Anadolu Orman Araştırmaları Dergisi
Anatolian Journal of Forest Research
http://dergipark.org.tr/ajfr

Evaluation of the European scientific authority structure in the control of wildlife trade under CITES

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ARTICLE INFO
Received : 14/10/2025
Accepted : 26/11/2025
https://doi.org/10.53516/ajfr.1803851
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Research Article

ABSTRACT

Background and Aims This study investigate the relationship between the institutional profiles of CITES Scientific Authorities and their effectiveness in combating illegal wildlife trade, with a particular focus on European Union countries.
Methods Qualitative and quantitative data analysis was applied in the study, and the scientific authority institutional structures of the Convention parties were grouped. A numerical comparison was made between the institutions announced according to the official data of the Secretariat and European countries, and measures to be taken in line with the reasons for the increase in illegal trade were interpreted.
Results The Convention on International Trade in Endangered Species of Wild Fauna and Flora, known as CITES for short, has 185 parties worldwide, including the European Union. Among all parties, there are 31 countries with universities as their scientific authorities, of which approximately 13% are in the European Union countries. Among all Parties, there are 62 countries with ministries as scientific authorities, of which approximately 11% are in the European Union countries.
Conclusions With these ratios; it is thought that the success of protectionism in general will be higher with an increase on the number of universities in the European Union countries' scientific authorities. It is also important to regularly monitor whether countries have a team of experts on plant and animal species within their scientific authorities and whether this team is in constant communication with customs units.

Key Words: Biodiversity conservation, illegal wildlife trade, governance, wildlife management

CITES kapsamındaki yaban hayatı ticareti kontrolünde Avrupa bilimsel otorite yapısının incelenmesi

ÖZ

Giriş ve Hedefler Bu çalışmada, CITES Bilimsel Otoritelerinin kurumsal profilleri ile yasadışı yaban hayatı ticaretiyle mücadeledeki etkinlikleri arasındaki ilişki, özellikle Avrupa Birliği ülkeleri üzerinde odaklanılarak incelenmektedir.
Yöntemler Nitel ve nicel veri analizi uygulanan çalışmada, Sözleşme üyelerinin bilimsel otorite kurumsal yapıları gruplandırılmıştır. Sekretarya resmi verilerine göre ilan edilen kurumların Avrupa ülkeleriyle sayısal kıyası yapılmış ve yasadışı ticaretin artma nedenleri doğrultusunda alınacak önlemler yorumlanmıştır.
Bulgular Kısaca CITES olarak bilinen Nesli Tehlike Altında Olan Yabani Hayvan ve Bitki Türlerinin Uluslararası Ticaretine İlişkin Sözleşme'nin, Avrupa Birliği dahil olmak üzere dünya çapında 185 tarafı bulunmaktadır. Tüm taraflar arasında, bilimsel otoriteleri üniversiteler olan 31 ülke bulunmaktadır ve bunların yaklaşık %13'ü Avrupa Birliği ülkelerindedir. Tüm taraflar arasında, bilimsel otoriteleri bakanlıklar olan 62 ülke bulunmaktadır ve bunların yaklaşık %11'i Avrupa Birliği ülkelerindedir.
Sonuçlar Bu oranlara bakıldığında, Avrupa Birliği ülkelerinin bilimsel otoritelerinde üniversite sayısının artmasıyla birlikte genel olarak korumacılığın başarısının da artacağı düşünülmektedir. Ülkelerin bilimsel otoriteleri bünyesinde bitki ve hayvan türlerine ilişkin uzmanlardan oluşan bir ekibinin bulunup bulunmadığının ve bu ekibin gümrük birimleriyle sürekli iletişim içerisinde olup olmadığının düzenli takip edilmesi önemlidir.

Anahtar Kelimeler: Biyoçeşitliliği koruma, yasadışı yaban hayatı ticareti, yönetişim, yaban hayatı yönetimi

Citing this article:
Uyar, Ç., 2025. Evaluation of the european scientific authority structure in the control of wildlife trade under CITES, Anatolian Journal of Forest Research, 11(2), 302-312.

1. Introduction

Among the many disciplines that have developed methods for the efficient protection of wild flora and fauna species, forest engineering and its subtitle, environmental and forest law, are also included. In addition to the contributions of all other scientific stakeholders on illegal wildlife trade, a holistic approach to the subject with the keyword's environment, forest, trade and law has paved the way for inductive recommendations.

The effectiveness of forestry/forest engineering, which is an international profession, is very important. Foresters working at all levels, especially in protected areas, take part in raising awareness of local people, forestry practices and management. Any practice that is in violation of the CITES Convention leads to consequences that are difficult or irreparable. Illegal trade of wildlife and/or live and non-live parts accelerate deforestation. Therefore, every illegal practice also affects the forest economy. Providing scientific support to foresters and forest engineers on this issue will increase the success in sustainability.

The practices such as overexploitation and unsustainable and illegal extraction of forest resources and the lack of CITES control have significantly caused and accelerated the loss of biodiversity and ecological services. Therefore, the resources in forest reserves and any buffer zones, as well as in national parks, are severely depleted (Lindsey et al., 2011; Paudel et al., 2020; Bropleh, 2023). The high price and high demand for certain CITES listed species, both locally and internationally, has encouraged significant levels of criminal activity, even in national parks. Continued and widespread illegal logging in upland forest areas and reserves results in a significant domestic supply demand gap. This is spreading noncompliance with CITES regulations (Ugochukwu et al., 2018). Weaknesses in inventory systems provide an easy way for corrupt forest engineers to systematically accumulate fraudulent credits, for example by misidentifying unwanted trees as valuable species, overestimating the volume of rare tree species or listing non-existent specimens (Greenpeace, 2018). This shows the importance of the control of forest areas by scientific authorities.

