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The Vega Alta of Segura River (Southeast of Spain): A Wetland of International Importance

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Abstract: The Ramsar Convention is an intergovernmental treaty for the conservation and wise use of wetlands, which establishes nine criteria related to natural values and a cultural one that wetlands must meet to be included in the list of wetlands of international importance. We aim to evaluate if the wetlands of the Vega Alta of the Segura River (southeast of Spain) meet the requirements to fulfil this agreement. Thanks to meticulous fieldwork and a bibliographic review related to the stated objective, we collected information on the existing environmental and cultural values. The results show that this set of wetlands is home to 11 species of threatened vertebrates in Spain, two priority habitats in the European Union, as well as cultural values related to their origin, conservation, and ecological functioning. Likewise, in the area there are archaeological sites, traditional uses of water associated with the cultivation of rice, and religious manifestations. Effective wetland inventories and rigorous analyzes of their ecological and environmental characteristics, as well as their socioeconomic functions, need to be carried out in order to improve their management and protection.This wetland certainly meets three criteria to be included in the Ramsar Convention list of wetlands.

Keywords: Ramsar Site; types of wetlands; endangered species; priority habitats; cultural values

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1. Introduction

The Convention on Wetlands of International Importance (Ramsar Convention) is the oldest of the modern intergovernmental agreements on the environment. The treaty was negotiated in the 1960s between countries and non-governmental organizations concerned about the loss and degradation of wetland habitats for migratory waterbirds [1,2], as it has been estimated that more than 50% of humid areas have disappeared over the last 150 years, currently occupying 6% of the surface land area [3–5].

This convention was adopted in the Iranian city of Ramsar in 1971 and entered into effect in 1975 with one main objective: "The conservation and wise use of wetlands, through national action and through international cooperation, in order to contribute towards achieving sustainable development throughout the world." The convention makes a broad definition of wetlands, which covers all "lakes and rivers, underground aquifers, swamps and marshes, wet grasslands, peatlands, oases, estuaries, deltas and tidal flats, mangroves and other coastal areas, coral reefs, and artificial sites such as fish ponds, rice fields, reservoirs, and salt flats" [1].

The convention highlights the importance of wetlands for the important ecosystem services they provide [6], among which the regulation of water regimes and their usefulness as reservoirs of biodiversity stand out. It also recognizes that they generate a resource of great economic, scientific, cultural, and recreational value, in addition to playing a fundamental role in adapting and mitigating climate change.

A requirement for those countries that adhere to the convention is that they designate at least one wetland of international importance, and therefore, the Ramsar List of Wetlands is a prestigious list, since it integrates the most important wetlands in the world from the point of view of its ecological interest and for the conservation of biodiversity.

The List of Wetlands declared as Ramsar Sites is the most extensive network of protected areas on the planet. As of December 2020, it had more than 2400 sites, covering more than 2.5 million square kilometers in the 171 countries that have signed the convention [7].

The Ramsar Convention has a set of tools for national wetland inventories [8], and goal number 6 of the Sustainable Development Goals is the protection and restoration of aquatic ecosystems such as wetlands. However, recent trends in the global assessment of wetlands indicate that between 1970 and 2015 the area of natural wetlands hasdecreased by approximately 35%, while constructed wetlands, mostly rice fields and reservoirs, almost doubled during this period and now constitute 12% of catalogued wetlands. Nevertheless, increases in constructed wetlands have not compensated for the loss of natural wetlands [9–11].

To halt the global deterioration and disappearance of wetlands, it is necessary to improve the identification, planning, and management of wetlands that have relevant ecological and cultural values [12], and implement conservation and sustainable development measures [13–16].

The inclusion of a wetland as a wetland of international importance requires that it meet at least some relevant requirements related to the presence of threatened species or ecological communities, to which cultural values related to their origin, conservation, and/or ecological functioning can be added [17–19].

Spain has been a party to the convention since 1982 and has declared a total of 75 sites as wetland of international importance, covering an area of 304,564 hectares, in such a way that it recognizes its commitment to contribute to sustainable development, actively working at local, regional and state level for the conservation and wise use of wetlands [2,20].

