PLURAL VALUES AND PERCEPTIONS FOR AN INVASIVE ALIEN SPECIES: THE CASE OF ROSE-RINGED PARAKEETS (*Psittacula krameri*) IN TÜRKİYE

by

Saadet Müge Ülkü

B.A. in International Relations, Bilkent University, 2015

M.Sc. in International Politics, KU Leuven, 2020

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APPROVED BY:

Assoc. Prof. Dr. Pınar Ertör Akyazı . . . . . .
Thesis Advisor

Assist. Prof. Dr. Çağlar Akçay . . . . . .

Prof. Dr. Raşit Bilgin . . . . . .

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ABSTRACT

PLURAL VALUES AND PERCEPTIONS FOR AN INVASIVE ALIEN SPECIES: THE CASE OF ROSE-RINGED PARAKEETS (*Psittacula krameri*) IN TÜRKİYE

Rose-ringed parakeets (*Psittacula krameri*) – RRP – are considered one of the most invasive species at a global scale, but despite their negative impacts over native ecosystems, efforts to control their populations are regularly met with strong public backlash across many countries. In 2022, preliminary attempts to regulate RRP populations in Türkiye were met with a similar resistance. The present study attempted to illuminate the underlying causes of these clashes. 160 face-to-face surveys were conducted with park visitors in select urban green spaces in İstanbul and Ankara to (1) determine prominence of different environmental values (intrinsic, instrumental, relational and ecological values), (2) examine the level of awareness, as well as the perceptions and attitudes towards RRP, and (3) offer insight on how these are shaped by socioeconomic factors and ecological knowledge. The findings showed that relational value – which highlights emotional, cultural, and inter-generational components in human-nature relations – dominantly informs the participants' perceptions and attitudes towards nature. Findings also revealed that the park visitors in İstanbul and Ankara have overwhelmingly positive perceptions and attitudes towards RRP and are mostly against any interventions to the species' continued existence. Our findings confirm existing studies on charismatic invasive alien species, where attitudes remain positive as long as there is no perceived trade-off for humans (such as noise pollution). We also found some tentative evidence that higher ecological awareness and knowledge reduces support towards the species, which signals that successful awareness raising campaigns may lead to behavioural change, but further research is needed to confirm this.

ÖZET

İSTİLACI YABANCI TÜRLERDE ÇOKLU DEĞERLER VE ALGILAR: TÜRKİYE'DE YEŞİL PAPAĞANLAR (*Psittacula krameri*) ÖRNEĞİ

Yeşil papağanlar (*Psittacula krameri*) küresel ölçekte en istilacı türlerden biri olarak kabul edilmektedir, ancak yerel ekosistemler üzerindeki olumsuz etkilerine rağmen, popülasyonlarını kontrol etme çabaları birçok ülkede sık sık güçlü bir kamuoyu tepkisiyle karşılanmaktadır. 2022'de Türkiye'de yeşil papağan popülasyonlarını düzenlemeye yönelik ön girişimler benzer şekilde güçlü bir dirençle karşılanmıştır. Bu çalışma, bu çatışmaların altında yatan nedenleri aydınlatmayı hedeflemiştir. Araştırma kapsamında İstanbul ve Ankara'daki seçili kentsel yeşil alanlarda park ziyaretçileriyle 160 yüz yüze anket gerçekleştirilerek park ziyaretçilerinde (1) farklı çevresel değerlerin (araçsal, içsel, ilişkisel ve ekolojik değerler) hangi ağırlıklarda görüldüğünün belirlenmesi, (2) yeşil papağanlar hakkında farkındalık düzeyinin ve türe yönelik algı ve tutumların incelenmesi ve (3) bunların sosyoekonomik faktörler ve ekolojik farkındalık tarafından nasıl şekillendiğine dair içgörü sunmayı amaçlamıştır. Bulgular, insan-doğa ilişkilerinde duygusal, kültürel ve nesiller arası bileşenleri vurgulayan ilişkisel değerin katılımcıların doğaya yönelik tutumlarını baskın bir şekilde şekillendirdiğini göstermiştir. Ayrıca, İstanbul ve Ankara'daki park ziyaretçilerinin yeşil papağanlar hakkında güçlü bir olumlu tutuma sahip olduğunu ve türün ülkedeki varlığını sürdürmesine yönelik herhangi bir müdahaleye büyük ölçüde karşı olduklarını ortaya koymuştur. Bulgularımız, insanlar tarafında olumsuz bir etki (gürültü kirliliği gibi) olmadığı sürece karizmatik istilacı yabancı türlere tutumların olumlu kaldığı üzerine yapılan önceki çalışmaları desteklemektedir. Çalışma kapsamında ayrıca daha yüksek ekolojik farkındalık ve bilginin türlere daha az destek sağladığına dair bazı ön kanıtlar bulunmuştur. Bu, başarılı farkındalık yaratma kampanyaları ile gerekli davranış değişikliklerinin sağlanabileceğine işaret ediyor olabilir, ancak bu konuda daha fazla araştırma daha kesin bilgi sunacaktır.

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LIST OF ABBREVIATIONS

Abbreviation	Explanation
ES	Ecosystem services
EU	European Union
IAS	Invasive Alien Species
IPBES	Intergovernmental Science-policy Platform on Biodiversity and Ecosystem Services
IUCN	International Union for the Conservation of Nature
NCP	Nature's Contribution to People
NGO	Non-governmental organization
RRP	Rose – ringed parakeet (Ring – necked parakeet)
TERIAS	"Addressing of Invasive Alien Species Threats in Terrestrial Areas and Inland Waters in Türkiye" Project

1. INTRODUCTION

In 2022, an international EU-Türkiye partnership project under the name of "Addressing of invasive alien species threats in terrestrial areas and inland waters in Türkiye" – or TERIAS for short – selected six non-native species in Türkiye to study their populations long term, understand their behaviours and population growths and use the findings to develop strategies and policies for the management of their populations. These species were some of the most prominent invasive alien species (IAS) in the country, and one of these species were rose – ringed parakeets (RRP), or "yeşil papağan" in Turkish. [1]

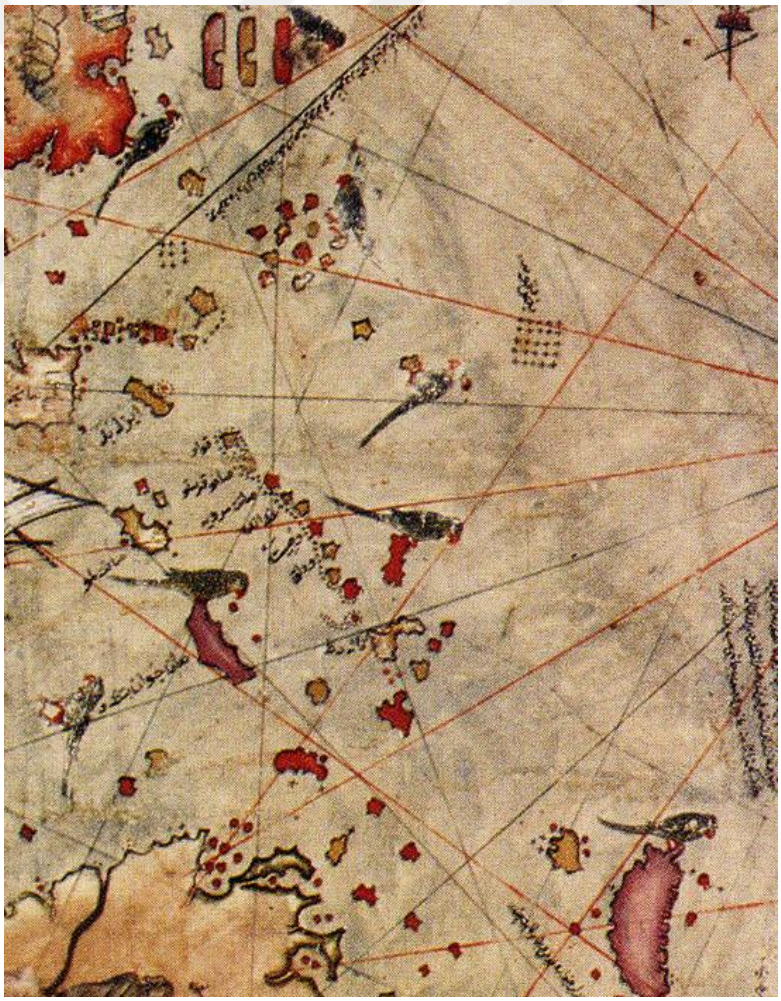


Figure 1.1. Rose-ringed parakeets on the presumed depiction of Central America on Piri Reis' map dated to 1513 (Wikimedia Commons, 2017)

[1] The other species included (1) the Prussian carp (*Carassius gibelio*), (2) nutria (*Myocastor coypus*), (3) bur-cucumber (*Sicyos angulatus*), (4) Eastern mosquitofish (*Gambusia holbrooki*) and (5) red-eared slider (*Trachemys scripta elegans*).

The months following the first unveiling of the potential plans for the control of RRPs was marked with a swift, heated, loud and widespread backlash. Across the social media, the responses varied from support to full out outcry as everyone from NGOs to casual citizens hotly debated RRPs continuing existence in the country. On the support side, some of the most prominent arguments were pointing out (1) RRPs inherent right to live, (2) their status as unwitting victims and subsequent survivors of trafficking as pets, (3) admiration for their persistence to survive despite being likely abandoned by (or escaping) their owners, and (4) their well-documented history in the country where they embellished ancient jewellery and mosaics, Ottoman paintings and even the maps of famed Ottoman cartographer and sailor Piri Reis.[2]



Figure 1.2. Depiction of a rose-ringed parakeet (or Alexandrine parakeet) in mosaic dating to 200 BC, discovered in Türkiye in 19th century (Bozoğlu, 2024)

A large faction of the debate, led by conservation experts declared that neither the scope of the research nor the data on the species were anywhere near close to conclude the species have any negative impact on the local ecosystems to begin with. Against these arguments were voices pointing out the potential long term ecological effects of leaving IAS unchecked, noting that RRPs (1) have been noted to be extremely disruptive and costly to agricultural production once they establish themselves to rural areas, and that they (2) take over shelter and food sources from local species which are already struggling, (3) introduce unknown pathogens and parasites in their adopted ecosystems, and (4) create debilitating noise pollution for local residents in urban settings in countries where they are recognized as invasive. Nevertheless, the former group proved dominant, with the

[2] It is important here to note that records of RRP through Ottoman manuscripts and other sources do not necessarily clarify if they existed only as pets but as a part of (urban) ecosystem. However, various sources records parakeets as prized pets (and delicacies) for rich families in Anatolia and its surrounding region since 4th century B.C.

resulting signature campaign - "*Say 'Stop' to the Murder of Rose-ringed Parakeets!*" [3] – amassing more than 64,000 signatures in 2 months; halting any actions against the species for the time being.

This was only an extension of several other examples in Europe and across the world, where rose-ringed parakeets have inspired fierce support in locals – at least in urban settings. The vigilant protectiveness towards the species persists even with research and experience on IAS and RRP are clear on the threats they bring. This period of resistance in Türkiye was particularly notable as the clashes emerged beyond the more readily apparent lines like public vs. conservation experts or across demographic groups but have manifested with a significant fragmentation within and across various stakeholders, including among conservation experts. As a consequence, we recognized that demographics fall short on explaining how these divergence in perceptions and attitudes towards the species emerged. Our expectation is that different factions and arguments during these debates may have been informed by much more complex systems of thoughts, principles, standards of behaviour and priorities in individual's minds – or environmental values, in short. As conceptualized and established by a multidisciplinary literature and more recently Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), environmental values, and in particular value plurality, may indeed be the main drivers beneath the varying attitudes and perceptions towards RRP.

[3] The signature campaign is available here: https://www.change.org/p/ye%C5%9Fil-papa%C4%9Fanlar%C4%B1n-%C3%B6ld%C3%BCr%C3%BClmesine-dur-de-dkmpistanbul-izmirdkmp-dkmpankara-tctarim



Figure 1.3. Rose-ringed Parakeets in "Book of Felicity" (Matali' al-Saadet), painted by Nakkaş Osman and commissioned by Sultan Murad III in 16th century, depicting a mystical story of the Conference of the Birds (Mantiq al-tayr) (al-Su'udi, 1582).

With this study, I aimed to understand how these divergence of opinions towards RRPs emerge and what drives them. The research questions that I tried to answer in this study were therefore as follows:

1. What are the general perceptions and attitudes of the urban park visitors in Istanbul and Ankara towards RRPs?

2. How do socio-economic background, ecological knowledge and environmental values shape perceptions and attitudes towards RRP?

2. LITERATURE REVIEW

This study attempts to combine two distinct literatures - invasive alien species and environmental values – within a survey application. With this section, I aim to offer an introduction to each of these three topics and give a brief breakdown of their related literatures.

2.1. Invasive Alien Species: Definitions and Challenges

The IUCN defines IAS as "(…) animals, plants or other organisms that are introduced into places outside of their natural range, negatively impacting native biodiversity, ecosystem services or human wellbeing" (IUCN, 2021, p. 1). While inter-ecosystem species' exchange has always been a common and regular occurrence through natural processes like climate fluctuations or tectonic activity, these breaches have recently seen an unprecedented boom in number and scale – largely driven by anthropogenic activities such as international trade, travel, global maritime activities, and large-scale alterations on landscapes such as the Panama Canal (Vermeij, 1991).

The impact of IAS over introduced ecosystems are varied both in scale and scope. Generally, these can be summed up under four points:

1. **Competitive exclusion[4] and extinction:** Introduced species often create heightened competition for resources such as shelter and food, often over-competing against local populations – sometimes to the point of their extinction. For example, a well-recognized IAS, the Argentine ant (*Linepithema humile*), is known to displace native ants by being a much better competitor for food sources across all its introduced ranges (Holway, 1999; Human & Gordon, 1996; Mooney & Cleland, 2001).

   The success and scale of competitive exclusion in IAS is highly dependent on the characteristics of IAS themselves and their adopted ecosystems. For example, IAS are known to be significantly more destructive in island ecosystems, as the isolation of the local populations limits their exposure to a range of predators and predation practices. This causes

[4] Introduced in 1934 by Russian ecologist G. F. Gause, competitive exclusion principle argues that two species who have identical niches cannot coexist indefinitely – meaning one of the species will emerge as a superior competitor leading to the exclusion of the other (Kneitel, 2008).

local populations to possess very little evolutionary countermeasures against invasive predators (Reaser, et al., 2007). In the island of Guam, this evolutionary weakness has resulted in the decimation of the entire local bird population in the island when the brown tree snake *(Boiga irregularis*) was accidentally introduced over 70 years ago. Majority of the bird species simply nested on the ground as the island was previously absent of any immediate predators (Boback, Nafus, Adams, & Reed, 2022).

2. **Introduction of pathogens and parasites:** Introduction of non-native populations to ecosystems can always be expected to be accompanied by the introduction of non-native pathogens and parasites. These are regularly disproportionately more destructive over local populations who often lack the immunity and other biological protections against them, often species simply cannot preserve enough members to evolve necessary immune resistance to survive (Chinchio, et al., 2020).

3. **Ecosystem alterations:** Many IAS establish their populations in new ecosystems through introduction of new nesting, feeding, breeding etc. behaviours. These can alter them substantially to the detriment of local populations. This phenomenon is particularly well-documented in lake and river ecosystems, where non-native species can significantly degrade water quality through (1) decreasing water flow, (2) reducing production/transportation of nutrients, (3) over-feeding on plants that prevent erosion, and (4) creating more favourable conditions for the emergence of eutrophic conditions (Heller, 2020). For example, a number of trout subspecies have become IAS in various locations around the world due to introduction to water ecosystems as game, and they co-introduced a new feeding behaviour where they burrow into the waterbed and suspend waterbed soil. In larger numbers – which is often the case as trout species are particularly enthusiastic invaders and feeders – this often significantly degrades water permeability, subsequently altering conditions relied on by various local plant, fish, and microorganism populations (Pulatsu, et al., 2004). Similarly, the invasive nutria (*Myocastor coypus*) populations in Gala Lake National Park in Türkiye have "irreversibly affected bird nesting and breeding sites" as nutria seems to have developed a preference over water lily leaves in the region, which acts as the sole nesting site for select bird populations (Özkan B. , 2019, p. 705)

4. **Disruptions to socio-economic activities:** As one of the main drivers of ecosystem alteration and biodiversity loss, IAS can also often impact human activities that depend on these nature services. For example, invasive monk parakeet (*Myiopsitta monachus*) populations in

Barcelona have resulted in around 30% decrease in corn, plum and pear output through feeding – a rate that is often above producers' profit range, effectively driving them out of business (ParrotNET, 2019).

2.1.1. Management Methods

Despite the scale of threat, the options for the management of IAS are rather limited both in number and success. All in all, the most successful management of IAS is prevention. Once the window for prevention is closed, several management options can be employed for mitigating the worst effects.

Management methods for IAS can be divided into two groups: (1) prevention (pre-establishment) and (2) management (post-establishment).

Pre-establishment:

Preventing the introduction of alien species relies largely on measures at the government and individual level. At the government level, ban on live animal trade – both for commercial use [5] and for companionship as pets is critical for the prevention of IAS introduction (Diederich, Nehls, Beusekom, & Reise, 2005). Better regulation and monitoring in urban and wild ecosystems, preventative measures for detected channels of invasion and rapid response if/when IAS occur are also crucial for long-term protection. Case – specific solutions and measures are also available at national/local levels. For example, shoe cleaning stations have been installed in several forests in New Zealand to prevent transportation of invasive spores that result in a fungus like disease on the native Kauri trees (*Agathis australis*) and enjoys a 98% compliance from visitors (MW Design, n.d.; New Zealand Department of Conservation, Office of the Minister of Conservation, 2018; RNZ, 2017).