The European Commission is also working on a regulation to minimize deforestation and forest degradation originating in the European Union (EU) since 2021. The Regulation sets mandatory due diligence rules for operators placing non timber forest derivative products associated with deforestation and forest degradation on the EU market (Carry and Maihold, 2022). There are also studies showing that overexploitation of wildlife is caused by the consumption of plant protein by about 50 per cent of the local population and overuse of wood. It has also been concluded that weak institutional framework and insufficient forest monitoring lead to overexploitation and illegal resource extraction (Beevers, 2016). Even musical instruments, parts and accessories made exclusively from forest products jeopardize biodiversity when used uncontrolled. As natural forests are increasingly sought to be managed to maintain people's ecological and livelihood security based on sustainable management of forests for the flow of ecosystem services, the wood needed to produce a variety of needed wood products needs to be produced either by increasing the area under commercial plantations with higher productivity or through tree cultivation outside the forest, especially through various agroforestry systems (Bansal, 2021).

In recent years, the efforts to prevent the loss of wildlife and habitats have been prioritized. Based on ICRAF (International Centre for Research in Agroforestry) and CIFOR's (Center for International Forestry Research) 2020-2030 strategy, whose work is compatible with the Paris Agreement, the Sustainable Development Goals and the 3 Rio Conventions, deforestation and biodiversity loss have been declared among the five problems of global importance that need to be addressed.

It is also worth mentioning that; Non-Timber Forest Products (NTFPs) are defined as any biological material except timber that is harvested from forests for the use of human beings. Examples include resins, ornamental plants, gums, foods, essential oils, tannins, latex, medicines, spices, dyes, wildlife (living animals and products), raw materials and fuelwood, bamboos, rattans, fibers, small timbers (CIFOR, 2020; CIFOR-ICRAF, 2021).

Today, it is widely recognized that preserving the diversity of living beings on the earth, or in other words, halting the process of extinction in nature, is an ethical obligation for all humanity. Although the decline in species and living populations has been somewhat mitigated by the efforts made in the last 30 years, the loss of biodiversity has not been completely halted. According to the report of the United Nations (UN) Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services, adopted at the 7th session of the plenary in Paris, reveals that nearly 1 million plant and animal species are under the threat of extinction due to human activities (IPBES, 2019). The report is based on a mid-low estimate of 8.7 million plant and animal species (Mora et al., 2011). The Living Planet Report (2020), published by WWF, reminds us that vertebrate species populations have declined by %68 in the nearly 50 years between 1970 and 2016 (WWF, 2020).

Besides IPBES' large-scale estimate, IUCN estimates that less than 28 000 species are currently threatened with extinction (Turnhout and Purvis, 2020). According to Inskipp and Wells (2019), which endorses this argument, about 130 of the nearly 13 200 mammal and bird species predicted to have existed in 1 600 are now extinct. Numerous fish, reptiles, invertebrates and amphibians are also endangered, and it is estimated that there are between 20000 and 25 000 endangered flora. Three quarters of those species have become endangered or extinct due to a direct consequence of human impacts, primarily habitat destruction and hunting. In this case, it has also been observed that the illegal trade of trophies and non-living animals after hunting directly affects the available budget and investments allocated to hunting grounds and, wildlife conservation and development.

When formulating national policies and initiatives, policy makers might use international forestry statistics as a reference. But it is noted that inadequate data and monitoring weaknesses exist in many countries when it comes to assessment of flora and fauna. Checklists of taxonomic groups can be found in publications that can serve as a baseline as well as data produced at national level by organizations such as research institutes. it would be good to refer to such information when doing national reporting.

Complete protection will be ensured, in particular, by the social participation of forest villages in decision making processes, the research/development dimension, the resource reuse dimension, and the integration of wildlife into decision

making processes. It is also possible to see the worldwide successes achieved through governance that ensures the protection and conservation of wildlife. Many studies suggest that the success of wildlife conservation depends on good management (Cohn, 1988; Ruiz-Miranda et al., 2020; Salerno et al., 2021; Pomeranz et al., 2021). It is also known that good monitoring is the key to good management of wildlife despite pressures such as grazing and poaching (Lee and Bond 2018). Good monitoring depends on how effectively authorities work on wildlife (Kadykalo et al., 2021).

Forests, which cover around one third of the earth, are crucial natural resources for sustainable society. A forest could never continue without its wildlife and the main habitat for wildlife is forests. In this particular situation, despite the abundance of criteria pertaining to wildlife, one aspect that has consistently been absent from the preservation of societal resilience is the fact that illicit activities associated with wildlife have not been adequately curbed. Establishing sustainable use and effective protection mechanisms for the socioeconomic uses of forests and wildlife, which are seen as forest products, has always been on the agenda. As it is known, CITES is a convention on the prevention and control of trade in wild flora and fauna species. Therefore, it is one of the key international legal instruments for the prevention of illicit trade.