The government of Spain created the Wetlands Committee in 1994 as a consultative and cooperative body between public administrations (Royal Decree 1424/2008) in order to provide the necessary mechanisms to apply and disseminate the philosophy of protection and wise use of wetlands. In addition to supporting the processing, approval, and application of national wetland policies, the management of wetlands, in particular Ramsar sites, the inclusion of new sites on the list, the control of the application of Resolutions and Recommendations of the COP (Conference of the Contracting Parties) at the national level and the writing of National Reports, etc.

Within the framework of this committee, in 2000, the Autonomous Organization of National Parks prepared the "Spanish Strategic Plan for the Conservation and Rational Use of Wetlands, within the framework of the aquatic ecosystems on which they depend", with the aim of laying the foundations to "guarantee the conservation and wise use of wetlands, including the restoration or rehabilitation of those that have been destroyed or degraded"[21].

As a consequence, the Autonomous Community of the Region of Murcia (southeast of Spain) has 3 Ramsar Sites: the Mar Menor Lagoon (designated in 1994) and the Campotéjar and Las Moreras lagoons (both chosen in 2011). It has also identified two other wetlands that meet the criteria to be included as wetland of international importanceunder the Ramsar Convention: the Ajauque and RamblaSalada Wetlands, in the municipalities of Santomera and Fortuna, and the Vega Alta of the Segura River in the municipalities of Calasparra, Moratalla, and Hellín (the latter administratively belonging to the province of Albacete and the Autonomous Community of Castilla-La Mancha).

Most of the wetlands of the Vega Alta of the Segura River are included within the Natura Network 2000 (Red Natura 2000) through the body of Site of Community Interest.They approved a Comprehensive Management Plan (Decree No. 55/2015, BORM No.

1 of 17 April) [22], whereall wetlands are in the Inventory of Wetlands of Spain (BOE No. 139, of 11 June 2019) [23].

The environmental and cultural values have been studied by various authors[24–32]. It is proposed, as a starting hypothesis, that the Vega Alta of the Segura River meets the requirements to be included as a Ramsar Site. In this way, the objective of this study has been to compile, organize, and evaluate the available information on the types of wetlands and natural/cultural values, as well as to verify if, indeed, the Vega Alta of the Segura River meets the necessary criteria to be included in the list of wetland of international importance

2. Materials and Methods

2.1. Study Area

The wetlands included in the Vega Alta of the Segura River cover an area of approximately 2500 hectares located largely within the administrative area of the Region of Murcia, in the municipalities of Cieza, Calasparra, and Moratalla, as well asa smaller part in the province of Albacete, within the municipality of Hellín (Figure 1).

The geographical position of the Vega Alta of the Segura River determines the presence of a Mediterranean climate, with average annual temperatures ranging between 13 and 18 °C, but with marked fluctuations, ranging from temperatures below 0 °C in winter and up to 40 °C in the summer period. Average annual rainfall varies between 200 and 350 mm per year, which increases to 300–500 mm in the westernmost part of the Moratalla River [32].

The Segura River is the main watercourse that crosses the territory on its northwest flank, where it acts as a natural boundary between the Province of Albacete and the Autonomous Community of Murcia, to which must be added other tributary rivers of the Segura River: Benamor, Argos, Quípar, Alhárabe, and Moratalla [33]. It is located in the outer part of the Betic Mountain Ranges, where the Prebetic and Subbetic Zones are represented. The most abundant geological substratum are limestone and dolomite, which are harder, older materials and typical of the base, located in the central nuclei of the mountains. Among these, there are softer, Neogene, and alluvial quaternary materials, which must be added, and to the south of the Cañaverosa area the river is embedded in a wide area of conglomerates [27].