Significant responsibility also falls on governments for awareness raising for the prevention of deliberate introductions by individuals. For example, a number of ongoing, persistent plant invasions are a direct result of deliberate human introductions due to aesthetic concerns, such as garden plants, or for food production (Hulme, 2020). Similarly, sport fishing is regularly supported by introduction

[5] For example, the Pacific oyster (*Crassostrea gigas*) was introduced by local fisheries to European seas as an alternative to declining numbers of the European oyster (*Ostrea edulis*) and has since dispersed and overtaken various locations. (Diederich, Nehls, Beusekom, & Reise, 2005)

of non-native species in lakes and other inland water bodies and have led to several invasions across the world (Chick, Gibson-Reinemer, Soeken-Gittinger, & Casper, 2020; Dextrase & Mandrak, 2006)

Post-establishment:

Once the species have been introduced, the government and the relevant public and non-governmental institutions generally have a small window of opportunity to prevent individual members from establishing into reproducing colonies. Once the populations have begun successfully reproducing, measures to prevent the unwanted impacts are very limited without also impacting local populations.

Management of IAS post-establishment can be grouped under four methods (Simberloff, 2013):

1. **Biological control methods** refer to the use of natural predators for the control of prey populations. For example, several ladybug species (such as *Harmonia axyridis* and *Adalia bipunctata*) are selectively bred to be flightless and they are used as an alternative to chemical pesticides for aphids (Ferran, Giuge, Tourniaire, Gambier, & Fournier, 1998). However, these have achieved modest application as viable application opportunities are limited and any new introduction also carries an inherent risk of becoming invasive itself (Roy, Brown, & Majerus, 2006).

2. **Chemical control methods** refer to the use of pesticides, herbicides, fungicides, and insecticides. While very effective, these impact the ecosystem as a whole, can have a very long lifespan in the applied areas and are similarly non-viable for majority of the cases.

3. **Manual control methods** refer to various physical intervention efforts ranging from hand-pulling, digging, manual destruction of plants, nests, eggs etc., as well as use of agricultural machinery for invasive plants.

4. **Cultural control methods** refer to initiatives for awareness raising for wider cooperation across the government and non-government institutions, as well as public, to combat IAS. These include awareness raising to recruit local populations for the detection and removal of invasive plants and animals.



Figure 2.1. Example of a cultural control method, awareness raising and early detection campaigns in Gülhane Park, İstanbul (Ministry of Agriculture and Forestry, 2022)

IAS management has no silver bullets, nor a one-size-fits-all solution. Each invasion has to be assessed for the best options depending on the invasive species in question, scope of the area impacted, the potential risks to the local populations, socio-economic activities, etc.

For mammal and avian species, the most prevalent method is manual control, most commonly through culling. Culling refers to removal of species through extermination via methods such as traps and hunting. It has also been a central method in efforts to curb rose-ringed parakeet populations (Strubbe & Matthysen, 2020). The strength of culling lies in its ability to limit its impact to targeted species and to offer a much more controllable and impactful option compared to other methods. However, it also comes with three significant problems. Firstly, despite targeted application, culling can carry results beyond the elimination of the targeted species. For example, the invasive camel

species in Australia, the dromedary (*Camelus dromedarius*), is often culled via gunfire from helicopters, but conservationists often have no way of removing the felled camel bodies. Their impact over time over the ecosystem, such as questions about sanitation in water sources, potential destabilizing effects by booming decomposer and detritivore populations that would feed on the felled bodies etc. are largely unstudied (Gibbs, Atchison, & Macfarlane, 2015). Secondly, culling remains a highly controversial topic, especially when the species in question is perceived to be "charismatic".[6] The negative public stance and compelling ethical concerns often nullifies culling as a viable option within participatory decision-making systems. Thirdly, the success of culling is heavily dependent on the characteristics of the invasion cases. Successful culling applications have historically been limited to islands where isolation and limited area size allowed much better control over the targeted species' populations and kept the costs limited. On mainland invasions, cost effectiveness becomes a problem almost without exception as the larger area increases the time required, and consequently the cost, and there is a perpetual risk of recolonisation from surrounding areas (Robertson, et al., 2017).

In invasions outside of island ecosystems, once a colony has been established, alternative methods such as containment of species in one area (for example controlling population movements to urban green spaces and preventing rural establishment) emerges as a more viable and cost-effective option. However, practical applications of such methods are unconvincing, potentially highly costly and have so remained far from offering a viable alternative.

The question of how to prevent, manage and mitigate IAS is also increasingly recognized as much of a social issue as it is a scientific one (Luna, Edelaar, & Shwartz, 2019; Reaser, 2001; Verbrugge, Born, & Lenders, 2013). The perceptions and values adopted by the general public is often influenced by a variety of social, cultural, and economic contexts, and can play a significant role in forming the political commitment required to address IAS as a both conservation and policy challenge (García-Llorente, et al., 2011; Shackleton, et al., 2019). Understanding these diverse, plural values is critical for understanding the main drivers of environmental decision-making for the prevention of invasions and success of management policies. It is also critical for identifying potential cooperation and trade-off areas across stakeholders, and for offering channels for wider

[6] The term "charismatic" was first introduced to conservation in late 1990s and largely refers to species that inspire sympathy and support through widespread popular appeal due to appearance, behaviour etc. (Ducarme, Luque, & Courchamp, 2013). They are often used as conservation "representatives" to drive interest and support to conservation efforts (Heywood & Watson, 1995). Well-known examples include giant pandas (*Ailuropoda melanoleuca*), Bengal tiger (*Panthera tigris tigris*) and Asian elephant (*Elephas maximus*). However, support and interest in "charismatic species" can also work against conservation efforts, as is often the case with IAS where management methods can incite strong public opposition.

representation, which could allow incorporation of alternative management options, such as citizen science and , indigenous knowledge (García-Llorente, Martín-López, José A. González, & Montes, 2008)

2.2. Rose-ringed Parakeets (*Psittacula krameri*)

Rose-ringed parakeet (*Psittacula krameri*) [7] – also known as ring-necked parakeet – is a medium sized bird whose native habitat stretches from parts of North Africa to Southeast Asia, largely within the borders of the Indian subcontinent (Cornell Lab of Ornithology, n.d.). The species are herbivorous, enjoy a wide palate and are highly adaptable to both colder climates and different feedstock – quickly switching their diet to whichever food source is more abundant in their adopted homes depending on climate (Strubbe & Matthysen, 2020). Rose-ringed parakeets have a lifespan of about 30 years and are quick to pair off and multiply if the food is abundant.

Rose-ringed parakeets are one of the most invasive species worldwide (Shivambu, Shivambu, & Downs, 2022). Flocks of tens of thousands live across the European Union and the UK, with some of them doubling in numbers every few years. The population in Israel alone has surpassed 10,000 members, largely with the aid of favourable climate and extensive availability of food, as the flocks have already descended on agricultural fields (ParrotNET, 2019). Rose-ringed parakeets as IAS often have significant economic and ecological impacts in their adopted homes, particularly over agricultural production. For example, in Spain, they have wiped out the greater noctule bat (*Nyctalus lasiopterus*) populations, where they were under protection as threatened species (Giuntini, et al., 2022) (Hernández-Brito, Carrete, Ibáñez, Juste, & Tella, 2018)

Eradication and control of rose-ringed parakeets requires intensive and costly effort and is often subject to public controversy due to lethal control methods. These have often caused eradication efforts to end up operating in an on-and-off manner, leading to booms in populations in the off periods and reversing any progress that may have been achieved (Menchetti, Mori, & Angelici, 2015). Extensive eradication efforts have been undertaken across North America, Europe, and Oceania with limited success, with more successful applications being recorded in islands. In 2019, Seychelles announced full eradication from rose-ringed parakeets after 8 years of continuous effort and removing

[7] It is important here to quickly note that a central scientific hub and publisher in ornithology – BirdLife – has decided to use an alternative scientific name for the rose-ringed parakeets as "*Alexandrinus krameri*" in its databases and publications in 2020. This has not yet been updated en masse and "*Psittacula krameri*" remains the commonly used scientific name for the species.

around 500 members from the island (Karapetyan, 2019). Canary Islands used a combination of trapping and culling efforts between 2015 to 2018 to curb flock growth, neutralizing 175 members in total – virtually eradicating invasion completely (Saavedra & Medina, 2020). Despite the success, the timeframe and the number of members culled highlight the high perseverance of established flocks even within an isolated area. Larger attempts have shown more limited success. In Hawai'i around 6,000 rose-ringed parakeets were culled from an estimated 10,512 members in 30 days over a year. However, researchers note here that the culling effort was undertaken during the COVID-19 restrictions and limited public awareness and lack of public exposure allowed comparatively higher freedom. Similar attempts at another island, Britain, came to abrupt end due to public outcry (Crowley, Hinchliffe, & McDonald, 2019; Mori, Onorati, & Giuntini, 2020)

In Türkiye, rose-ringed parakeets were first recorded in Ankara in 1975 (Karakaş, 2023). So far, the species has been recorded in almost 30 cities, with the latest new recording of new arrival being Diyarbakır (Karakaş, 2023). Since then, it has established 6 breeding populations in İstanbul, Ankara, İzmir, Yalova, Antalya and Şanlıurfa (Özkan L. , 2023). Alongside Alexandrine parakeets (*Psittacula eupatria*), it is one of the only two parakeet species to establish breeding populations in the country. So far, information on the size and expansion of rose-ringed parakeets in Türkiye has been anecdotal. The estimates range from 1200 to 10,000 members (Bir Gün, 2020; Perktaş, 2022; Sputnik, 2020). The most comprehensive study on the expansion of the species was carried out in 2018, which put the total number of members to around 1,355 individuals – approximately 1000 of which was found in Istanbul (Hürriyet, 2018; Per, 2018; Yavuz, 2022). However, estimates that are more recent point to around 5000 members in İstanbul's green spaces alone (Gazete Duvar, 2022).

The ecological impact of the species has not been studied sufficiently in Türkiye. There have been some recordings of aggressive/defensive interactions with local species such as hooded crow (*Corvus cornix*), the jackdaw (*Coloeus monedula*), the Caucasian squirrel (*Sciurus anomalus*), and the yellow-legged gull (*Larus michahellis*) in competition for shelter, but enough research is not yet available to conclude that RRP should be classified as invasive in the country (Per, 2018). Nevertheless, there has already been some preliminary discussions on the management of the species in 2022, where several exploratory monitoring activities were carried out in nests in Ankara (Yavuz, 2022). Even at its infant state, these attempts to create a roadmap for the potential elimination of the species sparked widespread outcry in May-July 2022 period, with various NGOs, academics and experts partaking a public debate through various social media channels (Atlas, 2022; Hürriyet, 2022; Uçar, Yeşil papağanların yaşam hakkını savunuyoruz!, 2022). The resulting signature campaign, "*Say 'Stop' to the Murder of Rose-ringed Parakeets!*" ("*Yeşil Papağanların Öldürülmesine 'Dur' de!*"),

was kicked off on June 7, 2022. Addressed to the Ministry of Agriculture and Forestry, the General Directorate of Nature Conservation and National Parks (under the same ministry) and the Ministry of Environment and Urbanization (now Ministry of Environment, Urbanization and Climate Change), the campaign collected more than 64,000 signatures in just under two months and was concluded on September 7, 2022, apparently halting all actions against RRPs continued existence in the country (Deniz Kartalı, 2022; Gazete Duvar, 2022; Uçar, 2022). The call for pre-establishment methods to be adopted to control the species has so far been left unanswered. While the import of avian species was outlawed in 2021, the reproduction and sale of the species is regulated but lawful, leading to a booming and largely unregulated market within the country (Gazete Duvar, 2022).

2.3. Plural Values in Conservation

Values are difficult to define but enjoy an almost global use across multiple disciplines and fields ranging from physics to economics. In social sciences, it is generally defined as a set of fundamental beliefs and principles that decides what is "right" and "wrong", and guides attitudes and actions (Cambridge Dictionary, n.d.; Mintz, 2018). They are fundamental parts of decision-making – in small everyday activities all the way up to long term political attitudes – and therefore play a critical part in the decisions pertaining to ownership, use and access to ecosystems and ecosystem services.

Values have enjoyed a marked attention from the field of conservation, particularly in areas where there has been significant public controversy. IAS is undoubtedly one of the most prominent areas where controversies have been common and persistent and has predictably been subject to extensive research and debate.

2.3.1. The Rise of Value Research in Conservation

The study of values and valuation, in particular with regards to nature, was pioneered by academic debates in philosophy and was developed through centuries with further interest and input from fields like sociology and anthropology (Luque-Lora, Keane, Fisher, Holmes, & Sandbrook, 2022). Unlike a number of fields that were developed with the intention to support deliberative, participatory policy-making processes and politics, the study of values was adopted later into fields like social policy and economics. This real-life application required significant adaptation to capture the complex, fluid, and interconnected practice of values for real life players and has acted as the main driver for the rise of concepts like value pluralism and relational values from 1970s and onwards (Chan, Gould, & Pascual, 2018; Kenter & O'Connor, 2022). The multidisciplinary and theory-heavy background that made value studies initially unfit for real life applications also made even the basic

concepts – like the question of what we mean when we say "value" – subject to extensive debates. For example, in conservation the use of the word "value" may encompass two different meanings: (1) to express something that is good ("goodness"), and (2) to express something that is "right" or "wrong" based on moral principles ("rightness") (Luque-Lora, Keane, Fisher, Holmes, & Sandbrook, 2022). To further complicate the process, these definitions can often correspond with different environmental values, some of which are often seen contradictory to one another. The value of biodiversity can lie in both its "goodness/usefulness" (instrumental value) and "rightness" (intrinsic value).

The terms *instrumental value* and *intrinsic value* were coined in 1978 by sociologist Max Weber, but arguments on the intrinsic value of nature and insistence upon its protection dated well before in the conservation movement (Weber, 1978). For much of its history, the conservation movement was deeply rooted in intrinsic valuation and saw humans and development as an antithesis of nature (Mace, 2014). From 1960s and onwards several societal shifts colluded in the evolution of modern conservation debates. The period was marked by a boom in visibility of human actions over nature (where biodiversity loss and deforestation became mainstream debates), saw a strong rise in pro-environmental attitudes [8], several civil rights movements and decolonisation efforts across the world – all of which have shaped and remained staple parts of conservation and other related studies.

From 1960s to late 1980s, the predominant conservation arguments were highlighting issues like biodiversity loss, pollution and overexploitation and called for strong protective response. For the Traditional Conservation Movement, no reconciliation was possible between human activities and nature and the supporters expected the state to play a central role for its protection via various means such as strict protective measures and establishment of nature protection areas. From the 1970s onwards, efforts to better understand and conceptualize how we value nature led to the conception of "Ecosystem Services" (ES) which played a foundational role in the emergence of opposite conservation movement in the following century. Defined as "outputs, conditions and processes of natural systems that directly or indirectly benefit humans or enhance social welfare", ES offered a shift away towards a more extractivist, a more anthropogenic and a more instrumentalist thinking of nature and its relation to humans (Gómez-Baggethun, Groot, Lomas, & Montes, 2010; Johnston, 2018).

[8] Pro-environmental behaviour is defined as behaviours that either have little harmful impact on the environment or benefit the environment (Steg & Vlek, 2009).

Building upon this, the 1990s saw the rise of a new understanding of human – nature relations. The "New Conservation Movement" argued that mutual win is possible. This period saw the first shifts in beliefs on where humans stand vis-à-vis nature. There was a general recognition that humans – and all their economic activities – were possible through services and resources provided by nature and that humans do not exist removed from a pristine, untouched ideal nature. This brought in a new wave of understanding and visibility of the economic costs of mismanaging environmental resources (Mace, 2014). The New Conservation movement that came to dominate the environmental discussions through the 1990s and much of the early 2000s advocated for a conservation that highlighted the monetary value that humans can derive from nature and ecosystem services and had a strong instrumental valuation at its basis. Having offered a more politically and economically palatable alternative to Traditional Conservation, the movement gained widespread support from international organizations like the United Nations and the World Bank who supported its escalation to a global level with sustainable development and fully adopted the ideas introduced in relation to externalities, cost/benefit analysis of various environmental components like biodiversity and the idea that development is possible with better resource management and technology (Mace, 2014) Advocates argued that solutions under capitalism are possible through cooperation with corporations and market based solutions (Sandbrook, Fisher, Holmes, Luque-Lora, & Keane, 2019).

Fuelled by strong instrumental valuation, the New Conservation Movement was seen to be in direct opposition to the Traditional Conservation Movement. From its rise to prominence to late 2000s, the discussions on the future of conservation, what it should do, what tools it should use etc. was dominated by the dichotomy between Traditional Conservation Movement (embedded strongly in intrinsic valuation) and New Conservation Movement (embedded strongly in instrumental valuation). This debate - which persisted for decades and directly shaped long-term conservation plans, global finance decisions and government pledges under the Paris Agreement - meant that there was very little space for groups of people, indigenous and local communities and regions where neither argument appealed. Consequently, the non-monetary, non-anthropogenic values and solutions were undermined in the conservation discussions for decades. This was particularly disastrous for indigenous communities who have historically played an integral role in the health and longevity of their ecosystems. This not only excluded their centuries worth of local, time-tested solutions and practices outside of any policy discussions and conservation efforts, but also divorced them completely from the process for decades, even on some occasions leaving them homeless and voiceless (Elliott, 2020).

This strong socio-environmental relationship and diverse valuation practices were further evidenced across diverse fields, bolstered by the rise of pro-environmental values in the 1970s, several civil rights movements for gender, race, and identity – based equality, a wave of decolonisation effort that swept the Global South. The subsequent rise of fields such as gender studies, race studies, neo-colonialism and environmental justice studies introduced myriads of values to the discussion which had been whittled down to an either/or decision.

Significant effort has been made to acknowledge and understand the diverse, plural values towards nature, how they coexist and combine with one another to create unique attitudes and re-introduce them back into conservation and decision-making (Pascual, et al., 2021). One of the earliest attempts to capture this was introduced in the late 1970s by Dunlap & Liere. "The New Environmental Paradigm" (NEP) was a Washington D.C. based survey that attempted to understand the values of conservationists (Dunlap & Liere, 1978). NEP was one of the first research on the field that acknowledged the shift towards non-anthropogenic valuation in conservation. Initially assessing conservationists' values pertaining to (1) limits to growth, (2) anti-anthropocentricism, (3) balance of nature, and (4) human domination, the survey was later updated as "New Ecological Paradigm" in the 1990s to include (5) eco crises, and (6) human exemptionalism as both topics gained relevance through the following two decades (Dunlap, Liere, Mertig, & Jones, 2002).