CITES listed specimens including primates, timber, reptiles, birds and live big cats as well as derivatives such as clothing, traditional remedies, cosmetics, food and handicrafts have been researched for illegal trade. Illegal wildlife trading and bio trafficking share many similarities. Bio trafficking puts species at risk of extinction. Food diversity, pharmaceuticals, numerous advertisements connected to genes and natural products, and tourism related advantages are some of the ways that biodiversity contributes to national economies (Atik et al., 2010). The most often smuggled species include birds, plants, amphibians, insects, mollusks and reptiles. Insects are employed in the cuisine, pharmaceutical, cosmetic, and dyeing industries as colorants, as well as in resistance tests against environmental stressors such extreme heat, cold, or radiation. Collectors can purchase butterflies. In addition to being employed as attractive plants and in cutting edge agricultural techniques, plants are utilized in the food, cosmetics, and pharmaceutical industries. Birds are collected and utilized for scientific research. In the textile, cosmetic, and medical industries, reptiles are utilized for their eggs, skin, and poison. Mollusks and amphibians are kept as pets or utilized in the culinary, cosmetic, and decoration industries (UNODC, 2011; Nellemann, 2012; OECD Publishing, 2012; Erol, 2014; Birben and Gencay 2019).

It is very important to establish a solid legal infrastructure for the protection of endangered species. In this regard, the CITES Convention mandates the establishment of authorities that provide guidance and data to law enforcement authorities in each party country. Regarding the structure of the scientific authority, Article 9 of the Convention requires each party to designate one or more management authorities and one or more scientific authorities for the purposes of the Convention. Nevertheless, it has been observed that several countries (other than European countries) have not submitted the information on the scientific authority to the Secretariat or do not yet have such an authority. The tasks of the scientific authority are summarized as follows; To monitor the status of the maintenance and housing capacity of the parties in the trade of Annex I-II-III species. To provide scientific opinion to the management authorities on the relocation of these species on the list. To make a choice on the transfer of confiscated species to a place of appropriate capacity. Report CITES species quotas in the form of national commercial lists to the Secretariat each year. Provide scientific advice to the management authority (Uyar, 2023; CITES, 2025).

A major shortcoming in this regard is the issue of getting scientific support quickly in customs procedures. Although the correct functioning of customs procedures is often the priority, not speed, the workload in this area has led to a search for a solution. It is envisaged that effective scientific support can be obtained in a timely manner within the scope of a protocol to be signed with directly relevant experts by setting certain criteria.

The International Consortium on Combating Wildlife Crime (ICCWC) is a joint effort of 5 intergovernmental organizations. Its partner organizations are the CITES Secretariat, INTERPOL, the United Nations Office on Drugs and Crime (UNODC), the World Bank and the World Customs Organization (WCO).

Lead officials in government agencies are responsible for enforcing wildlife laws and bringing wildlife crime offenders to justice. ICCWC directly works with them to support their efforts by providing the necessary technical support, services and tools they need to build capacity for the long term and combat wildlife and forest crime effectively. Consortium activities implementation is monitored by a Senior Expert Group (SEG) representing each of the five partner organizations (ICCWC, 2023).

In addition, the role of the ICCWC consortium in providing deterrence is crucial, and INTERPOL is one of the highly effective organizations supporting this through periodic regional operations. According to 2016, 2019, 2022 and 2023 INTERPOL reports, the data obtained are as follows;

Between $7 billion and $23 billion in annual resource losses were recorded in 2016 due to illicit trade and poaching of flora and fauna. With a yearly black market for illegal wildlife products reaching $20 billion, poaching and illegal animal trafficking have become more prevalent. According to the UNEP-INTERPOL Report: The Rise of Environmental Crime; The illegal wildlife trade is estimated to be worth $20 billion annually (UNEP and ASSESSMENT, 2016).

Wildlife crime has far reached effects that impact not only the environment but also societies, communities and economies. A multi sector approach is necessary to address such multi sector problems. The illegal sale of wildlife products and animals online, as well as the illicit trade via air, land, and sea transportation systems, need to be strictly regulated. Criminals are able to exploit animals and wild plants anywhere in the supply chain, from transportation and poaching to selling and processing. Wildlife crime is often linked to other criminal activities such as corruption, money laundering, document fraud (INTERPOL, 2019).

According to INTERPOL reports in 2022 and 2023; forest crime and wildlife is the world's 4th largest illegal trade, a highly profitable illegal business with wide reaching and disruptive consequences not only for the environment, but also for public health, society and the world economy (INTERPOL, 2022; 2023).

The relationship between illegal trade and the CITES convention has been briefly mentioned above. CITES and the CITES scientific authority will be explained below. The effectiveness of the scientific authority of the CITES convention, which is the subject of the study, is very important in this regard. Because this authority provides the scientific data of CITES implementations and directs the management authority. It is one of the most important pillars in the implementation of the CITES system.

This study seeks to evaluate the effectiveness of the CITES scientific authorities in terms of the institutions determined by the member countries. In particular, it is aimed to discuss the effectiveness of universities, which are the place where scientific data are produced the most, by finding out how much they are institutionally involved in CITES member countries. A continental approach was also shown based on the CITES records of the countries in the European continent, which are among the wildlife consuming countries. Because this authority provides the scientific data of CITES implementation and directs the management authority. It is one of the most important pillars in the implementation of the CITES system.

1.1 CITES convention

The CITES Convention (Washington Convention) was prepared following a decision taken at an IUCN (International Union for Conservation of Nature) members' meeting in 1963. The Convention text was adopted in 1973 in Washington, the capital of the United States of America, at a meeting attended by representatives of 80 countries and it entered into force in 1975. CITES started with 10 Parties in 1975 and as of 2025, there are 185 Parties to the Convention (Table 1). The number of Parties by continents is as shown in Table 1. According to the graph, the most member countries are in Africa, followed by Europe.

