareness of children in technical trips to be planned. Bird watching is a form of wildlife observing where bird watching is a fun activity or citizen science [11]. This recreational activity, starting from this interest of human beings in bird species; It can be used in raising children's awareness of wetlands, monitoring and protection of wetlands.

It was concluded that the scale developed according to these results in the context of the participants in this study, which was carried out with secondary school students, measured the wetland awareness levels of children in a valid and reliable way. The reliability value of the entire scale was 0.891; 0.704 for the wetland awareness (KTÇSAF) factor in terms of bird species diversity; The importance of wetlands and the awareness of the problems experienced (SAÖYSF) factor was determined to be 0.895. As such, the scale can be used to measure the awareness of similar groups towards research.

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The Declaration of Conflict of Interest/ Common Interest

No conflict of interest or common interest has been declared by the authors.

Authors' Contribution

The first author contributed 35%, the second author 20%, the third author 15%, the fourth author 15% and the fifth author %15. İU, NS, BEU, KT and AÇU designed the study, designed the data collection tool, collected the data and created the models. İU performed the data analysis. İU, NS and AU drafted the paper. All authors approved the final version to be published.

The Declaration of Ethics Committee Approval

This study does not require ethics committee permission or any special permission. The scale form was applied to secondary school students with the letter of T.R. Çanakkale Governorship Provincial Directorate of National Education, numbered E-60305806-44-21667935 and dated 04.03.2021. and with the letter of T.R. Fethiye District Directorate of National Education, numbered E-40068571-604.01.01-20426923 and dated 10.02.2021.

The Declaration of Research and Publication Ethics

The authors of the paper declare that they comply with the scientific, ethical and quotation rules of ETOXEC in all processes of the paper and that they do not make any falsification on the data collected. In addition, they declare that Environmental Toxicology and Ecology and its editorial board have no responsibility for any ethical violations that may be encountered, and that this study has not been evaluated in any academic publication environment other than Environmental Toxicology and Ecology.

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Appendix 1. Wetland Awareness Scale Through Children's Eyes (English)

Item No.	Wetland Awareness Scale Through Children's Eyes	I do not Agree	Partially Agree	I Agree
1	*Today, wetlands are damaged due to human activities.*			
2	*Wetlands are declining and this is worrying for our future.*			
3	We have to protect wetlands to protect the ecosystem we live in.			
4	*The importance of wetlands is not well known.*			
5	*The fact that there are usually many predators in wetlands negatively affects the animal and plant species there*			
6	*Due to global warming, our wetlands are gradually decreasing.*			
7	*As a result of hunting in wetlands, lead and pellets that settle at the bottom of the water accumulate and affect the wetland ecosystem by causing heavy metal pollution in the future.*			
8	*Cutting trees and burning reeds in wetlands cause pollution in wetlands.*			
9	*Our wetlands are rapidly disappearing.*			
10	*The number of infectious diseases increases if wetlands are reduced or polluted.*			
11	Wetlands are important in tackling global warming			
12	*If we see many birds in a wetland, this can be considered as an indicator of the healthy structure of the ecosystem in that wetland.*			
13	*The decrease in bird species, diversity and number is evidence of environmental pollution in that area.*			
14	*If I see or hear a wide variety of birds around me, I think that there is no environmental pollution where I am.*			

Appendix 2. Wetland Awareness Scale Through Children's Eyes (Turkish)

Sıra	Çocukların Gözünden Sulak Alan Farkındalığı Ölçeği	Katılmıyorum	Kısmen Katılıyorum	Katılıyorum
1	Günümüzde sulak alanlar insan faaliyetleri nedeniyle zarar görmektedir.			
2	Sulak alanlar giderek azalmaktadır ve bu durum geleceğimiz için endişe vericidir.			
3	Yaşadığımız ekosistemi korumak için sulak alanları korumak zorundayız.			
4	Sulak alanların önemi yeterince bilinmemektedir			
5	Sulak alanda çok sayıda avcı olması oradaki hayvan ve bitki türlerini olumsuz etkiler			
6	Küresel ısınma nedeniyle sulak alanlarımız giderek azalmaktadır			
7	Sulak alanlarda yapılan avcılık sonucu su dibinde çöken kurşun ve saçma parçaları birikerek gelecekte ağır metal kirliliğine yol açarak sulak alan ekosistemini etkilemektedir			
8	Ağaçların kesilmesi, sulak alandaki sazlıkların yakılması sulak alanlarda doğal yapının bozulmasına neden olur.			
9	Sulak alanlarımız hızla yok olmaktadır			
10	Sulak alanlarımız azalarısa ya da kirlenirse bulaşıcı hastalıkların sayısı artar			
11	Sulak alanlar küresel ısınmayla mücadelede önemlidir.			
12	Bir sulak alanda çok sayıda kuş görüyorsak, o sulak alandaki ekosistem sağlıklıdır.			
13	Sulak alanlarda yaşayan canlıların sayısının azalması çevre kirliliğine işarettir			
14	Etrafımda çok çeşitli kuşları görüyor ya da duyuyorsam bulunduğum yerde çevre kirliliği olmadığını düşünürüm.			