As one of the earliest survey applications in environmental values, NEP was particularly significant in its attempt to understand how and what demographic, political, economic characteristics indicated pro-environmental orientation in respondents. For example, the survey showed strong correlation with level of education, liberal political leanings, and age (with younger respondents scoring higher) with higher pro-environmental stance on conservation issues (Dunlap, Liere, Mertig, & Jones, 2002). This suggested that certain life experiences and circumstances determined the level of support in environmental issues, and therefore signalled a critical area of study as a large-scale shift in public attitudes and beliefs towards nature is critical in building public support and political momentum for combatting climate change (Luque-Lora, Keane, Fisher, Holmes, & Sandbrook, 2022). Over the years NEP was adapted and implemented in various countries on various topics (Blake, Guppy, & Urmetzer, 1997; Edgell & Nowell, 1989; Luna, Edelaar, & Shwartz, 2019; O'Connor, Bard, & Fisher, 2006).

Over the following decades interest in the research of complex processes through which environmental values and attitudes emerge and shape policies grew, and several concurrent attempts have been made. One of the more prominent ones was the conception of "Nature's Contribution to

People" (NCP) framework in IPBES – a global, multi-stakeholder effort by governments, academia and civil society to improve knowledge on biodiversity, ecosystems and their contribution to humans to help develop better policies (Díaz, et al., 2018). With NCP, the aim was not to challenge ES but build upon it to create a more inclusive understanding on human-nature relations by incorporating social, cultural etc. issues and pluralistic and diverse values that shape human-nature interactions (Dean, Rivera-Ferre, Rosas-Casals, & Lopez-i-Gelats, 2021).

Another alternative framework that has been gaining traction recently in the literature is the *Life Network of Values*, introduced by Kenter and O'Connor in 2022. It builds upon the increasingly interdisciplinary study of values to determine four main values informing attitudes towards nature and environmental issues, roughly corresponding with three dominant values in the literature:

1. Living from (instrumental value): the value of nature as means that contribute directly to the well-being of people
2. Living with (intrinsic and ecological value): the value of nature independent to humans
3. Living in (relational value): the value of nature as a home to humans that contributes to personal, cultural identities, heritages etc.
4. Living as nature (relational and intrinsic value): the value of nature as a cycle of evolution where cultural and natural landscapes are inextricably linked

2.3.2. Environmental Values in More Depth

Over the decades the literature on environmental values has developed four main categories, which are prominently featured literature:

1. **Instrumental value**, which refers to the value attained to species in line with their usefulness/benefit to humans
2. **Intrinsic value**, which refers to the non-instrumental [9] and non-relational [10] value that is inherent to ecosystems (Kenter & O'Connor, 2022)
3. **Relational value**, which refers to the values assigned to ecosystems and their components through their association with humans and their belief systems (Chan, Gould, & Pascual, 2018), and

[9] Non-instrumental value refers to the value that lies in the objects themselves

[10] Non-relational value is value that is determined without a reference valuing agent, that is to say qualification of a value does not rely in any outside relationships

4. **Ecological value**, which refers to the value of species determined on their relation and contribution to the health, stability and functioning of the ecosystems they are a part of (Amador-Cruz, Figueroa-Rangel, Olvera-Vargas, & Mendoza, 2021)

It is important here to note that in practice, people's values do not necessarily fall under four independent value clusters but exist on a spectrum. For example, a global survey has found that many conservationists supported methods that corresponded to clashing values for different issues and areas – probably in line with their personal experience on solutions that are best fit to different challenges and areas (Sandbrook, Fisher, Holmes, Luque-Lora, & Keane, 2019).

Additionally, the distinction between these values is not always readily apparent, even for groups that actively interact with the terminology. For example, a 2020 study in Singapore with 501 university students has found that the difference between instrumental and relational values were "nearly indistinguishable" in practice (See, Shaikh, Jaung, & Carrasco, 2020). Further clarifications are offered in the next section.

Instrumental vs. Relational Value

The relational value has emerged in conjunction with efforts for improved indigenous representation in the Traditional Conservation vs. New Conservation Movements and acts as a bridging value between instrumental and intrinsic value.

Relational value implies that the value of nature is not determined upon consideration of its objective value removed from one's self, or a purely cost/benefit relationship, but also within the context of the relationship towards it – how we interact with it, how we interact with one another when we are involved with it (for example, what cultural, historical and religious importance does it carry for us personally or for a group of people), and how these contribute to our quest for achieving a meaningful and satisfying life (IPBES, 2022, p. 63; Knippenberg, Groot, Born, Knights, & Muraca, 2018; See, Shaikh, Jaung, & Carrasco, 2020). Unlike instrumental value, qualification for relational value derives itself from the subjective experience of interactions between stakeholders and nature, irrespective of any tangible, monetary gains.

Intrinsic vs. Relational Values

While relational value highlights the importance of non-instrumental relationships as ends to themselves, intrinsic value highlights the importance of objects as ends in themselves, independent of their relationship to people or the wider system they exist in. In this sense, intrinsic value does not have any reference point that qualifies the value of the object (non-instrumental and non-relational), while relational value determines the value of an object based on its perceived cultural, historical etc. importance of its relationship with a group of people (non-instrumental) (Kenter & O'Connor, 2022).

Ecological vs. Intrinsic Value

As one of the oldest value concepts dating back to late 1800s, ecological value is defined as the "biotic and abiotic components (that) provide for the maintenance of organisms" – and the qualification of value is determined on the grounds of the scale and ability of individual components that make up an ecosystem to contribute to the perseverance and longevity of the ecosystem as a whole (Amador-Cruz, Figueroa-Rangel, Olvera-Vargas, & Mendoza, 2021). In this sense, unlike intrinsic value which has no reference point for the qualification of value, here the reference point is the ecosystem as a whole. In comparison, in relational value the reference point was humans.

Table 2.1. Comparison of Different Values According to Environmental Value Literature

INTRINSIC VALUE	INSTRUMENTAL VALUE	RELATIONAL VALUE	ECOLOGICAL VALUE
Inherent value (No reference)	**Humans** (Monetary gains)	**Humans** (Cultural, religious, historical importance)	**Ecosystem as whole** (Role played in ecological integrity)
Non-instrumental	**Instrumental**	**Non-instrumental**	**Non-instrumental**
Non-relational	**Relational** (Between ecosystems and humans)	**Relational** (Between ecosystems and humans)	**Relational** (Between ecosystem players)

Further attempts are continuously being made to further improve inclusivity and complexity of value studies. At the centre of these efforts is the concept of "value plurality". IPBES defines value plurality as: "(…) the idea that there are several values which may be equally correct and fundamental, and yet in conflict with each other." (IPBES, n.d.). Essentially, this aims to acknowledge that the cultural traditions, knowledge systems, economic, political and sociocultural identities and the way in which people interact with and identify themselves vis-à-vis nature, vary greatly across different

cultures, languages and systems and this diversity manifests itself as a typology of diverse understandings, activities and contributions to their relationships and interactions with nature (IPBES, 2022).

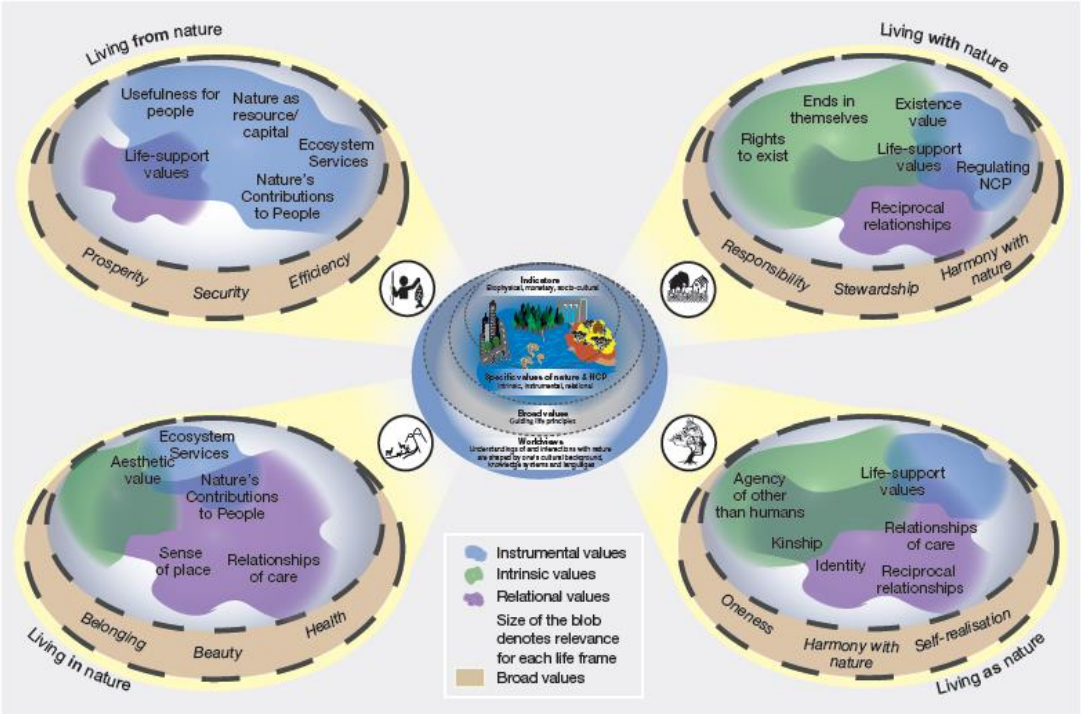


Figure 2.2. An example of the dispersion and fluidity between environmental values within IPBES framework (IPBES, 2022, p. 71)

IPBES' conceptualization of environmental values and value plurality has been gaining massive traction since its formal adoption in 2022 (Pascual, Balvanera, & Christie, 2023). The framework relies on existing conceptualizations of environmental values – specifically instrumental, intrinsic and relational – and attempts to incorporate the complexities borne from their real-life applications, such as acknowledging the strong cultural and religious links and their subsequent effect on the way people interact with nature, or the fact that individuals and groups can and often will carry contradictory values. It is important here to quickly note that the IPBES conceptualization of environmental values is considerably more fluid than the values we broke down above (see Figure 2.2 and Figure 2.3 for more in-depth information on how they play out). As such, ecological value is absorbed across all 3 values in the final IPBES value framework and is not measured independently as we did in our study. We, nevertheless, concluded that insight on the prevalence and distinction between values in the research will offer meaningful input for our study – particularly vis-à-vis other pro-environmental values – and kept all four of the distinctly defined values within the scope of our study.

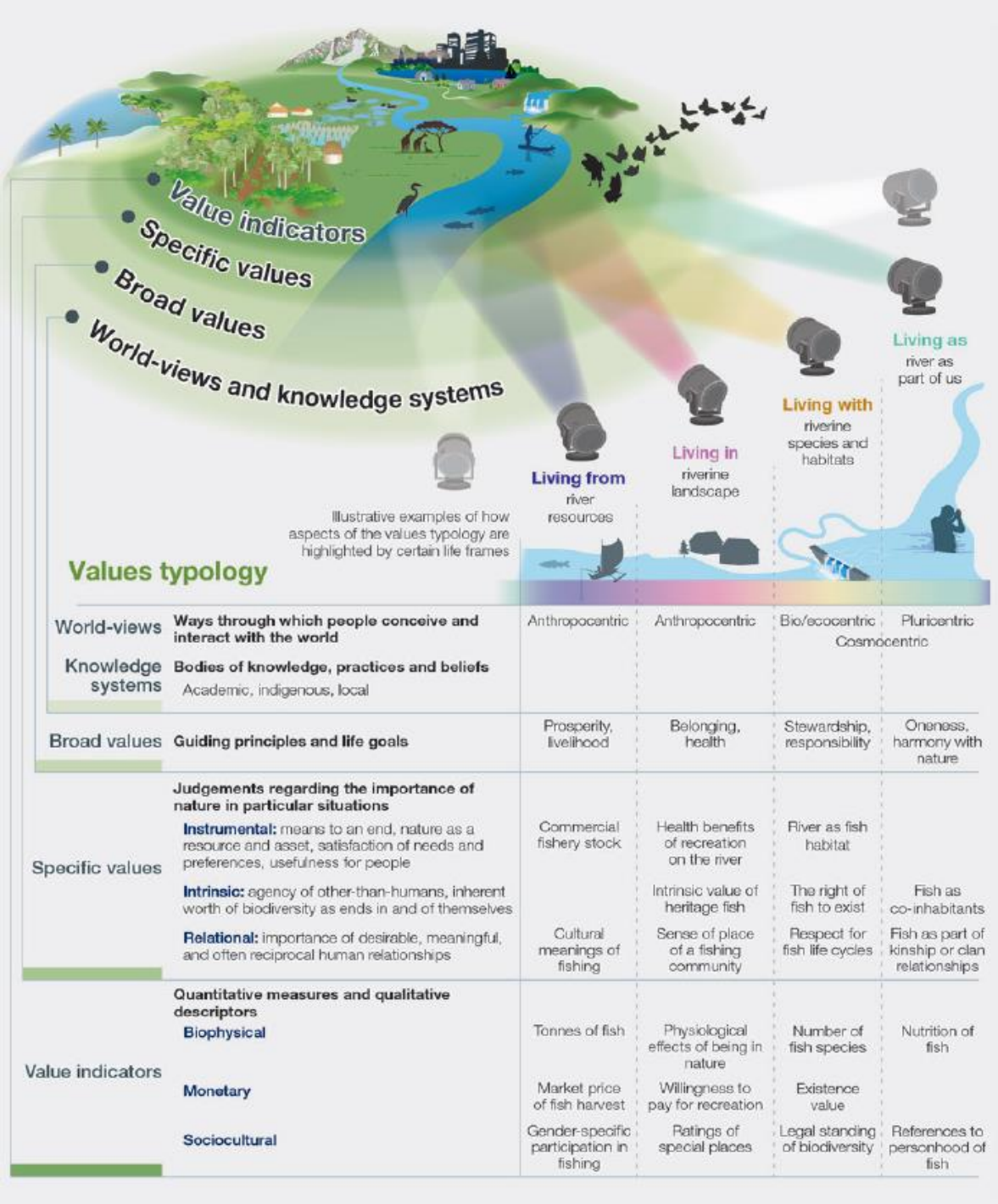


Figure 2. 3. IPBES on value plurality on nature: the key concepts and their interrelationship (IPBES, 2022, p. XXIII)

2.3.3. The Importance of Value Research

There are several arguments on why value research is relevant and plays a critical role for the future of conservation. There has been extensive evidence in the literature on the strong cultural and historical links embedded in the attitudes toward nature and its management – including IAS and its

management tools and methods (Coates, 2006; García-Llorente, Martín-López, José A. González, & Montes, 2008; Shackleton, et al., 2019). The study of values foremost offers insight on how individual decision-making emerges from the cultural, economic, social and political context they operate in, how these shape attitudes towards nature and its resources and how these amass into regional, national and cross-national differences in human-nature interactions. Value research can significantly boost our understanding on the motivations and justifications of different stakeholders in conservation issues. This could allow researchers and decision-makers to ascertain potential areas of cooperation and conflict. For example, value research can help explain why some IAS management options are met with strong opposition despite well-documented ecological benefits, anticipate if and where these opposition could emerge. These could help decision-makers and conservationists alike to develop timely, effective and collaborative responses to various ongoing challenges in conservation, climate change and environmental degradation, including IAS (Kenter & O'Connor, 2022).

A deeper understanding can also do the reverse: the study of values can help better assess the value plurality that exists across the landscape and make the converging and contrasting motivations of different stakeholders and help move the discussion towards more a constructive route by working with options that incurs less opposition. For example, conservationists and farmers may not share all values, but they might be sharing a strong emotional and spiritual connection with the local landscape. Value research can make these more apparent and help build a more inclusive and cooperative decision-making process by offering a common ground for dialogue (Kenter & O'Connor, 2022).

In line with this, another critical importance of value studies is that it allows us to discover value clusters that inform attitudes beyond individuals. Who decides what conservation actions should be taken is an inherently value-laden question. Throughout its modern history, the conservation movement has been predominantly shaped and implemented by white, Western, male experts and institutions, which means the global conservation movement is also unavoidably built around their values. This has massive implications for underrepresented groups in conservation – such as indigenous communities, women and developing countries – where previous studies have demonstrated a strong divergence in values from the dominant rhetoric (Miller & Jones, 2006). Lack of insight and therefore visibility of these value clusters not only severely restricts discussions on solutions and areas of cooperation, but it also raises very compelling questions on the legitimacy of conservation efforts at large around the world (Swiderska, et al., 2021). If mainstream conservation discussions omit the views and ideas from a significant portion of world's population, it renders them mute in decisions pertaining to their own lives and interactions with nature, as well as disregarding entire cache of tools and methods that are available for conservationists and decisionmakers as viable

options (Sandbrook, Fisher, Holmes, Luque-Lora, & Keane, 2019). For example, a significant number of research has found that women do not share the dominant, instrumentalist rhetoric on human-nature relations, meaning almost half of the world's population is not fairly represented in the conservation discussions or actions (Miller & Jones, 2006). This also raises very legitimate concerns over global conservation efforts being imposed on the rest of the world by Western conservationists, rather than being achieved through participatory decision-making processes – particularly in the Global South. Therefore, the study of values recognizes values that exist beyond prominent discussions, give voice and visibility to underrepresented values, and by doing so, also give a platform for alternative, often local, solutions in conservation problems.