Table 1. The number of parties by continents

Continent	Number of Parties
Oceania	9
Asia	39
Central and Southern America and Caribbean	31
Europe	50
Africa	53
North America	3
Country Total	185

The Convention text consists of twenty-five articles and three appendices. Each country party has the obligation to designate scientific authority, management authority and enforcement authority, and to notify these authorities to the secretariat based in Switzerland. CITES operates by subjecting all international trade in specimens of selected species to strict controls. The export, reexport, import, reexport and possession of species subject to the Convention are carried out through a system of permits and documentation. These authorities are responsible for ensuring that trade flows properly. The legalization and adaptation of the liabilities of the Convention to domestic law varies according to the geographical, administrative, and cultural conditions of each party. The CITES Secretariat in Switzerland does not provide a specific legal framework in this regard and leaves these regulations to each party.

The main purposes of the Convention are as follows (CITES, 2025):

- International trade in endangered or potentially endangered species should be monitored and halted, when necessary,
- The potential exploitation of the environmental balance by international trade must be avoided,
- Parties need to be assisted to achieve sustainable use of their biological resources.

In the international trade of CITES species and their parts and derivatives, the Management Authority of the exporting country first issues a CITES Export Permit. Then, by applying to the Management Authority of the country that will import, a CITES Import Permit Certificate equivalent to the CITES Export Permit Certificate previously obtained is issued (https://cites.org/: Wildlife crime linked to the Internet. Accessed: 10.07.25). The aim is to send the information in these documents issued by the two countries to the CITES Secretariat at the end of the year so that they can be transferred to the database and compared by WCMC (World Conservation Monitoring Centre). Thus, trade control is ensured and smuggling is prevented (CITES, 2025)

1.2 Convention appendices

The CITES Convention has three appendix lists for the control of illicit trade in living and nonliving parts of plant and animal species from wild habitats. The implementation procedure for each list differs according to the species' sustainability. The Convention sets out these lists for wild species of flora and fauna according to their level of protection, and the scope of these lists is as follows (CITES, 2025);

Appendix-1, species that are threatened with extinction due to international trade and whose international trade is therefore subject to very strict legislation.

Appendix-2, all species that are not currently threatened with extinction, but could be threatened with extinction if not strictly regulated, as trade in specimens of these species may involve uses incompatible with their survival.

Appendix-3, species that any party regulates within its jurisdiction in order to prevent or restrict overuse and that it considers requiring the cooperation of other Parties for trade control.

The species subject to these appendices and to which the Exemption from Trade Related Rules applies are as follows; *Specimens Subject to Scientific Studies, Specimens Considered as Personal Property and Household Goods, Specimens of Pre-Contractual Species*. In addition, there are species for which special permits are granted, and these special permits are determined in terms of weight and number. For example, a maximum of 125 grams of caviar (*Acipenseriformes spp.*) per person and a maximum of 3 rain sticks (*Cactaceae spp.*) per person can be carried among the species listed in Appendix-2.
This study investigates the relationship between the institutional profiles of CITES Scientific Authorities and their effectiveness in combating illegal wildlife trade, with a particular focus on European Union countries. The Convention has a large number of signatory countries, and the main purpose of this study is to examine the CITES scientific authority analysis for inclusion in

the literature, particularly due to the need to obtain species data as a result of scientific authority opinions in customs processes. It is clear that the accuracy of decision-making processes in customs is determined by the institutional structure of scientific authority. The hypothesis of this study is that if science-focused institutions are the authority in customs, endangered species will be protected more effectively.

2. Materials and Methods

The use of qualitative research dates back to the early twentieth century. Historically, qualitative research has been given different names (Baltaci, 2017; 2019), such as;

- naturalistic research, due to the effort to identify natural phenomena,
- interpretive research, due to the subjective views of the researcher on the problem, and
- field research, due to its in-depth examination of a subject in a specific social environment.

Qualitative research is a method that is inquisitive and interpretive about the problem it examines and strives to understand the form of the problem in its natural environment (Guba and Lincoln, 1994; Klenke, 2016). Qualitative research, which uses qualitative data collection methods such as observation, interview and document analysis to solve a problem, refers to a subjective-interpretive process for perceiving previously known or unrecognized problems and realistically addressing natural phenomena related to the problem (Seale, 1999). Qualitative research, in which quantitative data and intensive statistics can usually be ignored, includes details such as the researcher's observations, text and discourse analysis of the phenomenon under investigation (Mallat, 2007). In addition, qualitative approaches can add emotion, depth and different perspectives to quantitative data in a research method known as mixed design research, which combines the strengths of both research designs (qualitative research conducted alongside quantitative research). This increases the credibility and impact of quantitative data (Patton, 1990; Merriam, 1998; Creswell, 2015).

This study is based on a qualitative research approach. Qualitative research is a naturalistic and interpretive perspective of the world (Denzin and Lincoln, 2018). The unit of analysis of the study is the liabilities of the contract, which consist mostly of qualitative data. One of these liabilities is for member countries to designate one or more scientific authorities and notify the Secretariat. The data of this study were collected through document analysis. Considering the scientific data on biodiversity in the world, there is a concerning decline. As the CITES Secretariat emphasized that ICCWC is the most deterrent organization in wildlife crimes, the activity reports of this consortium were examined and INTERPOL's data on illegal wildlife trade were also taken into consideration (INTERPOL, 2019; 2022; 2023; ICCWC, 2023). Efforts by scientific authorities are very important to effectively prevent these illegal activities and to follow scientific data more effectively. While examining the documents, the countries including scientific authorities were examined in terms of specific words and concepts. The raw data, which is the data source of the study, and the table of the authorities of the Parties to the Convention were computerized in PDF format.