The study area is located in the central area of the Segura River basin, crossed and supported by the river itself and the main tributaries in this area, the Rambla de Cañaverosa and the Moratalla, Argos and Quípar rivers, all of them on its right bank [34]. In this area, the nine groups of wetlands are located in places mostly protected by the Special Conservation Area of the Sierras and the Vega Alta of the Segura River, as well as the Alhárabe and Moratalla rivers, the Special Conservation Area of the Sierra del Molino, Embalse del Quípar, and Llanos del Cagitán, which are connected by the Segura River and its tributaries: Mundo, Moratalla, Argos and Quípar rivers. Moreover, its surrounded by around a 1000 hectares of land area dedicated to rice cultivation that are currently not covered by any environmental protection body [35].

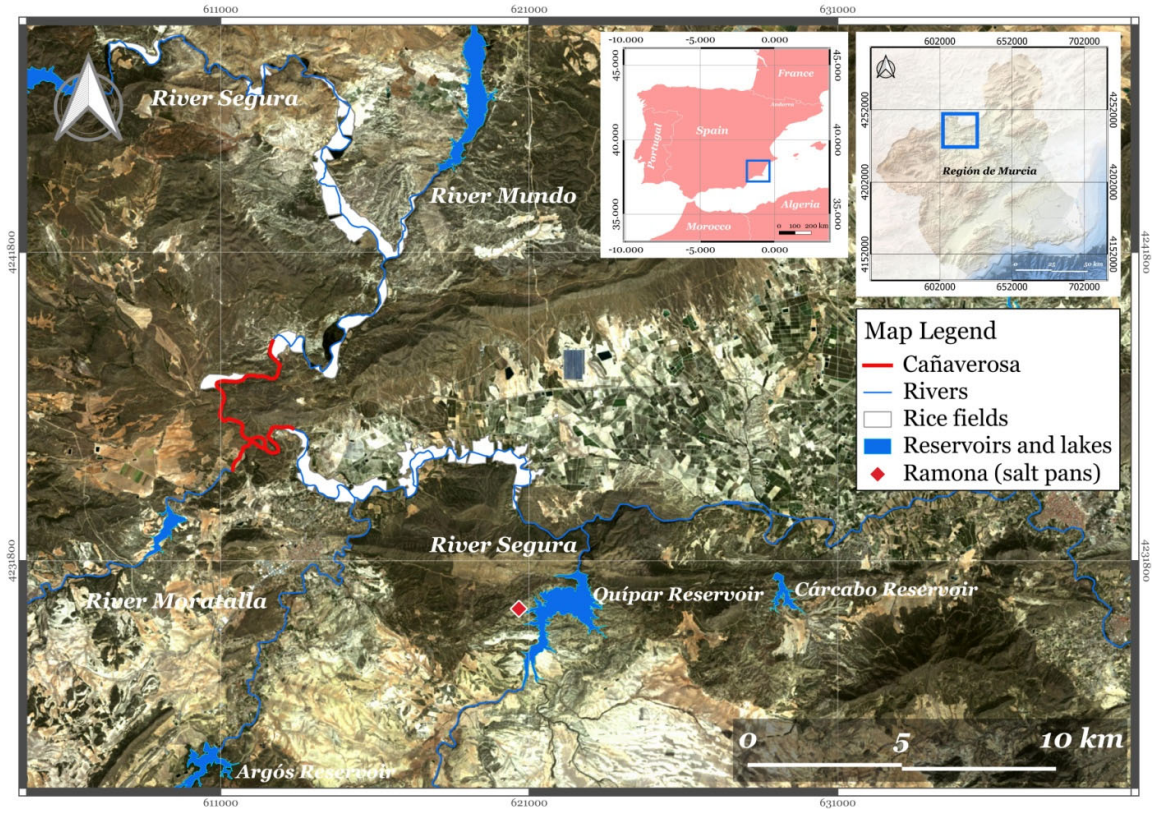

Figure 1. Location of the Vega Alta of the Segura River wetlands (southeast of Spain). Source: self-made. Cañaverosa: Natural reserve composed of groves and riverside forest.