Another area where value research carries critical importance is that global climate and conservation actions relies on strong shifts in existing values to achieve the necessary behavioural change in human-nature relations. Within the context of IAS, the research offers insight on the attitudes and behaviours that have led to humans emerging as the main drivers of the movement of species from one ecosystem to another and their actions dictating the occurrence and the intensity of invasions (IUCN, 2001). Awareness on the impact of these actions – and therefore perceptions and attitudes that shape their interactions with nature – is critical in the prevention of new invasions. For example, a number of widespread invasions – such as Japanese knotweed (*Fallopia japonica*) in New Zealand and fountain grass (*Pennisetum setaceum*) in the United States – were deliberate introductions via private gardens due to aesthetic pleasure. Both species have now become firmly established in their respective countries (in Arizona and southern California in the latter) (IUCN, 2001). Avoiding future invasions, as well as combatting ongoing invasions, requires significant awareness on the consequences of invasions over ecosystems and human activities and a shift towards new value clusters for better decision-making and extensive public cooperation with relevant government bodies and NGOs (Bremner & Park, 2007; Sharp, Larson, & Green, 2011). This is particularly important for IAS, where residents can often prefer and enjoy the existence of colourful, exotic, charismatic species, despite their invasiveness (Kourantidou, et al., 2022). Oftentimes strong shifts in values and attitudes may be necessary for building necessary collaborative efforts (Kalnicky, Brunson, & Beard, 2019; Sheail, 2003). For example, in New Zealand, a nation-wide call for the control and eradication of invasive plant species like Japanese knotweed relies on extensive public cooperation and therefore massive awareness raising activities on the impact of invasions over native ecosystems. The study of values allows to pinpoint the value clusters that enabled species' invasions and what new value clusters should awareness raising activities aim for to achieve necessary behavioural changes (Steg & Vlek, 2009).

2.4. Surveys on Environmental Values

The research of values is often undertaken using surveys. The researchers employ a vast selection of different survey methods that vary in form, scope, application, content and target groups in line with the subject and the aim of the research. Regardless of these variances, much of the literature has a clear focus on understanding environmental values apropos demographic variables. Some of the earliest survey applications, like Dunlap & Liere's NEP, have discovered a strong connection between pro-environmental attitude and three select variables: gender, age and level of education (1978). The relevance of these three variables have been iterated and reiterated in research across decades through different surveys and diverse cases, and all three are almost universally included in research mentioned below. Beyond these, there is significant flexibility in the literature on what demographic variables are included in the surveys – largely due to the fact that IAS are extremely context-specific. For example, while certain animals like coyotes carry economic or physical threats in their interactions with humans, this context is largely non-existent for other species such as invasive Eastern grey squirrel (*Sciurus carolinensis*). This means surveys are generally developed or adapted to each case's specific context (Stevenson-Holt & Sinclair, 2015).

Survey applications on environmental values offer a rich literature dating back to 1970s. The literature roughly centers around three main topics: (1) biodiversity conservation, (2) human – wildlife interactions, and (3) social acceptability of different conservation actions.

Surveys for biodiversity conservation were mainly concerned with understanding diverse valuations across different stakeholders, including incorporation of under-represented groups (such as local communities, indigenous populations, fishers etc.) to the mainstream discussions. Surveys here are targeted at determining and understanding attitudes and areas of potential cooperation (or contention) on topics such as protection areas (Allendorf, 2022; Cortés-Avizanda, Pereira, McKee, Ceballos, & Martín-López, 2022), including indigenous lands (Western, Nightingale, Mose, Sipitiek, & Kimiti, 2019), deforestation (Mikołajczak, et al., 2023), protection of endangered and other species (Niu, et al., 2019; Peterson, Chen, Essen, & Hansen, 2020), management of urban biodiversity (Bjerke & Østdahl, 2004), the impact of awareness raising over attitudes on species protection (Aiyadurai & Banerjee, 2020; Sponarski, Vaske, Bath, & Loeffler, 2016) etc. to help build more inclusive decision-making practices.

The human – wildlife interactions and conflicts make up a wide breadth of research in environmental values literature and attempts to understand how varying economic, social backgrounds inform individual attitudes in their interactions with nature and wildlife (Manfredo & Dayer, 2010). Here, the researchers examine a wide array of questions raised in conservation such as "conservation vs. economic interest" or "urban vs. rural attitudes" in topics such as rewilding [11] . A central topic of studies are species that pose threats to humans or anthropogenic activities. Given the increasingly more common interactions in suburban/urban areas as well as green spaces like natural parks, a significant portion of the literature focuses of coyotes (*Canis latrans*): the dominant urban and suburban values and attitudes (Buteau, Urbanek, & Dumas, 2022; Drake, et al., 2020; Jackman & Rutberg, 2015; Lukasik & Alexander, 2011; Sponarski, Vaske, & Bath, 2013), the impact of awareness raising on attitudes (Draheim, Rockwood, Guagnano, & Parsons, 2011; Sponarski, Vaske, Bath, & Loeffler, 2016) etc. Similar research has been carried out for other species such as foxes (*Vulpes vulpes*) (Nardi, Shaw, Brossard, & Drake, 2020), possums (*Pseudocheirus peregrinus*) (Hill, Carbery, & Deane, 2007), black bears (*Ursus americanus*) (Carlos, Bright, Teel, & Vaske, 2009), urban bees (*Hymenoptera: Apoidea*) (Sing, et al., 2016), white – tailed deer (*Odocoileus virginianus*) (Urbanek, Nielsen, Davenport, & Woodson, 2012), the spotted thick-knee (*Burhinus capensis*) (Josiah & Downs, 2022), feral dogs (Díaz, Simonetti, & Zorondo-Rodríguez, 2020) to name a few.

The social acceptability of different conservation measures focuses largely on how different values and valuation practices amass into different attitudes that feed into support or opposition to policy decisions and conservation practices. Here, majority of the literature focuses on areas where conflicts are common and persistent, such as rewilding efforts where there is tremendous variance in interests and values involved in stakeholders' decision-making processes. Examples of some of these research efforts include species like wolves (*Canis lupus*) (Breyne, Abildtrup, & Maréchal, 2021) and guanaco (*Lama guanicoe*) (Lindon & Root-Bernstein, 2015). This group also encompasses research on determining public perceptions regarding (potential) conservation measures (Gregory, et al., 2021), including control of species that carry (potential) harm beyond their interactions with humans, such as IAS, who make up a significant portion of the literature.

[11] Rewilding is roughly defined as restoration of species to their (native) habitats and restoring non-anthropological ecological processes to build self-regulating, complex ecosystems while reducing human control and pressures (Svenning, 2020).

2.5. Survey Studies on Invasive Alien Species

Value research on IAS generally combines all three of the research focuses mentioned above to varying degrees, but largely focuses on assessing various stakeholder's stance towards certain management methods. The literature is diverse and covers a number of topics such as (1) the role of values in attitudes towards specific species (Luna, Edelaar, & Shwartz, 2019), (2) acceptability of management methods for established colonies – such as eradication of Siberian chipmunks (*Eutamias sibiricus*) in Italy (Cerri, et al., 2020) or management options for red mangroves (*Rhizophora mangle*) in Hawai'i (Lewis, Granek, & Nielsen-Pincus, 2018) – and (3) the impact of previous experience with IAS on conservation attitudes – both on invasive animal species, like the common coquí (*Eleutherodactylus coqui*) in Hawai'i (Kalnicky, Brunson, & Beard, 2019) or rose-ringed parakeets (*Psittacula krameri*) in Italy (Mori, Onorati, & Giuntini, 2020), and, to an even bigger extent, on invasive plant species such as Chinese Windmill Palm (*Trachycarpus fortunei*) in Switzerland (Junge, Hunziker, Bauer, Arnberger, & Olschewski, 2019; Tonellotto, Fehr, Conedera, Hunziker, & Pezzatti, 2022), or in forests (Japelj, Veenvliet, Malovrh, Verlič, & Groot, 2019). A considerable portion of literature focuses also on the role of values in practice of IAS management (Nguyen, Eskelson, Meitner, & Murray, 2020), such as determination of priority points for minimizing both the impact over ecosystems and public opposition (Beaury, et al., 2019; Rockwell-Postel, Laginhas, & Bradley, 2020).

The scale and scope of RRP invasion around the world has made this species a popular topic for invasion studies, but sociopolitical side of the equation that makes these invasions a possibility in the first place has only just recently started gaining attention. Nevertheless, RRP remains one of the most clear and persistent examples of value clashes . Various populations across the UK and Europe often receive extensive support in urban areas as charismatic, exotic species and have continuously inspired significant public opposition to derail much of the conservation efforts several times (Crowley, Hinchliffe, & McDonald, 2019). Despite this, while there have been a number of survey applications assessing public values to invasive and local bird populations (Aiyadurai & Banerjee, 2020; Josiah & Downs, 2022), the specific case of the RRP has rarely been linked with plural values so far in the literature.

In line with other valuation surveys on avian species, much of the literature here relies on visual cues and content – such as using photographs to assess respondents' ability to recognize RRP among local biota and their previous interactions with the species etc. One such example is 2019 research carried out in Seville, Spain which built upon previous studies on pet bonding in children and offered

survey participants different sets of birds and asked them to make a choice on their preferred group to understand preferences towards local vs. introduced species (Luna, Edelaar, & Shwartz, 2019; Mori, Onorati, & Giuntini, 2020; Ribeiro, et al., 2021).

Another common method in the literature is a more traditional, question-based set up where participants are asked to choose to what degree they would assign positive (clean, pleasant, beautiful, friendly etc.) or negative (dirty, noisy, harmful etc.) adjectives to RRPs (Luna, Edelaar, & Shwartz, 2019; Pirzio-Biroli et al, 2024; Ribeiro, et al., 2021). This method was implemented in Portugal (Porto) and Italy (Rome, Palermo and Firenze) in 2020 and 2021 respectively, and UK in 2024 (Mori, Onorati, & Giuntini, 2020; Ribeiro, et al., 2021; Pirzio-Biroli et al, 2024). Despite almost identical applications and surveys (and presumed geographical and cultural proximity), the research output showed significant variance across all examples. While increased information on the negative effects of IAS was found to be positively correlated to more support for interventions in Spain and UK, in Porto, Italy attitudes were much more positive and the participants were much more tolerant and indulgent of the birds, even despite negative impacts like noise pollution. To mark how difficult it is to predict attitudes (and how erroneous it could be to make broad assumptions), an almost identical study in other Italian cities – Roma, Palermo and Firenze – found that noise pollution is the singular determinant of attitudes towards RRPs, which showed an inverse relationship with tolerance (Mori, Onorati, & Giuntini, 2020). A similar negative relationship was also captured in the UK, and scope of both studies seems to suggest that noise pollution and the subsequent negative perceptions regarding RRPs might be related with the size of the established flocks in the cities; but more in-depth research will be needed to make concrete arguments (Pirzio-Biroli et al, 2024).

Most studies have also found gender to be a significant component in determining attitudes towards RRPs, though findings are contradictory on which gender groups are more positive towards the species (Luna, Edelaar, & Shwartz, 2019; Ribeiro, et al., 2021).

Such variance in findings shows that attitudes and perceptions regarding RRPs are highly context-specific and are highly responsive to cultural, spatial and even personal differences. It also demonstrates that that demographics falls short in explaining why and how such diverse attitudes occur.

In this context, and based on the above reviewed literature, the specific hypotheses developed for the present study were as follows:

Hypothesis 1 (H_1): Environmental values predict the perceptions and attitudes towards the RRPs.

Hypothesis 1-a (H_1-a): Instrumental value will be negatively correlated with rest of the environmental values in shaping the RRP perceptions and attitudes.

Hypothesis 2 (H_2): Attitudes and perceptions towards RRPs, may still be influenced by individual experiences, through factors such as their gender, education level and income.

Hypothesis 2-a (H_2-a): There will be a divergence in the prominence of different values on male and female participants.

Hypothesis 2-b (H_2-b): The younger participants will have more positive perceptions and attitudes towards RRPs.

Hypothesis 3 (H_3): Some variables – such as recognition and knowledge on RRPs and awareness on ecological processes – could positively or negatively impact attitudes and perceptions towards RRPs.

Hypothesis 3-a (H_3-a): Higher ecological knowledge will lead to more negative attitudes and perceptions towards RRPs due to higher awareness on their negative ecological impacts.

3. METHODOLOGY

I developed an original face-to-face survey that incorporates several modules to assess environmental values and level of ecological knowledge, as well as RRP-specific modules to assess knowledge levels, perceptions and attitudes towards the species. The survey collection period was preceded with a preliminary study on 5-15 May 2024 to pre-test Module One. A total of 100 responses were collected and the resulting feedback (such as unclear wording, the scope of included questions etc.) was used to fine-tune the survey to its final version.

All surveys were carried out face-to-face in the urban green spaces on the European side of İstanbul (19 June 2024 to 22 August 2024) and in Ankara (1-5 November 2024), the two main cities estimated to house the two biggest RRP populations in the country. The exact survey collection areas were determined based on the existing RRP sighting recordings in urban green spaces through citizen-science, informal discussions with local bird watchers and previous counting studies carried out for RRP (eBird, n.d.; Per, 2018).

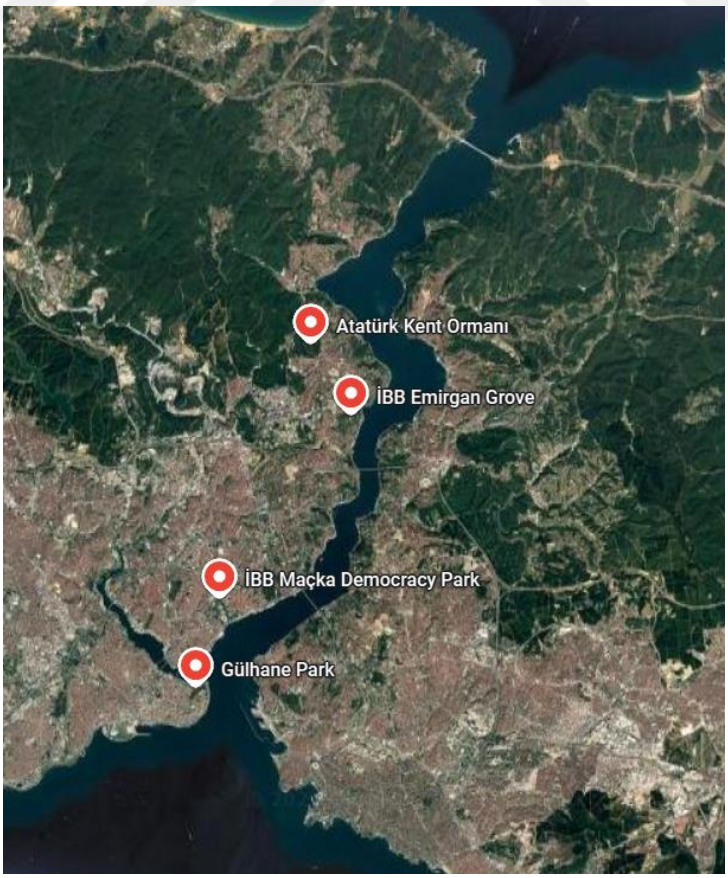


Figure 3.1. Survey collection areas in İstanbul

In İstanbul, the survey was carried out in four urban green spaces: (1) Gülhane Park, (2) Emirgan Korusu, (3) Maçka Park and (4) Atatürk Kent Ormanı (Hacıosman), ranked here according to the size of RRP flocks observed during the data collection by the researcher. The former three parks are comparatively central in the city and enjoy a robust and prominent RRP population, which were visible and audible during most of the survey collection process. In comparison, Atatürk Kent Ormanı is more remote and is comparatively "wilder", with more limited landscape management. Unlike the other survey sites, no RRPs were encountered for the duration of the data collection here. Ornithologists we consulted confirm that smaller groups of RRP populations have been observed here, but no breeding is suspected unlike the other three sites.

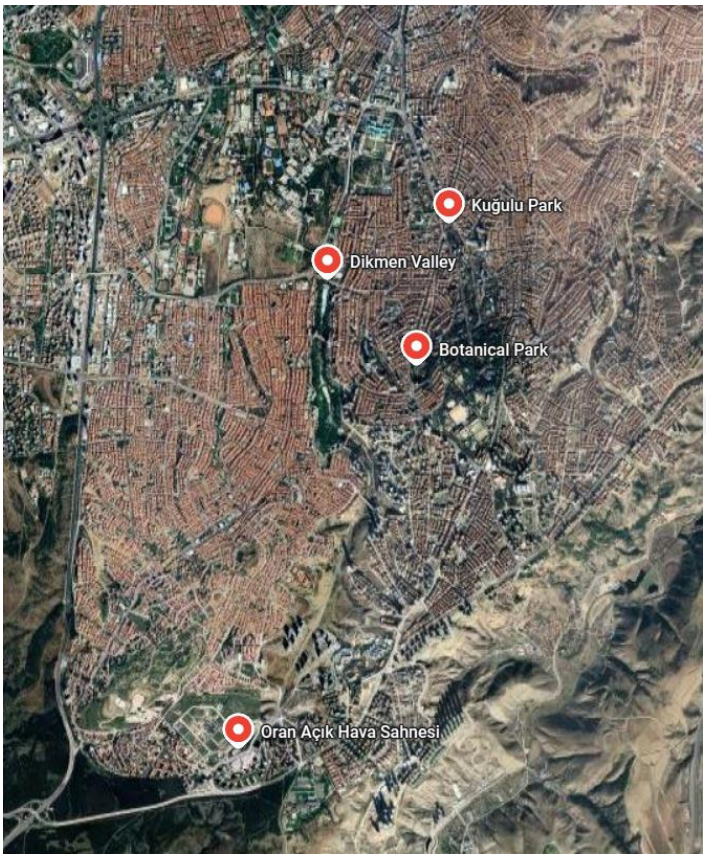


Figure 3.2. Survey collection areas in Ankara

In Ankara, the survey was carried out over 5 days in November 2024 in (1) Dikmen Vadisi, (2) Kuğulu Park, (3) Botanik Parkı, and (4) the green space that combines the Ministry of Health and Ministry of Agriculture and Forestry campuses – once again ranked according to observed flock size during data collection period. While all four collection areas could be considered central in the city, Dikmen Vadisi is a fragmented but more isolated green space situated on about 378.000 m² of land. It supports a significantly more diverse and dense vegetation compared to other collection areas, and is thus, more comparable to Atatürk Kent Ormanı (Hacıosman) in Istanbul. Unlike Atatürk Kent

Ormanı, several RRPs were encountered here during the data collection process.