This research analyzes the documents until today of the international CITES Convention, which entered into force in 1975. The contractual liabilities of 185 member countries identified in the specified year interval were investigated, and the scope was formed with the addition of new member countries between 2021-2025 (CITES, 2025). Announcements of the Convention Secretariat, international meeting publications, CITES official website and relevant literature were utilized in the research (https://cites.org/eng/Andorra_184th_Party_to_CITES_Convention_15102021 Andorra to become the 184th Party to CITES. Accessed: 06.11.25), (https://cites.org/eng/news/pr/turkmenistan-accession-to-cites-2024 Turkmenistan Joins CITES, Strengthening Wildlife Trade Regulation and Conservation in Central Asia. Accessed: 07.07.25). The Scientific Authority designation status of all parties was examined in detail, both in terms of number and institutions, and the data was processed in deductive form. In the data obtained as a result of the research, first of all, it was investigated whether a Scientific Authority was determined or not. Then, the number of institutions among these scientific authorities was determined.

The institutional profiles obtained during the data collection process were analyzed graphically using MS Excel 2024. Following the qualitative analysis of these institutional profiles, quantitative numerical ratios were given. While determining this institutional structure data for each country, the liability to identify at least one scientific authority under the Convention was considered (CITES, 2025). Since the number of scientific authorities alone is not decisive, the ratio of scientific authorities to all members was investigated to examine its relationship with the increase in wildlife trafficking seizures in Europe in recent years. There is an indirect relationship between knowing this numerical ratio and its effectiveness in practice. The direct correlation is that institutions conducting scientific research can assist in the national reporting and customs process more accurately and quickly regarding flora and fauna. The indirect correlation is the increase in illegal wildlife trade and seizures of CITES species in Europe in recent years, which has been higher than ever before (da Silva Marques, 2024; Sollund, 2025). As no analysis has been conducted on this subject before, the effectiveness of scientific authority practices can also be measured by reanalyzing scientific authorities in the coming years and examining ICCWC reports on Europe as an indicator set to see if there has been any progress.

While grouping institutions, the names of universities, ministries, and others were researched one by one and categorized as institutes, botanical gardens, research centers, etc. In this study, the purpose was to reveal the small number of universities considered scientific authorities and their connection to illegal wildlife trade using a simple methodology. Examples from the literature highlight that seizures have increased significantly in Europe in recent years and that the UN has emphasized the need for universities to be recognized as scientific authorities (Heim and Böcher, 2016; Maddison, 2019; Uyar, 2023; da Silva Marques, 2024; Sollund, 2025; CITES, 2025).

The identified authorities were first examined in number by reducing the number of authorities from worldwide to EU countries. The number of scientific organizations and public

institutions in EU countries compared to all parties has been investigated. Following these data, it was determined that the most identified scientific authority in the world is the Ministry, and the examination was continued to support the idea that a scientific authority should be primarily composed of universities, which is where the most scientists are located. In this way, it was expected to reveal the institutional and numerical status of scientific authorities both in the world and in the EU countries and to obtain inductive explanations.

For data analysis, the Excel program in Microsoft's Office 2021 was used to process data from the CITES Secretariat's official member country profiles (CITES, 2025). Scientific authority data were extracted from the member profiles of CITES party countries (https://cites.org/: *Home>About CITES>Parties>Country profiles*. Accessed: 06.08.25). The tabulation of this data is based on the continental data reported by each country to the Secretariat. In addition, the number of scientific authorities of all parties was also analyzed in this table. Among the data analyzed institutionally, whether universities dominate the data was evaluated according to the number of other institutions identified. The original data extracted for the purpose is shown in graphs using Microsoft Office programs. This analysis can be applied to both the management authorities and enforcement authorities of the parties to the CITES convention, i.e., it is an approach that can be used as a basis by another expert on the subject. It is also expected to contribute to the work of the CITES secretariat, which has regional CITES directorates on many continents.

3. Results

In order to ensure the integrity of the researched data, after the CITES convention was firstly introduced before the results. The Scientific Authority data obtained by analyzing the membership profiles established by the parties in line with their liabilities are presented both institutionally and numerically under the title of results. Statistics in Figures 1,2,3 and 4 were compiled by the authors based on CITES (2025) data.

3.1. Scientific authorities of the parties

The species that take part in the appendices of the Convention are determined and updated by the authorities of each country as a result of annual and biannual controls. Among these authorities, Scientific authorities have an important role in determining whether species are endangered because of trade.

As of 2025, 5 of the Parties to the CITES Convention had no scientific authority identified or not yet notified to the secretariat. Figure 1 shows the number of parties according to the number of scientific authorities.

When the current situation is evaluated, it is seen that the Parties mostly declare 1 authority. This number varies according to each country's domestic law, institutionalization system, environmental awareness and capacity for protectionism. Measuring the relationship between the number of scientific authorities and effective reporting could lead a separate study.