2.2. Methodology

In the first place, the types of wetlands that exist in the Vega Alta of the Segura River were demarcated, taking as a starting point the cataloguing of wetlands included in the inventory of wetlands approved by the Resolution of 21 May 2019, of the General Directorate of Biodiversity and Environmental Quality, by which 53 new wetlands of the Autonomous Community of the Region of Murcia wereincluded in the Spanish Inventory of wetlands (BOE No. 139 of 11 June 2019) [23]. Likewise, the limits of some wetlands were revised after carrying out specific field samplings for this research. Wetlands were managed using the Ramsar Convention's international classification system for wetlands, which groupedthem broadly, allowing the most significant and representative types of wetlands to be identified [17].

The procedure was proposed by the protocol for the inclusion of Spanish wetlands in the list of international importance (Ramsar Convention) and technical annex, prepared by the Wetlands Committee of the Ministry of Environment of the government of Spain in 2011, and approved by the National Commission for the Protection of Nature on 4 December 2007, which is an adaptation to the Spanish case of Manual 17. Designation of Ramsar sites include: strategic framework and guidelines for the future development of the list of wetlands of international importance(2010), a document that is part of the set of Ramsar Manuals (21 Manuals), which the Ramsar Secretariat made available to the public. It establishes some related criteria on the representativeness of the site, i.e., rare or unique wetland in a biogeographic region, sites of importance to conserve biodiversity, and an additional criterion related to cultural values (Table 1).

Table 1. Ramsar criteria for the identification of wetlands of international importance.

Sites comprising representative, rare, or unique wetland types
Criterion 1: A wetland may be considered of international importance if it contains a representative, rare or unique example of a natural or near-natural wetland type in a biogeographic region.
Criteria based on species and ecological communities
Criterion 2: A wetland may be considered of international importance if it supports vulnerable, endangered or critically endangered species, or threatened ecological communities. Criterion 3:A wetland may be considered of international importance if it supports populations of plant and/or animal species important to maintain the diversity of a biogeographic region. Criterion 4: A wetland may be considered of international importance if it supports plant and/or animal species when they are in a critical stage of their biological cycle.
Specific criteria based on waterfowl
Criterion 5:A wetland may be considered of international importance if it regularly supports a population of 20,000 or more waterfowl birds. Criterion 6:A wetland may be considered of international importance if it regularly supports 1% of the individuals in a population of a species or subspecies of waterfowl.
Specific criteria based on fish
Criterion 7:A wetland may be considered of international importance if it supports a significant proportion of indigenous fish subspecies, species or families, life cycle stages, species and/or population interactions that are representative of the benefits and/or values of wetlands, and in this way it contributes to the world's biological diversity. Criterion 8:A wetland may be considered of international importance if it is an important food source for fish, is a spawning area, an area of development and growth, and/or a migration route on which fish stocks within or outside the wetland depend.
Specific criteria based on other taxonomic groups
Criterion 9:A wetland may be considered of international importance if it regularly supports 1% of the individuals in the population of a subspecies or species that is a non-aviary animal.
Additionalcriteria
Cultural value:A wetland can also be considered of international importance when, in addition to ecological criteria, it has examples that illustrate important cultural value, whether material or not, related to its origin, conservation, and/or ecological functioning.

Source: Ramsar (2010) [17] and Committee on Wetlands (2011) [36].

The information on natural values has been prepared from specific field samples carried out in the study area, as well as a bibliographic compilation of the publications available on the related habitats [24,33] and vertebrates associated with aquatic environments [29,32,35,37], classified as threatened on a national and international scale, taking into account the threat criteria of the International Union for Conservation of Nature (IUCN) [38].

2.3. Field Work

Sampling of the different groups of vertebrates has been carried out periodically or recurrently between 2002 and 2021, which have covered the wetlands and river courses included in this study, as well as adjacent areas. For the ichthyofauna inventory, the channels and other bodies of water were sampled using a wide variety of fishing methodologies: active (electric fishing, landing net) or passive (minnow traps, traps, trammel nets, gill nets) [39]. To make the list of threatened chiroptera, the natural or artificial underground cavities were sampled (especially between the months of May to October). A visual inspection of the interior and/or trapping of the animals was carried out using fog nets and harp-traps [40]. These inspections were supplemented with ultrasound detectors (SONY model DCR-TRV33E video camera with infrared focus from Wildlife Engineering

Inc.; SONY model WM6-DC recorder; PetterssonElektronik model D-90A ultrasound detectors) [41,42].