The target group for the survey was urban green space visitors in İstanbul and Ankara. This imposed no gender, education etc. limits, but excluded all participants below the age of 18 due to required additional parental consent for participation. Participants that were not Turkish citizens and/or non-native speakers, were excluded from the study.

We observed a notable jump in park visitors' willingness to participate in the study when we slightly altered our opening line to emphasize our research focuses on local birds. Our response rate almost doubled from one day to the next once we changed the wording.

Participants were generally very involved and candid throughout the collection process. Among those who recognized RRPs, many were very forthcoming about their independent observations on the rising RRP numbers, with some participants noting that they observed competition with local species such as the Eurasian magpies (*Pica pica*) – even without any prior awareness and information on IAS. Most participants were also very quick to share other urban green spaces that they have encountered large flocks – most common ones being Fenerbahçe and Gülhane Askeri Tıp Akademisi in İstanbul and Bahçelievler and Anıtkabir in Ankara.

The duration of the survey varied according to participants, with some taking the time to think out loud and/or justify their choices and others preferring to fill independently in silence. Overall, the full survey took approximately 20 minutes, excluding the brief information shared on the first page of the survey on some basic information on the aim and scope of the study and data anonymity. Participants who did not recognize RRPs were navigated directly to demographic questions under the final module. The survey for these participants took around 10 minutes.

3.1. Survey Structure

The survey was structured around seven modules.

The first module focused on assessing the propensity of different environmental values of the respondents. This part is made up of 22 questions scored on a 5 point-Likert scale (1-5, with 1 as "Completely disagree", 5 as "Completely agree" and 3 as "Not sure") – 7 questions for relational value and 5 questions each for instrumental, intrinsic and ecological values. The number of items to assess relational values was higher because we based our questions on the pre-tested and widely-used

scale developed by Klain, Olmsted, Chan, & Satterfield (2017), consisting of 7 specific dimensions of relational value in the literature - (1) community, (2) health, (3) identity, (4) kinship, (5) responsibility towards nature, (6) wilderness and (7) responsibility towards others. We adapted the questions instead of using the direct translations for the Turkish context and to minimize any potential confusion from translations. Our questions for other values were developed through review of past questionnaires in the literature, which were similarly adapted to fit the Turkish context (Drake, et al., 2020; Dunlap, Liere, Mertig, & Jones, 2002; Holmes, Sandbrook, & Fisher, 2016; Sandbrook, Fisher, Holmes, Luque-Lora, & Keane, 2019; Mikołajczak, et al., 2023; Teel & Manfredo, 2010).

Questions under each value were summed up and divided to the number of questions to create a normalized 1-5 score for each participant. We calculated a separate "*Instrumental Value Score*", "*Intrinsic Value Score*", "*Relational Value Score*" and "*Ecological Value Score*" for each participant for this study.

The second module focused on ecological knowledge. Participants were asked to match the photographs of seven common bird species in green spaces in Türkiye with their common names in Turkish. The birds were chosen based on citizen-science data to maximize recognizability of the species. We derived the most commonly recorded species on eBird [12] in the chosen areas, filtering to (mostly non-migratory) birds that are available all year around. All seven species were observed by the researcher as present during the data collection process – with several species being abundant and visible throughout the data collection.

The chosen species were:

1. Hooded Crow (*Corvus cornix*)
2. Eurasian Jay (*Garrulus glandarius*)
3. Eurasian magpie (*Pica pica*)
4. European robin (*Erithacus rubecula*)
5. Great tit (*Parus major*)
6. House sparrow (*Passer domesticus*)
7. Rose-ringed parakeet (*Psittacula krameri*)

[12] The full list of recorded birds in İstanbul, with the filtering options that were used for this research is available at https://ebird.org/region/TR-34/bird-list.



Figure 3.3. Bird photo options provided under Module 2

The correct answers for each participant were counted to create the score for "Ecological Knowledge Score" variable in this study.

The third module included four questions and aimed to filter out participants that have not had any previous encounters or awareness of RRP. The first question offered an auditory recording [13] which contained a common call from RRP. Participants were asked (1) if they heard this call before, (2) if they could match the call with one of the birds' photos in the previous section, and (3) if they can name which bird it is.

[13] The recording used for the survey is available at https://www.youtube.com/watch?v=d9LkyHGtfU8.

Upon receiving their responses, the participants were informed that the call belonged to a RRP and were asked if they have ever seen this bird in green spaces in their city before (outside of pet ownership). Participants who confirmed they did were allowed to proceed to the next section designed to understand knowledge, perceptions and attitudes on RRPs. A total of 78 participants out of 160 moved on to the next section, making the RRP recognition in green space visitors approximately 48%. Participants who did not recognize or recall seeing the species outside before (82 respondents out of 160) were directly navigated to the last module on demographics.

It is important here to note that the Alexandrine parakeet (*Psittacula eupatria*), virtually almost identical to RRP, has also been recorded in green spaces – particularly on the European side in İstanbul, around Topkapı and Gülhane Parks. As of September 2024, records from citizen science platforms and preliminary population studies put their number to less than half of RRPs (Özkan L. , 2023). Due to their very similar appearances, behaviours and calls, as well as the fortuitous name of the RRP in Turkish – "Yeşil Papağan", literally translated as "green parakeet" – we recognize the possibility that participants might have recognized the call from either of the species. We made no attempts to differentiate either species in the survey, as both are invasive alien species for the country and therefore indicative for our research question and combined awareness data was not expected to pose any significant issues to the study.



Figure 3.4. Alexandrine parakeet (left) compared to rose-ringed parakeet (right), both taken at Topkapı Palace (Gauche, 2015; Moreland, 2022)

The fourth, fifth and sixth modules focused on RRP exclusively. One of the central inspirations for these sections was Sing, et al.'s survey on urban bee species (Sing, et al., 2016). We incorporated questions on awareness on the presence of the species in an urban setting and adapted some attitude statements for our study under the sixth module. (For example, "Bees cause damage to properties," and "Bees in cities should be subject to greater controls.")

The fourth module focused on eight true/false questions to gauge the knowledge and awareness level of participants regarding RRPs. The final count of correct answers was used to create the "RRP Knowledge Score" out of 8 for all participants that moved on to answer RRP focused modules. We took (Drake, et al., 2020) as a basis to structure this module.

The fifth module offered 11 adjective couples ("bad" vs. "good", "friendly" vs. "unfriendly" etc.) where participants were asked to choose one or the other. We adopted the full list that was used by several previous studies on RRP (Luna, Edelaar, & Shwartz, 2019; Ribeiro, et al., 2021), which were carried out using a 7-point Likert scale. We asked our participants to make a binary, either/or choice, to simplify the survey and cut on the time demanded from participants. To avoid automatic answers, we inverted some of the adjectives, so that positive adjectives can be on either side of the table. We counted positive adjectives selected by each participant and used the final count to assign a "*(Positive) Perceptions towards RRP Score*" to each participant. Therefore, this variable assesses only the positive choices, and a higher score means higher appreciation of species.

The sixth module consisted of eight, 5-point Likert scale questions on the attitudes of participants towards RRP in issues such as personal pleasure derived from encounters, permissibility of potential interventions to RRP populations, etc. The questions were combined from several sources and adapted to the context of our chosen species (Carlos, Bright, Teel, & Vaske, 2009; Draheim, Rockwood, Guagnano, & Parsons, 2011; Drake, et al., 2020; Sing, et al., 2016). We normalized each participant's scores by summing up the rate of positive responses on the Likert scale and then divided the final number to 8 to get a score between 1-5 for the "*(Positive) Attitudes towards RRP Score*" variable. Like the perceptions score, we included only positive attitudes, which means that a higher RRP attitude score implies a more positive attitude towards RRPs and support to their continued existence in both cities without any human intervention to their populations.

The final module focused on demographic information as well as some pro-environmental habits and activities such as support to environmental NGOs or pet ownership. We also included frequency of visits as a variable following Lindon & Root-Bernstein's example (2015).

3.2. Data Analysis

The data analysis was carried out in the open-source data analysis programme Jamovi (Version 2.3.28.0).

First, reliability analyses were carried out for the scales on environmental values, RRP perceptions and RRP attitudes. Next, I calculated Spearman correlations for the main continuous variables of the study to gather first insights regarding the relationships between different variables. Then, regression analyses were carried out to identify the possible drivers of RRP perceptions and RRP attitudes. I ran two sets of separate regressions, one for the dependent variable of RRP perceptions and the other for the dependent variable of RRP attitudes; while all the remaining variables – such as demographics, environmental value scores, the ecological knowledge score and the RRP knowledge score – were used as independent variables.

4. RESULTS

Excluding non-admissible participants (non-Turkish residents and those who could not finish the survey), a total of 160 people participated in the survey, with 64 being filled via the electronic version provided via QR code, which was mostly preferred by the younger respondents. All surveys, including electronic versions, were carried out face-to-face by the researcher. The QR code was not made available outside of researcher's use.

The response rate was around 78%, about 45 potential respondents in the urban parks rejected to be part of the study. The non-response rates were similar in Istanbul and Ankara, at 28% (29 refusals out of 105) and 29% (16 refusals out of 60), respectively. The combined total non-response rate for the survey was 22%.

The questions on different environmental values under the first module were offered in a mixed list, including some reverse coded questions to minimize automatic answers without participants actively thinking on their responses. The rest of the questions were asked in identical orders.

The next section provides the main descriptive findings of the study for each survey module.

4.1. Descriptive Results of the Survey

4.1.1. Module One: Environmental Values

The first module was mandatory for all participants. In Tables 4.1 and 4.2, we presented all our findings in a single table. Questions on the table are grouped under individual values for easier comparison.

Our results show a marked lower mean response for instrumental value – with total mean value being 2.32 over 5. In comparison, the total mean value for intrinsic, relational and ecological values are 4.29, 4.69 and 4.33 respectively. This suggests that, at least for visitors in urban green spaces, pro-environmental values are more dominant in shaping attitudes in conservation issues and human-nature relations.

We also carried out a Kaiser–Meyer–Olkin (KMO) test to ensure the adequacy of our sample under Appendix B (see page 83). KMO values for majority of our questions were 0.6 and higher, indicating that our sampling was adequate, but might benefit from some further action.

Table 4.1. Descriptive Results / Module One (Instrumental and Intrinsic Values)

MODULE ONE – ENVIRONMENTAL VALUES								
N = 160		Completely disagree	Somewhat disagree	Not sure	Somewhat agree	Completely agree	Mean	SD
INSTRUMENTAL VALUE	1. Objectives such as creating employment and increasing economic welfare should not take precedence over nature conservation efforts.	**7**	**12**	**9**	**29**	**103**	4.31	1.14
		4.38%	*7.50%*	*5.63%*	*18.13%*	*64.38%*		
	2. Destruction of natural areas can be tolerated for economic development.	**87**	**35**	**13**	**19**	**6**	1.89	1.19
		54.38%	*21.88%*	*8.13%*	*11.88%*	*3.75%*		
	3. We waste natural resources when we do not use rivers for fishing, electricity generation, tourism, etc.	**40**	**37**	**28**	**20**	**35**	2.83	1.48
		25.00%	*23.13%*	*17.50%*	*12.50%*	*21.88%*		
	4. As long as it benefits people, the use of animals in scientific research is acceptable.	**48**	**22**	**34**	**30**	**26**	2.77	1.46
		30.00%	*13.75%*	*21.25%*	*18.75%*	*16.25%*		
	5. I do not see any problem with people with hunting permits hunting in accordance with the law.	**68**	**25**	**23**	**19**	**25**	2.42	1.51
		42.50%	*15.63%*	*14.38%*	*11.88%*	*15.63%*		
INSTRINSIC VALUE	6. Plants and animals have the right to exist just like humans.	**1**	**0**	**4**	**10**	**145**	4.86	0.49
		0.63%	*0.00%*	*2.50%*	*6.25%*	*90.63%*		
	7. In order to protect nature, human access to and use of nature can be restricted if necessary.	**12**	**12**	**11**	**38**	**87**	4.10	1.26
		7.50%	*7.50%*	*6.88%*	*23.75%*	*54.38%*		
	8. I think that the expansion of cities violates the habitats of wild animals.	**7**	**1**	**12**	**36**	**104**	4.43	0.98
		4.38%	*0.63%*	*7.50%*	*22.50%*	*65.00%*		
	9. I find hunting cruel and inhumane.	**9**	**16**	**21**	**31**	**83**	4.02	1.25
		5.63%	*10.00%*	*13.13%*	*19.38%*	*51.88%*		
	10. I think that natural resources such as rivers, forests, and animals exist for human use.	**45**	**26**	**14**	**27**	**48**	2.96	1.63
		28.13%	*16.25%*	*8.75%*	*16.88%*	*30.00%*		

Table 4.2. Descriptive Results / Module One (Relational and Ecological Values)

RELATIONAL VALUE	11. Spending time in nature positively affects people's physical and mental health.	**0**	**0**	**1**	**6**	**153**	4.95	0.24
		0.00%	*0.00%*	*0.63%*	*3.75%*	*95.63%*		
	12. I think that local species such as fallow deer, cranes, and Anatolian leopards have an important place in our culture.	**3**	**2**	**10**	**24**	**121**	4.61	0.81
		1.88%	*1.25%*	*6.25%*	*15.00%*	*75.63%*		
	13. I think that wild animals that I encounter in the city, such as seagulls and hedgehogs, have a positive effect on my quality of life.	**8**	**7**	**12**	**32**	**101**	4.32	1.11
		5.00%	*4.38%*	*7.50%*	*20.00%*	*63.13%*		
	14. I see our efforts to protect nature as one of our most important responsibilities towards future generations.	**1**	**0**	**2**	**11**	**146**	4.88	0.45
		0.63%	*0.00%*	*1.25%*	*6.88%*	*91.25%*		
	15. I feel a great responsibility towards all beings in nature as a human being.	**0**	**0**	**4**	**19**	**137**	4.83	0.43
		0.00%	*0.00%*	*2.50%*	*11.88%*	*85.63%*		
	16. I form strong emotional bonds with plants and animals.	**1**	**1**	**9**	**53**	**96**	4.51	0.69
		0.63%	*0.63%*	*5.63%*	*33.13%*	*60.00%*		
	17. Protection of natural assets with high historical and cultural importance, such as the Euphrates River, should be prioritized.	**1**	**1**	**3**	**20**	**135**	4.79	0.56
		0.63%	*0.63%*	*1.88%*	*12.50%*	*84.38%*		
ECOLOGICAL VALUE	18. I can think of more than one reason for the importance of lakes and wetlands other than the benefits they provide to people.	**0**	**0**	**3**	**32**	**125**	4.76	0.46
		0.00%	*0.00%*	*1.88%*	*20.00%*	*78.13%*		
	19. I think that the decrease in the diversity of wildlife will not have a great impact on the future of humanity.	**85**	**26**	**10**	**14**	**25**	3.75	1.56
		53.13%	*16.25%*	*6.25%*	*8.75%*	*15.63%*		
	20. The diversity of plant and animal species in nature should be preserved even if it does not provide any benefits for humans.	**1**	**0**	**2**	**16**	**141**	4.85	0.47
		0.63%	*0.00%*	*1.25%*	*10.00%*	*88.13%*		
	21. I think that the decrease in insect diversity will have a significant impact on humans.	**8**	**10**	**22**	**33**	**87**	4.13	1.17
		5.00%	*6.25%*	*13.75%*	*20.63%*	*54.38%*		
	22. I think that human life is closely related to all living things in nature.	**3**	**3**	**4**	**19**	**131**	4.70	0.77
		1.88%	*1.88%*	*2.50%*	*11.88%*	*81.88%*		

4.1.2. Module Two: Ecological Knowledge

Module Two was mandatory for all participants. Our results show that average park visitor in İstanbul and Ankara has moderate awareness on local bird species, with just about 23% of participants recognizing less conspicuous species like the European jay. We expected our participants to score high on RRP recognition as the species' green colour sets them apart from the rest of the species and its Turkish name ("yeşil papağan" or green parakeet if translated) is an immediate give away. At 93% recognition, it was the most easily named species out of the seven birds provided. We presented the full breakdown of participants' responses under Table 4.3.

We observed that most participants took clues from the names offered to match to the species which can suggest these scores might have been considerably lower if no names were provided. This was markedly apparent during the survey collection process in species like European robin - which is named after the reddish plumage on its front in its Turkish name, which was clearly shown in the photo provided - compared to less readily identifiable names like the great tit's ("büyük baştankara" or roughly translated as great black headed). This also caused species to be mixed up often – such as Eurasian magpie. A significant number of participants interpreted the Turkish name for Eurasian jays ("alakarga") to mean "iridescent" – a notable characteristic of Eurasian magpie's dark feathers. Hence, both birds scored high in each other's responses due to mix up.

Overall, our results show that most park visitors were largely not aware of the urban wildlife when it comes to birds and most were only able to identify few species that can more readily be found within the urban city landscape, such as house sparrow and hooded crow.