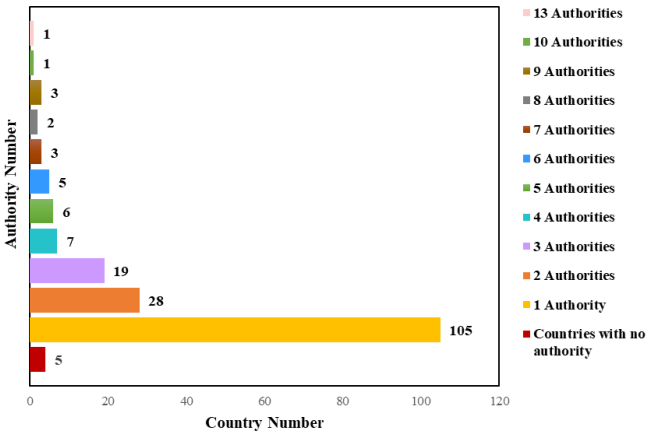

Figure 1. Number of CITES scientific authorities by countries

The CITES Convention has outlined nine steps for important tasks such as effectively conducting species identification studies for flora and fauna listed in Appendix II and evaluating post-trade population status (Leaman and Oldfield, 2014). In countries where the administrative authority is also the scientific authority, if there is an active unit working on this issue, it can be said that the process is progressing successfully. It is extremely important for the biological and ecological balance that the people working in scientific authority can quickly establish contact with customs officials. Therefore, even if a country's scientific authority consists of only one institution, the presence of an actively accessible team within that institution will ensure success in effective conservation.

3.2. The role of the scientific authority in preventing illicit trade

Above all, all trade and related import and export permits must be supervised and controlled by a scientific authority (Sellheim, 2020). The main responsibilities of the Scientific Authority are to advise the management authority on whether the export of specimens threatens the persistence of species in the wild, and to advise the management authority where necessary. Export authorization is only granted if applicants complete requirements from the scientific authority stating that exports will not harm the existence of the species, and also if the managing authority is satisfied that exports do not violate national laws on wildlife protection (Nurbani *et al*., 2021), Parties are also instructed to seek advice from their scientific authorities when deciding on the disposal of confiscated live specimens (COP, 2016; Rivera *et al*., 2021).

The scientific authority in each country sets quotas based on population data, reproduction of the species and other relevant information. Adhering to quotas aims to ensure that trade does not affect the survival of species. The scientific authority is tasked with obtaining all the scientific evidence that supports quotas and listing recommendations (Wyatt, 2021). Other duties are to establish the annual export quota, to advise on captive breeding and artificial breeding facilities, to assist and advise the Management Authority in the preparation of proposals for amendments to the Appendices (CITES, 2025).

When the official profiles of all member countries are examined, it is seen that the scientific authorities of 185 member

countries include 104 scientific organizations and 124 public institutions.

In the grouping according to the graph above, public institutions consist of ministries, botanical gardens and other uncategorized government institutions. Scientific organizations consist of universities, institutes, research centers and scientific committees (16 museums and other categories are not included). It is noteworthy that only 6 of the 267 identified institutions are botanical gardens. Considering that scientific institutions such as botanical gardens have the most direct experience with CITES reports, it can be said that they are very few in number. The distribution of 185 countries' scientific authorities by institution is shown in Figure 2.

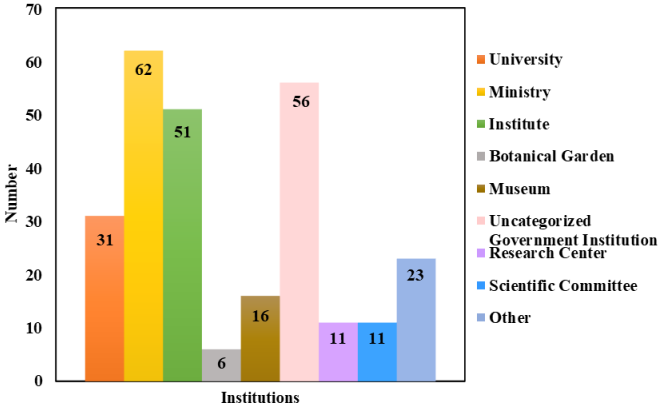

Figure 2. Scientific authority institutions of CITES by numbers

According to the graph, the highest number of scientific authorities came from ministerial institutions with 62 parties. It is also known that management authorities are mostly selected from ministerial institutions. This number is followed by uncategorized government institutions with 56 parties. Other science authorities are zoo, office, school, laboratory, private sector, veterinary service, conservation office, nongovernmental organization (NGO), agency. It is also determined that the scientific authority of 31 countries consists of universities.

3.3 Institutional analysis of countries' scientific authorities

The role and effectiveness of Scientific Authorities in preventing illicit trade is very high. It is crucial that they are always up to date and in a position to maintain institutional coordination. In particular, the first stage of the legal process, the confiscation processes where the decision is made, is the time when scientific support is most needed. In this regard, it is important to be careful, not fast.

When comparing the scientific authorities of all parties in terms of ministries and universities, almost 62% are found to be from ministries, 31% are found to be from universities and 6% are found to be from both universities and ministries. The number of universities producing the most scientific data is lower than it should be. When we look at the number of scientific authorities, the majority of which are ministries according to the data of all members in the EU countries in proportion to the number of universities, the graph in Figure 3 emerges (decimals are not included).