For the bird inventory, censuses were carried out by observing and identifying birds with a telescope or binoculars in the different wetlands, generally first thing in the morning, in the absence of wind or rain, taking note of all the species observed [43]. The amphibians, given the high extension of the area to be examined, were detected by quantitative sampling of larvae, a method that allows detecting species when the abundances of adult specimens are low and of nocturnal species during the day [44].

3. Results

In the Vega Alta of the Segura River, three different types of wetlands were described. They are formed by natural wetlands, artificial reservoirs of ecological interest, salt pans, and rice fields flooded cyclically through a system of crop rotation, and that together encompass 10humid areas and aquatic environments that are connected to each other by the Segura River and some of its tributaries (Table 2).

Table 2. Types of wetlands in the Vega Alta of the Segura River.

Zone	Area (ha)	Type of wetland	Ramsar Code
Natural Wetlands			
Segura, Mundo, Moratalla, Argos, Quípar and rambla del CárcaboRivers	-	Natural stretches of permanent waterways (includes riverbanks)	M
"Sotos and Bosques de Ribera de Cañaverosa"Nature Reserve	56.7	Natural stretches of permanent waterways (includes riverbanks)	M
"Cañón deAlmadenes"Nature Reserve	40.1	Natural stretches of permanent waterways (includes riverbanks)	M
Artificial or modified wetlands with ecological interest			
La RiscaReservoir	15.3	Reservoirs of ecological interest and that function as wetlands	6
Argos Reservoir	126.6		
MoratallaReservoir	1.3		
CárcaboReservoir	16.0		
QuíparReservoir	423.6		
Salinas de la Ramona	2.1	Salt flats	5
Rice fields of Calasparra, Salmerón, and Mundo	875	Flooded land of ecological interest	5

Source: prepared from Ramsar 2010 [17] and Directorate General for the Natural Environment (2015) [45].

The analysis of the natural values of the wetlands and aquatic environments allows us to conclude that these wetlands meet, as a whole, 3of the 10criteria defined by Ramsar (2010) for this area to be declared a Wetland of International Importance:

i. Criterion 2: in the Vega Alta of the Segura River, 11 threatened species have been found in Spain, to which we must add two species of fish included in Annex II of the Habitat Directive of the European Union (Table 3). Among them, it is worth highlighting the populations of chub *(Squaliuspyrenaicus*), a species of fish that is considered in danger of extinction in the Segura Riverbasin, since it has a distribution that is restricted to the upper part of the River Mundo and some enclaves isolated from other tributaries of the Segura River[29]. It is alsonoteworthy that populations of bigeye buzzard (*Myotiscapaccinii)* are in danger of extinction and are distributed in the Region of Murcia, mainly around the courses and bodies of water of the Vega or the Segura River[30,33].

The Quípar river is considered important for the conservation of aquatic invertebrates, with the presence of 39 species of aquatic and semiaquatic coleopterans, among which the presence of 5 Iberian endemism's stand out (Table 4).

Two habitats classified as priority in the context of the European Union were located in the humid areas of the Vega Alta of the Segura River (Table 5): habitat 7210: Calcareous bogs of *Cladiummariscus* and with *Caricondavallanae* species, whose associations 621012 Cladiomarisci-Caricetumhispidae O. Bolòs 1926 and 621123 Typho-Schoenoplectetumglauci Br.-Bl. andO. Bolòs 1958 present a wide distribution along these sections of the Segura riverbed and its main tributaries; habitat 7220*: Petrifying springs with tuff formation (*Cratoneurion)*, constituted by the association 622027 *Tracheliocauruleae-Adiantetumcapilli-veneris* O. Bolòs 1957 [24,33].

Table 3. Threatened species in the Vega Alta of the Segura River.