Table 4.3. Descriptive Results / Module Two

MODULE TWO – ECOLOGICAL KNOWLEDGE										
N = 160		**ANSWERS**								
		Eurasian magpie	House sparrow	Hooded crow	Great tit	Eurasian Jay	Rose-ringed parakeet	European robin	I don't know	% of correct answers
BIRD PHOTOS	Eurasian magpie (Saksağan)	**63**	**4**	**6**	**18**	**41**	**0**	**1**	**27**	39.38%
		39.38%	*2.50%*	*3.75%*	*11.25%*	*25.63%*	*0.00%*	*0.63%*	*16.88%*	
	House sparrow (Bayağı Serçe)	**3**	**124**	**0**	**5**	**1**	**0**	**2**	**25**	77.5%
		1.88%	*77.50%*	*0.00%*	*3.13%*	*0.63%*	*0.00%*	*1.25%*	*15.63%*	
	Hooded crow (Leş Kargası)	**0**	**1**	**127**	**3**	**17**	**5**	**1**	**6**	79.38%
		0.00%	*0.63%*	*79.38%*	*1.88%*	*10.63%*	*3.13%*	*0.63%*	*3.75%*	
	Great tit (Büyük Baştankara)	**27**	**10**	**7**	**41**	**13**	**0**	**1**	**61**	25.63%
		16.88%	*6.25%*	*4.38%*	*25.63%*	*8.13%*	*0.00%*	*0.63%*	*38.13%*	
	Eurasian Jay (Alakarga)	**21**	**7**	**2**	**27**	**37**	**0**	**7**	**59**	23.13%
		13.13%	*4.38%*	*1.25%*	*16.88%*	*23.13%*	*0.00%*	*4.38%*	*36.88%*	
	Rose-ringed parakeet (Yeşil Papağan)	**1**	**0**	**0**	**1**	**1**	**149**	**0**	**8**	93.13%
		0.63%	*0.00%*	*0.00%*	*0.63%*	*0.63%*	*93.13%*	*0.00%*	*5.00%*	
	European robin (Kızılgerdan)	**5**	**7**	**1**	**4**	**4**	**0**	**102**	**37**	63.75%
		3.13%	*4.38%*	*0.63%*	*2.50%*	*2.50%*	*0.00%*	*63.75%*	*23.13%*	

4.1.3. Module Three: Rose-ringed Parakeet Awareness

Module Three was mandatory for all participants. Here, we attempted to distinguish participants who are aware of RRPs existence in Türkiye and have previously encountered the species.

The first question offered participants a common RRP call. 65% of our participants recognized the call and indicated that they have heard it in an urban setting before, but recognition of which bird species it belongs to was comparatively lower, with only 31 participants (less than 20% of our participants) correctly identifying RRPs from the options provided.

Once presented with a photo of a RRP, the overall rate of participants who recalled previous encounters with the species were approximately 49%. We noted a marked difference in participants' recognition of RRPs in the two cities (around 36% for Ankara and 55% for İstanbul). This gap might be due to the differences in flock sizes; as anecdotal evidence (and our in-person observation during the survey collection period) suggests İstanbul houses several thousandfold more individuals compared to Ankara, making them more common, louder and more noticeable. In fact, RRP flocks were occasionally very prominent and loud, and even on occasion disruptive to the data collection

process in İstanbul, whereas the biggest flock we encountered in Ankara consisted of 7 individuals at most.

We pinpointed no significant variance in RRP recognition between RRP-rich collection areas and those with more limited RRP presence. The recognition rate was %50 in areas with large flocks and 46% in little-to-none RRP presence.

The last question on this module was also used to determine which participants moved on to RRP related modules (Modules 4, 5 and 6) based on previous encounters with RRPs. Around 49%, that confirmed to have previously seen the species in urban areas, moved on to answer further questions on their perceptions and attitudes on RRPs, while the rest were directly navigated to the last module on demographic information.

The full breakdown of responses is available below on Table 4.4.

Table 4.4. Descriptive Results / Module Three

MODULE THREE – ROSE-RINGED PARAKEET AWARENESS		
N = 160	**YES**	**NO**
Have you heard this bird's call before here?	**104**	**56**
	65%	*35%*
Do you know which one of the 7 birds in the previous section this call belongs to?	**77**	**83**
	48.12%	*51.87%*
If yes, which one?	Hooded Crow (*Corvus cornix*)- 2 (1.25%) Eurasian Jay (*Garrulus glandarius*) - 3 (1.87%) Eurasian magpie (*Pica pica*) - 15 (9.37%) European robin (*Erithacus rubecula*) - 10 (6.25%) Great tit (*Parus major*) - 9 (5.62%) House sparrow (*Passer domesticus*) - 12 (7.5%) Rose-ringed parakeet (*Psittacula Krameri*) - 31 (19.37%) I don't know - 78 (48.75%)	
The call you have just heard belongs to a rose-ringed parakeet. Below you can see a typical photo of the species. Have you ever seen this bird in Istanbul/Ankara before?	**78**	**82**
	48.75%	*51.25%*

4.1.4. Module Four: Rose-ringed Parakeet Knowledge

This module was made available only to participants who had encountered RRPs in urban green spaces prior to survey participance. We found that the knowledge on the species is moderate, with the mean score at 5.35 (out of 8), but majority of our participants picked the correct answer across all 8 questions. A full breakdown of participant answers is available below on Table 4.5.

Table 4.5. Descriptive Results / Module Four

MODULE FOUR – ROSE-RINGED PARAKEET KNOWLEDGE			
N = 78	**TRUE**	**FALSE**	% of correct answers
1. Rose-ringed parakeets are approximately the same size as pigeons.	**47** *60.26%*	**31** *39.74%*	60.26%
2. Rose-ringed parakeets are native to Turkey.	**13** *16.67%*	**65** *83.33%*	83.33%
3. In addition to green, rose-ringed parakeets' feathers can also come in blue, pink, and yellow.	**53** *67.95%*	**25** *32.05%*	67.95%
4. Rose-ringed parakeets also live in other countries in Europe.	**44** *56.41%*	**34** *43.59%*	56.41%
5. Rose-ringed parakeets feed on the fruits of trees in Istanbul.	**70** *89.74%*	**8** *10.26%*	89.74%
6. More than 5,000 green parrots live in Istanbul's/Ankara's parks.	**50** *64.10%*	**28** *35.90%*	64.10%
7. Rose-ringed parakeet can live up to 30 years old on average.	**43** *55.13%*	**35** *44.87%*	55.13%
8. Rose-ringed parakeets usually live in large colonies (groups).	**46** *58.97%*	**32** *41.03%*	58.97%
SCORE (OUT OF 8)	MEAN	**5.35**	
	MEDIAN	**6**	
	MAX	**8**	
	MIN	**2**	
	SD	**1.28**	

4.1.5. Module Five: Perceptions Towards Rose-ringed Parakeets

Module Five is the second module that was offered exclusively to participants with previous encounters with RRPs.

Our findings show an overwhelmingly positive perception towards RRPs with approximately 84% of respondents choosing positive adjectives in relation to RRPs. "Noisy" emerged as the only case where the negative adjective was picked by the majority of the participants (approximately 77% of respondents). Previous findings in the literature suggest that noise emerges as the primary irritant and first introduction to more negative aspects of RRPs in urban spaces (Mori, Onorati, & Giuntini, 2020). This finding could be signalling that this positive stance could sour in the long term if the flock sizes continue to grow, but as it is our results show no significant links.

The overall breakdown of the responses (available below on Table 4.6) shows that most participants not only enjoy the more aesthetic aspects of RRPs as a charismatic species but associates them with positive attributes like "good" and "valuable".

Table 4.6. Descriptive Results / Module Five

MODULE FIVE – PERCEPTIONS TOWARDS ROSE-RINGED PARAKEETS					
N = 78					
NEGATIVE ADJECTIVES			POSITIVE ADJECTIVES		
	No of responders	% of responders	% of responders	**No of responders**	
Bad	**6**	*7.69*	*92.31*	**72**	Good
Harmful	**12**	*15.38*	*84.62*	**66**	Harmless
Worthless	**3**	*3.85*	*96.15*	**75**	Valuable
Plague	**11**	*14.10*	*85.90*	**67**	Useful
Unpleasant	**1**	*1.28*	*98.72*	**77**	Pleasant
Dirty	**2**	*2.56*	*97.44*	**76**	Clean
Unfriendly	**19**	*24.36*	*75.64*	**59**	Friendly
Noisy	**60**	*76.92*	*23.08*	**18**	Silent
Abundant	**20**	*25.64*	*74.36*	**58**	Rare
Ugly	**1**	*1.28*	*98.72*	**77**	Pretty
Muted Coloured	**4**	*5.13*	*94.87*	**74**	Colourful
	TOTAL:	*16.20*	*83.80*		
SCORE – POSITIVE (OUT OF 11)				MEAN	**9.23**
				MEDIAN	**10**
				MAX	**11**
				MIN	**5**
				SD	**1.46**

4.1.6. Module Six: Attitudes Towards Rose-ringed Parakeets

Module Six is our last mandatory module for participants who moved on to answer questions on RRPs.

Our results show a marked positive stance with 34% of our participants scoring 4 and higher (out of 5) on the RRP attitude score. Our participants not only support continuing existence of RRPs in Türkiye (Question 8), but more than 60% also supports their continued existence in urban green spaces (Question 4) outside of a pet setting.

Since we wanted to capture attitudes and perceptions as it is right now, we avoided asking any question to assess awareness level on the harmful effects of RRPs as an invasive species, but more than 62% of our participants “completely disagreed” to our sole question on a potential negative impact, where we asked if our participants think RRPs harm trees and plants in their cities. This could be signalling low awareness on the RRPs’ impacts as IAS.

However, we noted that support for the control of the species existence is slightly elevated when we indicate that the species is “foreign” and “brought from outside”. This “non-native” attribute introduced notable variance on responses on Question 6 on a response pattern that is otherwise

clustered around either side of the Likert scale (based on our wording). We can clearly see this effect in the breakdown of the full dataset below on Table 4.7, when we compare Question 5 (“I believe that rose-ringed parakeets have the right to exist without interference like other bird species.”) with Question 6 (“Foreign species that are brought from outside, such as rose-ringed parakeets, should be subject to more control.”).

Table 4.7. Descriptive Results / Module Six

MODULE SIX – ATTUTUDES TOWARDS ROSE-RINGED PARAKEETS							
N = 78	Completely disagree	Somewhat disagree	Not sure	Somewhat agree	Completely agree	Mean	SD
1. I think that rose-ringed parakeets harm trees and plants in cities.	**49**	**10**	**10**	**5**	**4**	1.78	1.20
	62.82%	*12.82%*	*12.82%*	*6.41%*	*5.13%*		
2. I feel happy when I encounter rose-ringed parakeets in my daily life.	**0**	**0**	**5**	**14**	**59**	4.69	0.58
	0.00%	*0.00%*	*6.41%*	*17.95%*	*75.64%*		
3. I find it objectionable for rose-ringed parakeets to become a part of urban green spaces in Türkiye.	**49**	**10**	**8**	**6**	**5**	1.82	1.26
	62.82%	*12.82%*	*10.26%*	*7.69%*	*6.41%*		
4. Rose-ringed parakeets should only be found as pets in Türkiye.	**49**	**12**	**5**	**6**	**6**	1.82	1.29
	62.82%	*15.38%*	*6.41%*	*7.69%*	*7.69%*		
5. I believe that rose-ringed parakeets have the right to exist without interference like other bird species.	**1**	**1**	**3**	**9**	**64**	4.72	0.71
	1.28%	*1.28%*	*3.85%*	*11.54%*	*82.05%*		
6. Foreign species that are brought from outside, such as rose-ringed parakeets, should be subject to more control.	**13**	**5**	**19**	**20**	**21**	3.40	1.39
	16.67%	*6.41%*	*24.36%*	*25.64%*	*26.92%*		
7. I believe that rose-ringed parakeets should be intervened if they cause disturbance to people living in cities.	**38**	**13**	**9**	**12**	**6**	2.17	1.38
	48.72%	*16.67%*	*11.54%*	*15.38%*	*7.69%*		
8. I support the continued existence of rose-ringed parakeets in Istanbul.	**2**	**0**	**4**	**11**	**61**	4.65	0.80
	2.56%	*0.00%*	*5.13%*	*14.10%*	*78.21%*		
SCORE – POSITIVE (OUT OF 5)					MEAN	**4.13**	
					MEDIAN	**4.25**	
					MAX	**5.00**	
					MIN	**2.63**	
					SD	**0.63**	

4.1.7. Module Seven: Demographics

Module Seven is the final part of the survey and was mandatory for all participants.

Overall, our sample in Istanbul and Ankara consisted of a larger share of female respondents, and slightly younger than the average Turkish citizen. However, the sample was rather balanced regarding income. According to TURKSTAT data, the average household income in the country per person has reached ₺181,200 in 2023 (TURKSTAT, 2024). More than half of our participants represented the national average income group.

According to TURKSTAT data, the percentage of people with higher education in Türkiye was 24% of the total population in 2022, which encompasses undergraduate and above education levels. With 70% of our participants carrying an undergraduate and higher degree, we can conclude that we have an over-representation of individuals with higher education in our data set. However, it is important to note that Ankara and İstanbul are among the cities with the highest duration in education (for citizens 25 and older), with Ankara leading at 11.2 years. Here, the over-representation is likely due to above-average share of people with higher education in both cities (TURKSTAT, 2023).

More than 80% of our participants have owned or currently own pets and more than half have previously supported environmental movements – mostly through donations.

Table 4.8. Descriptive Results / Module Seven

MODULE SEVEN –DEMOGRAPHICS			
N = 160		**No of responders**	% of responders
Gender	Female	**96**	*60.00*
	Male	**64**	*40.00*
Age	17 – 35	**71**	*44.38*
	35 – 50	**45**	*28.13*
	50 – 65	**29**	*18.13*
	65 and higher	**15**	*9.38*
Highest level of education completed	High school and lower	**48**	*30.00*
	Undergraduate	**90**	*56.25*
	Graduate	**19**	*11.88*
	Doctorate and higher	**3**	*1.88*
Approximate monthly income	₺17,000 – 40,000	**85**	*53.13*
	₺40,000 – 70,000	**47**	*29.38*
	₺70,000 – 100,000	**18**	*11.25*
	₺100,000 and higher	**10**	*6.25*
Current and/or previous pet ownership	Yes	**107**	*66.88*
	No	**27**	*16.88*
	Previously	**26**	*16.25*
Frequency of visits to urban green spaces	Every day	**22**	*13.75*
	Several times a week	**49**	*30.63*
	Several times a month	**78**	*48.75*
	Several times a year	**11**	*6.88*
Support to environmental organizations and/or movements	Yes	**90**	*56.25*
	No	**70**	*43.75*
IF YES,…	**N = 90**		
Financial support	Yes	**64**	*71.11*
	No	**26**	*28.89*
Signature campaigns	Yes	**59**	*65.56*
	No	**31**	*34.44*
Physical support (Volunteering etc.)	Yes	**32**	*35.56*
	No	**58**	*64.44*

4.1. Reliability Analyses for Individual Scales

We carried out reliability analyses by calculating Cronbach alpha for each of the scales on environmental values (one on the entire value scale and then also separately for each of the intrinsic, instrumental, relational and ecological values), RRP perceptions and RRP attitudes.

The scale on environmental values (consisting of 22 items) gave a rather high Cronbach alpha (0.677), confirming that the scale created was reliable to measure environmental values of respondents. Reliability analyses were also carried out for each of the four environmental value categories separately (for each of the intrinsic, instrumental, relational and ecological values). The highest internal consistency (reliability) was achieved for the relational value scale (0.556). This was followed by instrumental value (0.413), intrinsic value (0.349), and finally by ecological value (0.308). The rather low Cronbach alpha value was expected, as there was not a pre-tested reliable scale for ecological value in the literature, to the best of our knowledge.

The reliability of the RRP perceptions scale, as adopted and slightly modified from Luna, Edelaar, & Shwartz (2019) and Ribeiro, et al. (2021), was also tested. This provided a relatively lower Cronbach alpha of 0.454. However, this lower figure could be attributable to the use of binary responses, as opposed to previous two studies which used a 7-point Likert scale (Luna, Edelaar, & Shwartz, 2019; Ribeiro, et al., 2021).

Next, we also tested the reliability of the RRP attitudes scale. This delivered a higher Cronbach alpha value (0.694), indicating a rather higher internal consistency for this scale.

All results are available on Appendix C (see page 85)

4.2. Correlation Matrix

Following the reliability analyses, Spearman's correlation was calculated between each of the continuous variables in the study in order to get some first insight on the strength and the direction of the relationships between the variables. The full breakdown of the results of the correlation matrix is provided on Table 4.9, with positive and negative correlations marked with green and orange respectively.

First and foremost, we captured a statistically significant negative relationship between intrinsic and instrumental values. This supports hypothesis H_1-a and is in line with the initial binary conceptualization of environmental values in the literature (Himes, et al., 2024). A somewhat weaker negative relationship could also be observed for relational and ecological values. The rest of the environmental values – intrinsic, relational and ecological values – were associated positively with each other. In fact, our preliminary analyses of these value categories through exploratory factor analyses (provided under Appendix B – see page 83) confirmed that there were two distinct value categories for the sample: one factor mainly consisting of instrumental value and the other factor consisting of a combination of intrinsic, relational and ecological values. However, as the reliability of the relational value and intrinsic value scales was rather high, we kept them as separate categories for further analyses in this study. [14]

When we look beyond the environmental value variables, we found that ecological knowledge is negatively correlated with instrumental value and exhibited some tendency to be positively correlated with relational value, but the latter did not emerge as statistically significant. A similar tentative finding can be noted for the negative correlation with RRP Perceptions, which also did not emerge as statistically significant. This neither confirms nor negates hypothesis H_3-a.

Finally, there was relatively strong, statistically significant positive correlation between RRP Perceptions and RRP Attitudes, as expected, implying that respondents who associate RRPs with more positive adjectives tend to support the continued existence of RRPs in the two cities.

[14] The reliability of the ecological value scale was rather low, as we could not find a pre-tested reliable scale for this value in the literature. We, nevertheless, also kept it as a separate category for further analyses as we considered to be an important insight to understand the values that shape attitudes towards RRP.