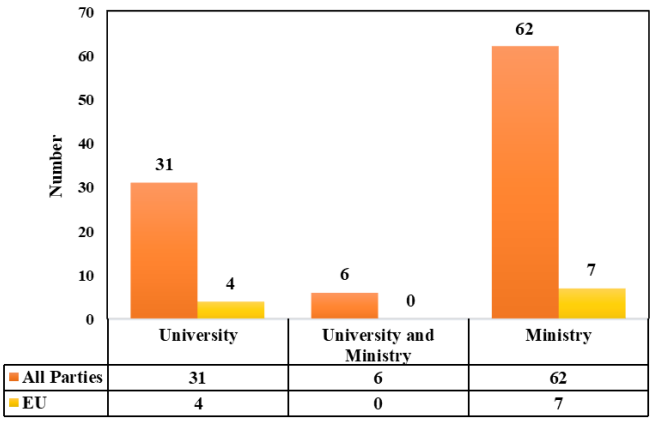

Figure 3. Ministries and universities in terms of all parties and EU countries

Only ministries and universities are shown in the graph. The remaining EU scientific authorities by institution are as follows: 8 government agencies, 8 institutes, 7 ministries, 6 museums, 4 universities, 2 agencies, 2 scientific committees, 2 research centers, and 1 each of veterinary services, NGOs and academia.

There are 31 countries worldwide whose scientific authorities are universities, of which approximately 13% are in the EU. While the number of countries with ministries as scientific authorities in the world is 62, approximately 11% of this number is in the EU countries. With these rates; it is thought that the success of protectionism in general will be higher with the increase in the number of universities in the scientific authorities in the EU countries.

4. Discussion

Illicit or non-sustainable wildlife trade is globally rising, jeopardizing traded species and coexisting biota, and fostering the introduction of invasive species. The consequences permeate our daily lives and have a dangerous impact on our welfare, from risk of human zoonosis to the loss of ecosystem services or the corruption of local to global economies and connections to large, organized crime networks (Cardoso *et al*., 2021). Maintaining the sustainability of this global market is challenging even at best. The data available on wild populations is often limited and key life history traits are challenging to be measured unless appropriate research is undertaken (Annorbah *et al*., 2016; Martin, 2018). That is why it is important to discuss the effective implementation of strong conventions such as CITES and the effectiveness of authorities.

When the data obtained from the graphs are evaluated together with the recent INTERPOL reports emphasizing the illicit trade in wildlife, it is seen that the countries in Category 1 of the CITES Convention fulfill only the obligation to submit reports and identify authorities (Reeve, 2004; 2006; INTERPOL, 2023). However, there are very few examples where warnings have been issued for the contents of the reports or effective practices have been rewarded. Despite the measures and practices taken to date, it is understood that illicit trade is still at a certain level. In this case, it seems that it would be beneficial for each member country to carry out flora and fauna conservation activities based on scientific data, including trade with nonparty countries, under a common roof and for the

scientific authorities of each country to unite as an auxiliary mechanism. Today, INTERPOL reports still show that illegal wildlife trade is among the top international crimes (INTERPOL, 2023). In addition, transboundary projects of international organizations such as ICCWC seem to be successful (ICCWC, 2023). The involvement of more countries in projects for a strong monitoring system will increase wildlife conservation. The identification of wildlife assets to be protected will only be possible through systematic scientific studies and efforts.

It is important that new implementations are found by Scientific Authorities for countries to establish a mechanism to reassess the population dynamics of their CITES species. Sometimes increases and decreases in populations can be overlooked by field workers. Regular reporting to the Scientific Authority will ensure effective conservation.

Approximately 27% of CITES member countries are located in Europe (Figure 1). Looking at all member countries, it is seen that mostly 1 scientific authority has been assigned (Figure 2). Among these scientific authorities, it is seen that Ministries are the most institutionally determined (Figure 3). Since taking only administrative decisions about CITES species without scientific opinion cannot be effective (Guggisberg, 2016; Wolf *et al*., 2018; Uyar and Elvan 2024). It is very important that universities, which have the most experts in this field, should be included among the scientific authorities and it is thought to increase the scientific effectiveness in the protection.

Strengthening the science based decision-making process for listing purposes also requires that the data presented be consistent and that scientific authority in this field be composed of actual experts (Friedman *et al*., 2020). Europe has run successful projects to restore wildlife species, such as Rewilding Europe. (Helmer *et al*., 2015). Despite these efforts, the high demand for wildlife and the lack of control over trade flows have persisted. It is quite positive that scientific authorities in Europe are mostly composed of science-focused institutions. However, the latest official data still shows that biodiversity loss has not stopped and illegal wildlife trade has not yet declined. Therefore, it would be a refreshing step for experts working on this subject to keep themselves up to date and work more closely with customs officers.

For the trade of CITES species, a commercial permit alone is not sufficient; if the species is live, its welfare must also be guaranteed. IATA procedures governing the responsibilities of the shipper and carrier in live animal trade—container requirements, CITES documentation, environmental conditions, reservations, loading, animal welfare, and appropriate transport conditions—must be fully implemented. For this purpose, the Live Animal Regulations (LAR) explaining the rules in the IATA (2025) resource should be used as a reference.

It is obvious that a world standard should be set for determining whether wildlife flora and fauna elements are CITES species at customs as soon as possible. While determining this standard, it should be taken into account that customs inspection officers and customs officials most frequently make species determinations by consulting their own Scientific Authority. The time it takes for scientific authority decisions to be reflected in the bureaucratic process, the variable methods of accessing instant data and the lack of sufficient personnel trained in species identification prolong customs processes and put species identification at risk. So, the management, scientific and enforcement authorities should be effective and well connected, and it seems that border/customs officers and these authorities seem to need more inclusion.