CommonName	Scientific Name	Red Books of Spain	Spanish Catalogue of Species in Danger of Extinction (RD131/2011)	Habitat Directive (92/43/CEE)	Birds Directive (2009/147/CE)
		Fishes			
Chub	*Squaliuspyrenaicus*			A.II	
Iberiannase	*Chondrostomapolylepis*			A.II	
		Mammals			
Cave bats	*Myniopterusschereibersii*		VU	A.II	
Long-fingeredbat	*Myotiscapaccinii*		EPE	A.II	
Lesser mouse-earedbat	*Myotisblythii*		VU	A.II	
Greater mouse-earedbat	*Myotismyotis*		VU	A.II	
		Birds			
Squacco Heron	*Ardeolaralloides*		VU		A.I
Western marshharrier	*Circusaeroginosus*	VU	VU		A.I
Montagu'sharrier	*Circuspygargus*	VU	VU		A.I
Western osprey	*Pandionhaliaetus*	EPCr	VU		A.I
Eurasian teal	*Anas crecca*	VU			
Commonreedbunting	*Emberizaschoeniclus*	VU			A.I
		Amphibians			
Beticmidwifetoad	*Alytesdickhilleni*	VU	VU		

Legend: A.I: Annex I; A.II: Annex II; EPCr: critically endangered; EPE: in danger of extinction; VU: vulnerable.**Source**: prepared from the information provided by the Directorate General for the Environment (2010) [33]; Doadrio (2002) [46]; and Madroñoet al.(2004) [47].

Table 4. Endemic and vulnerable aquatic beetles.

Species	Iberian endemism	Regional vulnerability
Agabusramblae	X	
Hydrochusnooreinus	X	High
Helophorusbrevipalpis		High
Newbrioporusbaeticus	X	
Ochthebiusdelgadoi	X	
Stictonectesepipleuricus	X	

Source: prepared from Sánchez-Fernández et al. (2004) [31] andGeneral Directorate of the Natural Environment (2015) [45].

Table 5. Habitats of priority interest in the European Union in the Vega Alta of the Segura River.

Code	Habitat
7210*	Calcareous bogs of *Cladiummariscus* and with *Caricondavallanae* species
7220*	Petrifying springs with tuff formation (*Cratoneurion*)

Source: own elaboration from Alcaráz et al. (2008) [24].

ii. Criterion 3: in the Vega Alta of the Segura River, in addition to the two habitats included in criterion 2, nine habitats associated with humid environments of Annex I of the Habitats Directive of the European Union were described with Global Assessment A [24,33]. They are as follows:
   (a) Habitat 1410. Mediterranean saline grasslands *(Juntaliamaritimi)* occupies 1.10 hectares and is distributed in narrow strips around the Segura riverbed and in brackish areas around the Cárcabo reservoir.
   (b) Habitat 3150. Natural eutrophic lakes and lagoons, with *Magnopotamion or Hydrocharition* vegetation (underwater grasslands), andan area of 20.18 hectares.
   (c) Habitat 3250. Mediterranean rivers of permanent flow with *Glauciumflavum*, with an extension of 2.35 hectares.
   (d) Habitat 3280. Mediterranean rivers of permanent flow of the Paspalo-Agrostidion with riparian plant curtains of *Salix and Populusalba*, which occupy a total of 2.26 hectares, and which colonize surfaces with frequent floods along the banks of rivers, streams, and irrigation canals.
   (e) Habitat 3290. Mediterranean rivers of intermittent flow of the *Paspalo-Agrostidion*. These are reed beds that develop in non-permanent waters.
   (f) Habitat 6420. Mediterranean hygrophilous herbaceous communities (reed beds), with an area of 60.88 hectares.
   (g) Habitat 6430. Hygrophilous eutrophic megaphorbs of the plain fringes and mountainous to alpine steeps, with a total area of 23.54 hectares.
   (h) Habitat 92AO. Gallery forests of *Salix alba* and *Populus alba* (poplars and willows), which develop in the upper and middle sections of the Segura river basin, with a layout in two parallel bands located on both sides of the riverbed, together occupying an expanse of 84.49 hectares. These formations are usually accompanied by elms, ash trees, willows, and Magnoliopsida, in addition to other shrub species, such as oleanders.
   (i) Habitat 92DO. Thermomediterranean riparian thickets and galleries *(Nerio-Tamaricetea*and*Securinegiontinctoriae)* (Magnoliopsidaand oleanders), with a vegetation formed mainly by poplars, tars, Magnoliopsida, and oleanders, which are distributed along the riverbeds and occupy an area of 128.5 hectares.