Table 4.9. Correlation Matrix

		INSTRUMENTAL VALUE SCORE	INTRINSIC VALUE SCORE	RELATIONAL VALUE SCORE	ECOLOGICAL VALUE SCORE	ECOLOGICAL KNOWLEDGE SCORE	RRP KNOWLEDGE SCORE	RRP PERCEPTIONS (POSITIVE)	RRP ATTITUDES (POSITIVE)
INSTRUMENTAL VALUE SCORE	Spearman's rho	—							
	df	—							
	p-value	—							
INTRINSIC VALUE SCORE	Spearman's rho	-0.462 ***	—						
	df	158	—						
	p-value	< .001	—						
RELATIONAL VALUE SCORE	Spearman's rho	-0.193 *	0.291 ***	—					
	df	158	158	—					
	p-value	0.015	< .001	—					
ECOLOGICAL VALUE SCORE	Spearman's rho	-0.173 *	0.337 ***	0.361 ***	—				
	df	158	158	158	—				
	p-value	0.029	< .001	< .001	—				
ECOLOGICAL KNOWLEDGE SCORE	Spearman's rho	-0.205 **	0.138	0.160 *	0.129	—			
	df	158	158	158	158	—			
	p-value	0.009	0.081	0.043	0.105	—			
RRP KNOWLEDGE SCORE	Spearman's rho	0.088	-0.042	0.211	0.108	0.142	—		
	df	76	76	76	76	76	—		
	p-value	0.446	0.716	0.063	0.345	0.216	—		
RRP PERCEPTIONS (POSITIVE)	Spearman's rho	0.051	-0.191	-0.002	-0.015	-0.244 *	-0.124	—	
	df	76	76	76	76	76	76	—	
	p-value	0.659	0.094	0.984	0.893	0.031	0.278	—	
RRP ATTITUDES (POSITIVE)	Spearman's rho	-0.150	0.126	0.262 *	0.144	-0.054	-0.161	0.415 ***	—
	df	87	87	87	87	87	76	76	—
	p-value	0.160	0.240	0.013	0.177	0.615	0.160	< .001	—

Note. * p < .05, ** p < .01, *** p < .001

4.3. Regression Analyses

Once we got a better understanding on the data and the relationship between variables, we wanted to further look into the specific determinants of our two dependent variables: (1) RRP Perceptions and (2) RRP Attitudes. We used linear regressions to estimate the relationships between our independent and dependent variables, to pinpoint which factors lead to the differences with respect to positive and negative perceptions and attitudes of our respondents towards RRPs.

The past studies on RRP attitudes mostly considered demographics such as gender, age, and education as potential determinants (Luna, Edelaar, & Shwartz, 2019; Pirzio-Biroli et al, 2024; Ribeiro, et al., 2021). However, from our observations in the clashes on RRPs in 2022 – which manifested between scientists and regular citizens, as well as within these groups – we hypothesized that beyond demographics, environmental values – especially intrinsic and relational values – and ecological knowledge may play a more dominant role in shaping RRP attitudes (Hypothesis H_1 and H_3). To test these hypotheses, we ran our first set of regressions for each of our two dependent variables (RPP Perceptions and RRP Attitudes) separately, including only the demographics (plus the frequency of visits to urban parks), then re-run them by adding other possible factors such as environmental values, ecological knowledge and RRP knowledge to the model. Full breakdown of all four of our regression analyses are available in Appendix D (see page 92)

Overall, the findings were in line with our expectations regarding the importance of values for determining RRP perceptions and attitudes. Environmental values, particularly relational value, were a robust factor impacting both RRP perceptions and RRP attitudes when controlling for other possible factors such as demographics. This supports our hypothesis H_1.

We found higher intrinsic and relational value scores to be significantly and positively associated with positive RRP perceptions ($p = 0.02$ and $p = 0.04$, respectively).

Higher relational value scores emerged much more robustly as significant and positively associated with positive attitudes towards RRPs ($p = 0.01$).

We also found support for environmental causes to be a statistically significant indicator for positive attitudes towards RRP ($p = 0.01$) – signalling that people that more actively support environmental movements are less likely to support interventions towards RRPs. Here, unlike RRP perceptions, we found no links between ecological knowledge and RRP attitudes. This seems to suggest our participants'

support to environmental causes is not borne from knowledge on ecological issues and a desire to prevent them, but likely from more complex emotional justifications. It is possible that there could be link between environmental values (particularly, relational value) and support for environmental causes as well; but much more targeted research will have to be carried out for concrete conclusions.

Table 4.10. Independent Samples T-test for Gender

Independent Samples T-Test

		Statistic	df	p
INSTRUMENTAL VALUE SCORE	Student's t	−1.859	158.0	0.065
INTRINSIC VALUE SCORE	Student's t	0.805	158.0	0.422
RELATIONAL VALUE SCORE	Student's t	2.303 [a]	158.0	0.023
ECOLOGICAL VALUE SCORE	Student's t	0.710	158.0	0.479
ECOLOGICAL KNOWLEDGE SCORE (OVER 7)	Student's t	−0.621	158.0	0.536
RRP KNOWLEDGE SCORE (OVER 8)	Student's t	−0.639	76.0	0.525
RRP PERCEPTIONS - ADJECTIVES (OVER 11) / POSITIVE	Student's t	1.524	76.0	0.132
RRP ATTITUDES (OVER 5) / POSITIVE	Student's t	1.828 [a]	87.0	0.071

Note. H_a $\mu_{Female} \neq \mu_{Male}$

[a] Levene's test is significant ($p < .05$), suggesting a violation of the assumption of equal variances

Lastly, the regressions revealed that the demographic findings (gender, age and ecological knowledge) that were present in previous studies in Italy, UK and Spain did not exist in our data set (Hypotheses H_2, H_2-a, H_2-b, H_3 and H_3-a). We found some tentative indication that both gender ($p = 0.09$) and ecological knowledge ($p = 0.08$) may play a role in shaping RRP perceptions, but neither were strong enough to confirm hypotheses H_2, H_3-a. Neither variable was statistically significant for RRP attitudes. We also found no significant links between age and perceptions and attitudes on RRP, which is contrary to previous examples in the literature. This negates hypothesis H_2-b.

To test for the any difference between values pertaining to gender, we carried out independent samples t-tests which revealed that women tended to score stronger on relational values (see Table 4.10). However, we did not find any impact of gender on RRP perceptions and attitudes in the regressions. This neither confirms nor negates hypothesis H_2-a.

5. DISCUSSION

The present study foremost aimed to improve insight on the attitudes and perceptions towards RRP in park visitors in İstanbul and Ankara and to better demonstrate how demographics and individual environmental values play into their emergence. We found evidence of a strong link between relational value and positive perceptions and positive attitudes towards RRPs.

Several previous studies have found some links with exposure to the species and attitudes towards them. One of the notable findings from Mori, Onorati, & Giuntini (2020) showed that tolerance towards RRP is negatively linked with the number of RRP calls. There is currently no data available on prevalence of RRP calls in our data collection areas, but we found some evidence that noise can become a point of annoyance for urban park visitors in Türkiye too. Around 60% of the participants who confirmed that they had previous encounters with them in urban green spaces picked “Noisy” out of the adjective pairs we offered under Module Five. However, we did not observe any subsequent significant uptick in negative perceptions towards them. “Noisy” remained the only adjective where the majority picked the negative option out of the eleven adjective pairs provided. While there is very little information on the exact number and flock sizes of RRP in Türkiye, we suspect that the flock sizes were much smaller and thus less disruptive in our survey areas compared to other examples in Europe. It is also important here to note that Mori, Onorati, & Giuntini (2020) found their highest intolerance levels in Rome, where the noise pollution due to RRPs likely caused a more than 3% decrease in the real estate values where the flock sizes were the largest. There has not been any evidence of similar economic impact in Türkiye so far and informal chats with participants after the survey showed clear appreciation and delight with daily encounters despite comments on the loud calls outside of their homes and balconies. It seems that urban park visitors in Türkiye continue to appreciate the RRP presence and see them as charismatic and “exotic” species even with some awareness on the noise pollution the species cause.

High appreciation and sympathy by the public towards charismatic invasive alien species are some of the biggest hinderances in control of IAS, particularly charismatic species like RRP (Crowley, Hinchliffe, & McDonald, 2019). Much like previous findings in Italy (Mori, Onorati, & Giuntini, 2020) and Portugal (Ribeiro, et al., 2021), we found very high level of support and positive perceptions towards the species. We can safely assume that, at least park visitors in İstanbul and Ankara, are likely to be

against any interventions against RRP populations and are likely to stay that way for the foreseeable future.

There is breadth of previous studies that demonstrate that men and women possess inherently different values and perceptions pertaining to nature and environmental issues (Dougherty, Fulton, & Anderson, 2003; Lauber, Anthony, & Knuth, 2001). This difference was also present in some previous survey applications on RRP in the literature such as Luna, Edelaar & Shwartz (2019) and Ribeiro, et al. (2021). Like Ribeiro, et al. (2021) example in Portugal, we found some tentative evidence that gender plays a role in shaping values and perceptions towards RRP. However, while their example found male participants to be more likely to pick positive options, we found evidence on the contrary with women having relatively stronger relational values, and therefore, likely to have more positive perceptions towards the species. Moreover, while our regression analysis on RRP attitudes did not show gender to be statistically significant, we found that women are comparatively less likely to support interventions towards the species than men.

Ribeiro, et al. (2021) also found education to be an important determinant of RRP attitudes. Our regression analyses run for RRP perceptions delivered a tentative relationship between having graduate level studies and positive perceptions; however, a larger sample would offer a clearer insight on this.

Two significant focus areas on the earlier studies on attitudes towards RRP was the impact of RRP population size and urban vs. rural divergence on attitudes. We have very limited insight on the RRP population sizes in general and almost no data on the individual green spaces in Türkiye. We have some anecdotal comparison on the population sizes between different green spaces, where we presumed population size is bigger in Gülhane Park than Emirgan Korusu in İstanbul, for example, but further data could be incorporated to see if population sizes had any impact on participant attitudes and perceptions towards RRP. Within the confines of our study, no such divergence on attitudes was detected. Our study also excluded any urban vs. rural comparisons as the species have so far been exclusively recorded in urban green spaces in Türkiye. This containment in the urban area also prevents their introduction to agricultural fields as a pest, further bolstering their warm welcome in the absence of negative trade-offs on humans' side.

A recent study on RRP attitudes in the UK this year showed very high awareness level for RRPs at around 90% of the participants (Pirzio-Biroli et al, 2024). Our similar question process resulted in an awareness level at around 49% of participants. However, we should note here that UK houses one of the oldest and biggest non-native RRP settlements in the world and the management of RRP has been a

much more prevalent and public discussion compared to Türkiye, which likely affected recognition levels.

In the same article, the researchers have also assessed what they called “nature-relatedness”, based on the six questions developed by Nisbet & Zelenski (2013). Due to strongly overlapping concept and almost identical questions, our relational value findings can be discussed parallel to “nature-relatedness” findings in the research. We offered a comparison with our relational value questions in Appendix D (see page 92). Pirzio-Biroli et al (2024) have found that for UK participants, higher nature relatedness scores indicated a higher preference for RRPs in local neighbourhood. This is very much in line with our findings with relational value and RRP attitudes and perceptions. However, in contrast to our example, majority of the participants held negative views towards RRP. Pirzio-Biroli et al note that this is partially driven by the species’ non-native status in the country. This is somewhat in line with our experience and findings as well – as noted, the attitudes showed a sudden negative shift once we highlighted that RRPs are not native to Türkiye. This subtle shift in the attitudes was observable even during the data collection process, on our one-on-one correspondences with the participants.

All in all, our findings show that urban park visitors in Türkiye have overwhelmingly positive perceptions and attitudes towards RRP and are largely against any interventions on their existence, despite some awareness on their negative impacts like noise pollution. This signals that any action taken on the government side to manage their populations will likely be met with similar public outcry and resistance as we previously saw in 2022 in Türkiye and several other countries over the decades. There is a tentatively negative relationship between ecological knowledge score and RRP Perceptions in the present study - which could be signalling that participants that have a higher knowledge in ecological issues may also have higher awareness on the negative ecological impacts on IAS and therefore RRP, leading to lower scores on perceptions - but more in-depth and targeted research is necessary to make any concrete remarks.

Overall, the most robust relationship we detected between our dependent variables and the rest our data is relational value. This suggests that – at least for park visitors in İstanbul and Ankara – relational value is a central driver in their perceptions and attitudes towards RRPs. This means that gaining the support and cooperation of the public and developing the behavioural change required for impactful conservation action for IAS management should be preceded with awareness raising activities that target relational values. We argue that messages that target relational value issues – such as cultural and emotional connections, intergenerational responsibilities etc. – are more likely to be successful. A statement based on ecological information, such as: “RRPs are very harmful to local ecosystems”, will

not have the same impact as a statement appealing to the relational values of individuals, such as: “RRPs could prevent your children from growing up with the same bird calls you heard when you were growing up.”

6. CONCLUSION

The aim of this research was to understand the full scope of the effect of environmental values, demographics and knowledge on ecological processes on perceptions and attitudes towards RRP. We found that demographics offer an incomplete picture and that understanding environmental values are critical for anticipating future clashes in conservation action and achieving the behavioural change necessary for its success. A stronger insight on values across different groups could prove crucial in predicting potential conflicts, particularly those that are time-sensitive and difficult to reconcile, as its often the case with charismatic IAS like RRP (Shackleton, et al., 2019).

Our findings show that RRPs are likely to continue to be a point of contention in the immediate future should any action against their continuing existence be taken. Any potential actions – if they are found necessary – will likely have a much better chance of success if it is preceded with some awareness raising campaigns on the species' negative ecological impacts within the context of their relation to humans. That being said, the research on RRP is in its infancy in Türkiye with very little knowledge on the population size, distribution, breeding patterns and impact on local ecosystems and local species. As it was constantly argued across the social media during the height of the protests – there is no scientific evidence so far that clearly demonstrates the ecological impacts of RRPs on local species in Türkiye (@mihavcomtr, 2022). In fact, the decision to take action against RRPs in the absence of any proof of their negative impacts was at the centre of the divide amongst the conservation experts during the discussions, and clashes in this context can only be remedied by more research on the species at large in the country.

When examined with other examples in the literature, we see that each RRP population has a unique and complex relationship with the people it cohabits its parks with. We found a considerably more positive and delighted audience in Türkiye compared to other countries, but examples from Spain and Italy suggest this could quickly change as their numbers grow and their more negative aspects (such as noise pollution) becomes more apparent. A similar argument can be made for potential spread of the species to rural areas and a subsequent economic loss due to disruptions in agricultural production. The public attitudes may very well swing on a more negative note if the species' existence poses more direct inconveniences to humans.

While we tried to balance our representation on all demographic fronts, we were nevertheless satisfied with our somewhat higher representation of female participants, who are regularly underrepresented in similar studies (Jackman & Rutberg, 2015). With this study, we re-iterated a well-demonstrated variance in attitudes across genders, with female participants presenting as more pro-environmental compared to their male counterparts. Such discrepancy – and awareness on the existence of it – could prove critical in conservation action in the long term, particularly for countries in EU and USA where women regularly score a higher participation rate in elections than men. [15] Better insight on women's attitudes towards nature and conservation issues is essential in understanding and shaping policies.

Finally, we wanted to highlight how our research could offer a starting point for a number of further studies that can improve our understanding on how environmental values shape conservation actions. A very interesting future avenue of research would be a comparison of this survey – particularly Module One and RRP specific modules (Modules Four, Five and Six) – between randomized, average Turkish citizens and conservation experts, such as professionals working in environmental NGOs, international organizations, academics etc. This could offer pre-emptive insight to potential conflicts that could arise similar to the protests for the protection on RRPs. Another interesting research area would be implementing this survey on other species that are not widely considered as charismatic and/or those that cause economic loss via disruptions to human economic activities, such as agricultural production. [16]

[15] Participation in elections in mandatory for everyone above the age of 18 in Türkiye so this argument carries more significance for countries where its elective.

[16] RRPs do cause disruptions to agricultural production across several countries they are not native to, but no such disruptions have been recorded in Türkiye, so it is not a permissible option.

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APPENDIX A: SURVEY

DOĞA-İNSAN İLİŞKİSİ ANKETİ

Sayın katılımcı,

Bu bilimsel çalışma, Boğaziçi Üniversitesi'nde bir yüksek lisans tezi kapsamında, bireylerin insan-doğa ilişkisini şekillendiren değerleri araştırmayı hedefliyor. Araştırmamıza katılmayı kabul ettiğiniz takdirde, sizden yaklaşık 8 dakikalık bir ankete katılım göstermeniz beklenecektir.

Ankette sizden isim talep edilmeyecek, tüm bilgileriniz isimsiz bir şekilde yalnızca bilimsel çalışmalarda kullanılacak ve yanıtlarınız herhangi bir kişi ya da kurum ile paylaşılmayacaktır.

Ankete katılımınız tamamen isteğe bağlıdır. İstediğiniz zaman çalışmadan çekilme hakkına sahipsiniz. Bu durumda yanıtlarınız çalışma dışında tutulacak ve verdiğiniz yanıtlar imha edilecektir.

Anketimiz ileri bir tarihte başka bir çalışma için kullanılmayacak, başka bir çalışma ile birleştirilmeyecek, herhangi bir kurum veya kuruluş ile paylaşılmayacak ve herhangi bir karar alım sürecinde kullanılmayacaktır.

Araştırma sonuçlarına ilişkin dilerseniz daha sonra **saadet.ulku@bogazici.edu.tr** e-posta adresinden bilgi talep edebilirsiniz. Araştırmayla ilgili haklarınız konusunda Boğaziçi Üniversitesi Sosyal ve Beşeri Bilimler İnsan Araştırmaları Etik Kurulu'na (sbinarek@boun.edu.tr) da danışabilirsiniz.

Ankete katılımınız için teşekkür ederiz.

☐ Bana anlatılanları ve yukarıda yazılanları anladım. Çalışmaya katılmayı kabul ediyorum.

Online Anket:

ANKET

BÖLÜM 1

Aşağıdaki ifadelere ne derece katıldığınızı 1-5 arasında (1- Kesinlikle katılmıyorum, 5 – Kesinlikle katılıyorum) belirtir misiniz?
Toplam 22 soru cevaplamanız beklenmektedir.
Lütfen her soru için tek bir seçim yapınız.