The convention, which has a history of nearly 60 years, has its roots in environmental protection concerns that started in the 1960's and was grounded in IUCN meetings. However, since then, even in countries with the lowest crime rates, it is still seen that there is illicit wildlife trade at a level that affects the world's biodiversity. It is obvious that improvements will be made with the motto of *conscious society and decisive authorities*.

Aside from publicly available records of import and export data of species not listed by CITES, historically only a few countries have kept any records. To better understand the scale of trade (e.g., quantities and diversity of species), data on trade in non-listed species also needs to be collected and standardized (Watters *et al*., 2022).

Public confidence and work dedicated to emphasizing the importance of the issue is crucial. In order to build sustainable societies and increase societal resilience, efforts should be made to raise awareness of how to build stronger through detection and determination to protect. This is because, assuming that every country has adequate deterrent legal infrastructure and monitoring mechanisms, it is still surprising to see and report that trade moves underground at the first opportunity. Societies must be convinced that protection is more cost effective and beneficial.

Highlights of the findings are as follows:

- Among all 185 CITES parties; the scientific authorities include 104 scientific organizations and 124 public institutions.
- Scientific Authorities are; 62 ministries, 31 universities and 6 both universities and ministries.
- The International Consortium on Combating Wildlife Crime and other mechanisms that assist CITES implementation are addressed.
- As a ratio of EU scientific authorities to all parties; university 13% and ministry 11%.
- When the reasons for the inadequacy of the measures taken are questioned, it is thought that scientific authorities should work together with universities.

This study, researched against the growing illegal wildlife trade data in recent years, reveals that CITES Scientific Authorities, designated as academic institutions, particularly universities, are more likely to demonstrate a higher level of scientific consistency and transparency than ministries. This structural difference significantly affects the effectiveness of species conservation and legal harmonization across EU countries. The findings suggest that strengthening the scientific basis of institutional roles within CITES could strengthen biodiversity governance and contribute to more effective wildlife trade regulations. These insights are crucial to inform conservation policy makers seeking to improve the operational capacity of Scientific Authorities.

According to da Silva Marques (2024) and Sollund (2025), demand for wildlife in Europe has reached its highest level in recent years, and illegal wildlife cases continue to increase. Based on this, in line with ICCWC reports, it is a priority to first analyze them structurally to determine the effectiveness of institutional authorities. In this study, since scientific authorities

mostly consist of ministries, it was concluded that when improvements are made in conservation efforts, for example, when universities are more involved in the decision-making process of scientific authorities, the number of seizures will decrease. The Convention's effective protection is not simply a matter of being a ministry or research center in the institutional sense. It is particularly important to ensure that the designated contact persons, who are recognized as scientific authorities, are part of a specialized team composed of flora and fauna experts and maintain close communication with customs officials. In Europe, the majority of structural authorities may not be universities; rather, institutions such as botanical gardens and museums are considered to have the most direct experience with CITES species. However, even if there is no problem with this process, INTERPOL reports and Ministry data still show that the demand for illegal wildlife in Europe has not declined, highlighting the need for improvement in this area. The underlying reason for this relationship is that academic personnel who directly produce scientific data and conduct research on the subject are seen to work as direct scientific authorities in successful country examples. This situation is also reflected in the 2019 UN report, which states that universities and scientific institutions such as institutes and museums should be identified as sources that should be consulted directly in the confiscation process, and that this is a proactive measure (Heim and Böcher, 2016; Maddison, 2019; Uyar, 2023; CITES, 2025).

5. Conclusions

In the literature on the CITES convention, it has been determined that this approach has not been studied before and evaluations have been made from a general perspective. Thus, it is also expected that these data will provide a source of data for other researches and decision makers. The following conclusions were reached regarding the structure of scientific authority and illicit trade presented in the study.

- Scientific authorities should work together with universities. As seen in the study, a significant number of scientific authorities are within the ministry. This structure is contrary to the basic principles of the convention. Because the scientific authority should be composed of scientists. Scientists are most often found in universities. This indicates a high compatibility of universities as CITES authority.
- Bio-smuggling, which causes deterioration of the natural balance, decrease in the richness of endemic species and unauthorized use of natural resources, should be prevented and the personnel and local people should be well trained in its detection and cases should be recorded. In this regard, cooperation with scientific authorities should be carried out.
- Convention parties should increase the number of scientific authorities such as universities, institutes and laboratories, or should review the team of experts within its current authorities. Especially by these scientific organizations, both live flora and fauna transportation processes should be followed strictly in customs processes.
- Customs and enforcement officers should be well-trained, and their labor rights should be improved.
- Scientific events should be organized for the activities of scientific authorities, and more staff should be employed in this field. Although the existence of a institutional authority represents the fulfillment of responsibility, it is crucial that CITES scientific contact persons are designated and accessible. In order to avoid this uncertainty, it is now essential that the Secretariat takes proactive action in this regard. Each country should be asked whether the scientific authority contact persons have a dedicated team working specifically on communication with customs in this area. For example, a statement such as “the herpetofauna officer in the unit holds a doctorate in this field” would be sufficient in the initial stage.
- The CITES Convention consists of 3 main authorities for each country. Examining the management authorities and enforcement authorities like this study will enable a more comprehensive analysis of the subject in the future. In the present study, the current status of scientific authorities was analyzed, and general perspective is given.

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