iii. Cultural values: associated with the river terraces of the Segura River and the Mundo River are rice fields, which have been cultivated in a traditional way since the 18th century. It is a type of humid area of an artificial nature, both due to its origin and its use, which is characterized by the significant returns from irrigation that periodically and naturally recharge the underlying aquifer. They constitute shallow aquatic ecosystems (15–20 cm), which have a dry phase during winter and another wet phase that lasts from April or May to November or December [33]. Rice cultivation occupied a potential area of 2463 hectares at the beginning of the 20th century, which was made official and protected by the Royal Decree of February 1, 1908, the date on which the delimitation of the CotoArrocero (Rice farms) located in the municipal terms of Hellín (Castilla-La Mancha), Moratalla, and Calasparra (Region of Murcia), with the latter municipality having a larger area (approximately 1000 hectares), roots, and tradition (Sánchez-Lorente, 1999). In 1986, the Protected Designation of Origin (PDO) was approved for the Bomba varieties (cultivated since the 19th century) and BalillaXSollana (hybrid variety obtained in 1948). This certificate guarantees the quality of the product and its origin, so that Calasparra rice became the first to have this endorsement in the world, with a Regulatory Council that must ensure compliance with the regulations during the process and methods cultivation that ensure its quality. There are two main factors that influence the origin, uniqueness,and quality of the product [48,49], and that make it of cultural value closely interrelated with the natural values of the environment.

(a) The rice fields are located in small valleys, with slopes that make mechanization difficult, located at an average altitude of 450 m above sea level, in a fertile valley surrounded by mountains and fed by the clean moving waters of the Segura River, with a system of ditches and floodgates that take the water from the river and that generate a renewing current, flooding the rice field. This is met with a structure supported at different levels and plots separated by small boundaries. The excess water after irrigation returns to the main river.

(b) Use of traditional cultivation methods that, in part, are maintained over time: adaptation of the land, sowing, weeding, and harvesting of the produce. The sowing is done with seeds that have been previously hydrated, to prevent them from floating and can be spread over the flooded boxes, which have been previously conditioned and nourished. The cultivated varieties (Bomba and BalillaXSollana) are adapted to the special characteristics of this environment.

On the other hand, there is also another rich cultural heritage in the study area, characterized by the presence of traces of the first settlers of the Iberian southeast: cave paintings, tools remains, ceramics, and utensils located in the cave-chasm of La Serreta, known as "Abrigo de losMonigotes"or"Abrigo del Pozo", "caveand spring of las Enredaderas", "Abrigos del Laberinto", "Abrigo de las Escalerillas", "Cueva de losPucheros",or"Cueva del Arco"[33]. Finally, it is also necessary to mention the combinations of the heritage generated from the different uses of water, which have conceived an extensive network of ditches and dams, i.e., the presence of hydraulic heritage closely related to the culture of water, which in turn was once closely linked to the traditional uses of rice cultivation, with rice mills and other buildings associated with religious worship, which also constitute elements of cultural and ethnographic interest in the Vega Alta of the Segura River, such as the Sanctuary of Our Lady of Hope (place of pilgrimage), located in the town of Calasparra[50–52].

4. Discussion

According to Scott andJones [53], the classification of wetlands is extremely problematic, and the definition of the term wetland is a difficult and controversial starting point. Nonetheless, considerable effort has been made in developing national and regional wetland classifications, although the only attempt to establish a global system has been under the auspices of the Ramsar Convention [54]. The incorporation of a wetland to the Ramsar List requires meeting some of the requirements that demonstrate that it has natural values of international importance [17,19]. As a consequence of the requirement that countries that adhere to the Convention must include at least one wetland, the Ramsar List of Wetlands has become the most extensive network of protected areas on the planet and continues to grow every year, as it is a prestigious list that favors the interest and worldwide projection of wetlands that are included on the list [55–60], which predisposes populations and countries that have humid areas to study them to see if they meet the criteria in order to achieve their incorporation (as is the case of the study at hand).

However, the protection of a wetland within the framework of the Ramsar Convention should be the starting point for developing plans and strategies that generate the necessary instruments to guarantee its conservation and sustainable use, as well as the application of integrated wetland management policies [56,61,62]. In the case of the Vega Alta of the Segura River, it is necessary to integrate the management of natural wetlands, artificial wetlands, which make up structures of water regulation (reservoirs), and the different surrounding land uses, such as rice fields, which maintain extensive areas flooded with rotation systems and which preserve high natural values, compatible with agricultural and social or recreational use.

In Costa Rica, for example, there are several studies on different wetlands that conclude the relevance of these reservoirs for the maintenance of the ecological dynamics of

the surrounding territory, and how changes in land use in the areas adjacent to this protected wild areas generates alterations in this delicate ecosystems. Among others, the wetlands of the Térraba-Sierpe Delta [63–66], the high Andean wetlands of the Chirripó National Park [67], and the San Vito wetland [68] have been analyzed. Performing analyzes similar to those mentioned would be of great interest to complete the information of the wetland in this analyzed work.

South America has a large proportion of wetlands compared to other continents. While most of these wetlands remained in relatively good condition until a few decades ago, pressures from land use and climate change have threatened their integrity in recent years [69].

On the other hand, the wetlands of Saudi Arabia, located in a region with water stress, vulnerable to climate change and other global changes (changes in nearby land uses, for example), as in our case study, present significant challenges for long-term maintenance [70].

In India, the reasons for the loss of wetlands are urbanization, changes in land use, and pollution. There is no adequate regulatory framework for their conservation [71] and, in this sense, future research should also focus on the institutional factors that influence their condition and evolution. The same is happening in China, and some authors call for improvements in legislation and management systems for wetlands [72]. According to Hu et al. [73], the greatest loss of wetlands occurred in Asia, but the most serious situation currently resides in Europe.

We are seeing that numerous ecosystems of environmental, patrimonial, social, and economic interest, such as wetlands, are in decline, suffering the consequences of poor land use planning. Extensive restoration of these critical ecosystems is increasingly seen as critical to conserving biodiversity and stabilizing the Earth's climate [74]. Support to biodiversity, improving water quality, reducing floods, and sequestering carbon are key functions that are impacted when wetlands are lost or degraded.Restoration techniques are improving, although the recovery of lost biodiversity is challenged by invasive species, which thrive under disturbance and displace the natives [75]. The Ramsar Convention has helped many nations protect their wetlands, but effective wetland inventories need to be rigorously carried out.

5. Conclusions

The wetlands of the Vega Alta of the Segura River, which together have a surface area of more than 1500 hectares, joined together by the Segura Riverand its tributaries, meet three of the 10 criteria indicated by the Ramsar Convention to be classified, as a whole, as a wetland of international importance. The presence of 11 species of vertebrates have been classified in Spain as vulnerable or in danger of extinction, two endemic aquatic beetles, another two habitats considered as a priority in the European Union, and another nine habitats associated with humid environments that are included in Annex I of the Habitats Directive are considered important to maintaining the high biological diversity. This is also true for relevant cultural representations related to the existence of the wetland.

Finally, the cultural values associated with the ecological functioning of the Segura River must also be taken into consideration, such as the traditional cultivation of rice introduced in the 18th century, of great quality, uniqueness, and originality, together with other manifestations of traditional uses of water and assets of cultural interest, with relevant paleontological and archaeological sites, as well as buildings closely associated with religious worship.

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