SORULAR		Soruya katılma seviyenize göre 1-5 arasında bir seçim yapabilirsiniz.				
		Kesinlikle katılmıyorum	Pek katılmıyorum	Kararsızım	Biraz katılıyorum	Kesinlikle katılıyorum
1	İstihdam yaratma ve ekonomik refahın artırılması gibi hedefler, doğa koruma çabalarının önüne geçmemelidir.	1	2	3	4	5
2	Ekonomik kalkınma için doğal alanlarda gerçekleşebilecek tahribat tolere edilebilir.	1	2	3	4	5
3	Balıkçılık, elektrik üretimi, turizm vb. amaçlarla nehirleri kullanmadığımızda doğal kaynakları israf etmiş oluruz.	1	2	3	4	5
4	İnsanlara fayda sağladığı sürece, bilimsel araştırmalarda hayvanların kullanılması kabul edilebilir.	1	2	3	4	5
5	Avlanma izni olan kişilerin, kanunlara uygun şekilde avlanmasında herhangi bir sorun görmüyorum.	1	2	3	4	5
6	Bitkiler ve hayvanların da insanlar gibi var olma hakkı vardır.	1	2	3	4	5
7	Doğayı korumak için, gerekirse insanların doğaya erişimi ve kullanımı kısıtlanabilir.	1	2	3	4	5
8	Şehirlerin genişlemesinin, yaban hayvanlarının yaşam alanlarını ihlal ettiğini düşünüyorum.	1	2	3	4	5
9	Avcılığı zalimce ve insanlık dışı buluyorum.	1	2	3	4	5
10	Nehirler, ormanlar, hayvanlar gibi doğal kaynakların, insanların kullanımı için var olduğunu düşünüyorum.	1	2	3	4	5
11	Doğada zaman geçirmek, insanların fiziksel ve ruhsal sağlığını olumlu etkiler.	1	2	3	4	5

SORULAR		Soruya katılma seviyenize göre 1-5 arasında bir seçim yapabilirsiniz.				
		Kesinlikle katılmıyorum	Pek katılmıyorum	Kesinlikle katılmıyorum	Biraz katılıyorum	Kesinlikle katılıyorum
12	Alageyik, turna, Anadolu Parsı gibi yerel türlerin kültürümüzde önemli bir yeri olduğunu düşünüyorum.	1	2	3	4	5
13	Şehirde gördüğüm martı, kirpi gibi yaban hayvanlarının yaşam kaliteme olumlu etkisi olduğunu düşünüyorum.	1	2	3	4	5
14	Doğayı korumak için gösterdiğimiz çabaları gelecek nesillere karşı en önemli sorumluluklarımızdan biri olarak görüyorum.	1	2	3	4	5
15	Doğadaki tüm varlıklara karşı insan olarak büyük bir sorumluluk hissediyorum.	1	2	3	4	5
16	Bitki ve hayvanlarla güçlü duygusal bağlar kurarım.	1	2	3	4	5
17	Fırat Nehri gibi yüksek tarihi ve kültürel öneme sahip doğal varlıkların korunması önceliklendirilmelidir.	1	2	3	4	5
18	Göller ve sulak alanların önemi hakkında insanlara sağladıkları faydaların dışında birden fazla sebep düşünebilirim.	1	2	3	4	5
19	Yaban hayatındaki çeşitliliğin azalmasının, insanlığın geleceğine etkisinin çok büyük olmayacağını düşünüyorum.	1	2	3	4	5
20	Doğadaki bitki ve hayvan türlerindeki çeşitlilik, insanlar için herhangi bir fayda sağlamasa bile korunmalıdır.	1	2	3	4	5
21	Böcek çeşitliliğinin azalmasının insanlar üzerinde büyük etkileri olacağını düşünüyorum.	1	2	3	4	5
22	İnsan hayatının doğadaki tüm canlılar ile yakından ilişkili olduğunu düşünüyorum.	1	2	3	4	5

BÖLÜM 2

Şimdi size İstanbul korularındaki/parklarındaki yaygın 7 kuş türünün fotoğraflarını göstereceğim. Bu türlerin isimlerini biliyorsanız söyleyebilir misiniz?

1. Kızılgerdan (*Erithacus rubecula*): ____, Bilmiyorum
2. Leş Kargası (*Corvus cornix*): ____, Bilmiyorum
3. Bayağı Serçe (*Passer domesticus):* ____, Bilmiyorum
4. Saksağan (*Pica pica*): ____, Bilmiyorum
5. Büyük Baştankara (*Parus major*): ____, Bilmiyorum
6. Yeşil Papağan (*Psittacula krameri*): ____, Bilmiyorum
7. Alakarga (*Garrulus glandarius*): ____, Bilmiyorum

1



2



3



4



5



6



7



BÖLÜM 3

Şimdi size bir kuş sesi dinleteceğim. Hemen arkasından bu sese ilişkin kısa sorular soracağım.

1. Daha önce bu sesi İstanbul'da hiç duymuş muydunuz? Evet – Hayır

2. Bu sesin bir önceki bölümde görmüş olduğunuz kuş türleri arasından hangisine ait olduğunu biliyor musunuz? Evet – Hayır

3. Evet ise hangisi?

   .....

Az önce dinlediğiniz ses bir yeşil papağana aitti. Şimdi size yeşil papağanın tipik bir fotoğrafını göstereceğim.



4. Bu kuşu daha önce İstanbul'da hiç görmüş müydünüz? Evet – Hayır

BÖLÜM 4

Şimdi sizinle Türkiye'deki kentsel yeşil alanlarda görülebilen yeşil papağanlar hakkında birkaç ifade paylaşacağız.

Aşağıdaki ifadelerden hangileri sizce doğrudur veya yanlıştır?

1	Yeşil papağanlar yaklaşık güvercin boyutundadır.	*Doğru*	*Yanlış*
2	Yeşil papağanların anavatanı Türkiye'dir.	*Doğru*	*Yanlış*
3	Yeşil papağanların tüyleri, yeşile ek olarak mavi, pembe ve sarı renklerde de olabilir.	*Doğru*	*Yanlış*
4	Yeşil papağanlar, Avrupa'daki diğer ülkelerde de yaşamaktadır.	*Doğru*	*Yanlış*
5	Yeşil papağanlar İstanbul'daki ağaçların meyveleriyle beslenmektedir.	*Doğru*	*Yanlış*
6	İstanbul'un parklarında yaklaşık 5000 tane yeşil papağan yaşamaktadır.	*Doğru*	*Yanlış*
7	Yeşil papağanlar ortalama 30 yaşına kadar yaşayabilir.	*Doğru*	*Yanlış*
8	Yeşil papağanlar genelde büyük koloniler (gruplar) halinde yaşar.	*Doğru*	*Yanlış*

BÖLÜM 5

Aşağıdaki sıfatların sizce hangileri yeşil papağanları daha iyi tanımlar?

Kötü	☐	☐	*İyi*
Zararlı	☐	☐	*Zararsız*
Değersiz	☐	☐	*Değerli*
Yıkıcı	☐	☐	*Faydalı*
İtici	☐	☐	*Hoş*
Pis	☐	☐	*Temiz*
Dostane	☐	☐	*Hırçın*
Gürültücü	☐	☐	*Sessiz*
Bol bulunan	☐	☐	*Nadir*
Çirkin	☐	☐	*Güzel*
Soluk renkli	☐	☐	*Rengarenk*

BÖLÜM 6

Aşağıdaki ifadelere ne derece katıldığınızı 1 – 5 arasında (1 - Hiç Katılmıyorum, 5 – Tamamen Katılıyorum) belirtebilir misiniz?

SORULAR		Soruya katılma seviyenize göre 1-5 arasında bir seçim yapabilirsiniz.				
		Kesinlikle katılmıyorum (1)	Pek Katılmıyorum (2)	Kararsızım (3)	Biraz Katılıyorum (4)	Kesinlikle katılıyorum (5)
1	Yeşil papağanların kentlerdeki ağaç ve bitkilere zarar verdiğini düşünüyorum.	1	2	3	4	5
2	Günlük hayatımda yeşil papağanlara denk gelince mutlu oluyorum.	1	2	3	4	5
3	Yeşil papağanların Türkiye'deki kentsel yeşil alanların bir parçası haline gelmesini sakıncalı buluyorum.	1	2	3	4	5
4	Yeşil papağanlar Türkiye'de yalnızca evcil hayvan olarak bulunmalıdır.	1	2	3	4	5
5	Yeşil papağanların diğer kuş türleri gibi müdahale olmaksızın var olma hakları olduğuna inanıyorum.	1	2	3	4	5
6	Yeşil papağanlar gibi dışarıdan gelen türler daha fazla kontrole tabi tutulmalıdır.	1	2	3	4	5
7	Yeşil papağanlara, kentlerde yaşayan insanlara rahatsızlık vermeleri durumunda müdahale edilmesi gerektiğini düşünüyorum.	1	2	3	4	5
8	İstanbul'daki yeşil papağanların varlığının devam etmesini destekliyorum.	1	2	3	4	5

BÖLÜM 7

Şu anda veya daha önceki yıllarda evcil bir hayvanınız oldu mu?	☐ Evet	☐ Hayır	☐ Daha önceki bir dönemde	
Doğa korumaya ilişkin faaliyet yürüten kurumlara (dernekler, kamu kuruluşları gibi) hiç destek verdiniz mi?	☐ Evet	☐ Hayır		
Bu kurumlara nasıl destek verdiniz? *(Birden fazla seçim yapabilirsiniz. Daha önceki soruda destek bulunmadığınız belirttiyseniz bu soruyu boş bırakabilirsiniz.)*	Finansal destek: ☐ Evet ☐ Hayır	İmza kampanyalarına destek: ☐ Evet ☐ Hayır	Fiziksel destek (gönüllülük, yürüyüş vb. aktiviteler) ☐ Evet ☐ Hayır	
Şehirdeki yeşil alanlara ya da parklara ne sıklıkla geliyorsunuz?	☐ Her gün	☐ Haftada birkaç gün	☐ Ayda birkaç sefer	☐ Senede birkaç sefer
Cinsiyetiniz nedir?	☐ Kadın	☐ Erkek	☐ Diğer	
Hangi yaş aralığındasınız?	☐ 18 -35	☐ 35 - 50	☐ 50 – 65	☐ 65 ve üzeri
Son bitirdiğiniz eğitim seviyesi hangisidir?	☐ Lise ve altı	☐ Üniversite	☐ Yüksek lisans	☐ Doktora ve üzeri
Mesleğiniz nedir?	☐ Eğitim ve Akademi ☐ Bakanlıklar ve diğer kamu kurumları ☐ Belediyeler ve diğer yerel yönetim kurumları ☐ Finans ☐ Uluslararası Organizasyonlar ☐ Sosyal Toplum Örgütleri ☐ Tıp ☐ Çevre ve doğa koruma ☐ Madencilik ve tabii kaynaklar ☐ Enerji ☐ Öğrenci ☐ Serbest Meslek ☐ Ev Hanımı ☐ Çalışmıyor ☐ Diğer : ……....			
Aylık geliriniz yaklaşık olarak hangisine denk gelmektedir?	☐ ₺17,000 – 40,000	☐ ₺40,000 – 70,000	☐ ₺70,000 – 100,000	☐ ₺100,000 ve üzeri

APPENDIX B: EXPLORATORY FACTOR ANALYSIS

Table B.1. Exploratory Factor Analysis (Module One)

Factor Loadings

	Factor		
	1	2	Uniqueness
Q1			0.915
Q2			0.912
Q3			0.996
Q4		0.486	0.767
Q5		0.933	0.130
Q6	0.437		0.776
Q7			0.859
Q8			0.855
Q9		−0.607	0.621
Q10		0.380	0.862
Q11			0.902
Q12	0.545		0.715
Q13	0.455		0.795
Q14	0.501		0.762
Q15	0.448		0.785
Q16	0.455		0.649
Q17	0.323		0.890
Q18	0.441		0.813
Q19			0.956
Q20			0.926
Q21	0.325		0.899
Q22	0.529		0.697

Note. 'Maximum likelihood' extraction method was used in combination with a 'oblimin' rotation

Table B.2. Initial Eigenvalues (Module One)

Initial Eigenvalues

Factor	Eigenvalue
1	2.8770
2	1.3620
3	0.7108
4	0.5506
5	0.4330
6	0.2681
7	0.2214
8	0.1342
9	0.1256
10	−0.0337
11	−0.0411
12	−0.1122
13	−0.1339
14	−0.2305
15	−0.2519
16	−0.2794
17	−0.3415
18	−0.3588
19	−0.4250
20	−0.5120
21	−0.5380
22	−0.5521

Table B.3. Sampling Adequacy Tests (Module One)

Bartlett's Test of Sphericity

χ^2	df	p
676	231	< .001

KMO Measure of Sampling Adequacy

	MSA
Overall	0.675
Q1	0.555
Q2	0.687
Q3	0.532
Q4	0.671
Q5	0.660
Q6	0.696
Q7	0.705
Q8	0.735
Q9	0.689
Q10	0.578
Q11	0.778
Q12	0.656
Q13	0.641
Q14	0.667
Q15	0.752
Q16	0.775
Q17	0.568
Q18	0.693
Q19	0.644
Q20	0.695
Q21	0.559
Q22	0.735

APPENDIX C: RELIABILITY ANALYSES

Table C.1. Reliability Statistics (all environmental value questions) / Module One

Scale Reliability Statistics

	SD	Cronbach's α
scale	0.258	0.258

Note. items 'Q1', 'Q2', 'Q3', 'Q4', and 'Q5' correlate negatively with the total scale and probably should be reversed

Item Reliability Statistics

			If item dropped
	Mean	SD	Cronbach's α
Q1 [a]	1.69	1.144	0.319
Q2	1.89	1.197	0.311
Q3	2.83	1.489	0.245
Q4	2.77	1.462	0.275
Q5	2.42	1.511	0.416
Q6	4.86	0.495	0.229
Q7	4.10	1.260	0.180
Q8	4.43	0.982	0.200
Q9	4.02	1.251	0.259
Q10 [a]	2.96	1.634	0.353
Q11	4.95	0.246	0.249
Q12	4.61	0.816	0.205
Q13	4.32	1.112	0.196
Q14	4.88	0.454	0.220
Q15	4.83	0.438	0.232
Q16	4.51	0.691	0.208
Q17	4.79	0.562	0.234
Q18	4.76	0.469	0.223
Q19 [a]	3.83	1.528	0.228
Q20	4.85	0.478	0.234
Q21	4.13	1.172	0.186
Q22	4.70	0.775	0.212

[a] reverse scaled item

Table C.2. Reliability Statistics (instrumental value questions) / Module One

Scale Reliability Statistics

	SD	Cronbach's α
scale	0.749	0.413

Note. item 'Q1' correlates negatively with the total scale and probably should be reversed

Item Reliability Statistics

			If item dropped
	Mean	SD	Cronbach's α
Q1 [a]	1.69	1.14	0.5491
Q2	1.89	1.20	0.2562
Q3	2.83	1.49	0.4225
Q4	2.77	1.46	0.0969
Q5	2.42	1.51	0.3438

[a] reverse scaled item

Table C.3. Reliability Statistics (intrinsic value questions) / Module One

Scale Reliability Statistics

	SD	Cronbach's α
scale	0.625	0.349

Item Reliability Statistics

			If item dropped
	Mean	SD	Cronbach's α
Q6	4.86	0.495	0.323
Q7	4.10	1.260	0.264
Q8	4.43	0.982	0.216
Q9	4.02	1.251	0.202
Q10 [a]	2.96	1.634	0.487

[a] reverse scaled item

Table C.4. Reliability Statistics (relational value questions) / Module One

Scale Reliability Statistics

	SD	Cronbach's α
scale	0.351	0.556

Item Reliability Statistics

			If item dropped
	Mean	SD	Cronbach's α
Q11	4.95	0.246	0.549
Q12	4.61	0.816	0.452
Q13	4.32	1.112	0.557
Q14	4.88	0.454	0.508
Q15	4.83	0.438	0.507
Q16	4.51	0.691	0.496
Q17	4.79	0.562	0.545

Table C.5. Reliability Statistics (ecological value questions) / Module One

Scale Reliability Statistics

	SD	Cronbach's α
scale	0.502	0.308

Item Reliability Statistics

			If item dropped
	Mean	SD	Cronbach's α
Q18	4.76	0.469	0.272
Q19 [a]	3.83	1.528	0.321
Q20	4.85	0.478	0.261
Q21	4.13	1.172	0.248
Q22	4.70	0.775	0.228

[a] reverse scaled item

Table C.6. Reliability Statistics (Perceptions towards RRP questions) / Module Five

Scale Reliability Statistics

	SD	Cronbach's α
scale	0.132	0.562

Note. items 'RRP_ADJ Q5', 'RRP_ADJ Q10', and 'RRP_ADJ Q11' correlate negatively with the total scale and probably should be reversed

Item Reliability Statistics

			If item dropped
	Mean	SD	Cronbach's α
RRP_ADJ Q1	1.92	0.268	0.513
RRP_ADJ Q2	1.85	0.363	0.454
RRP_ADJ Q3	1.96	0.194	0.559
RRP_ADJ Q4	1.86	0.350	0.446
RRP_ADJ Q5	1.99	0.113	0.563
RRP_ADJ Q6	1.97	0.159	0.572
RRP_ADJ Q7 [a]	1.76	0.432	0.574
RRP_ADJ Q8	1.23	0.424	0.551
RRP_ADJ Q9	1.74	0.439	0.506
RRP_ADJ Q10	1.99	0.113	0.577
RRP_ADJ Q11	1.95	0.222	0.560

[a] reverse scaled item

Table C.7. Reliability Statistics (Attitudes towards RRP questions) / Module Six

Scale Reliability Statistics

	SD	Cronbach's α
scale	0.633	0.694

Item Reliability Statistics

			If item dropped
	Mean	SD	Cronbach's α
RRP Q1 [a]	4.22	1.202	0.668
RRP Q2	4.69	0.588	0.668
RRP Q3 [a]	4.18	1.266	0.614
RRP Q4 [a]	4.18	1.297	0.648
RRP Q5	4.72	0.719	0.686
RRP Q6 [a]	2.60	1.390	0.671
RRP Q7 [a]	3.83	1.381	0.722
RRP Q8	4.65	0.803	0.633

[a] reverse scaled item

APPENDIX D: REGRESSION ANALYSES

Table D.1. Linear Regression Analysis for RRP Perceptions (only demographic variables)

Model Coefficients - RRP PERCEPTIONS - ADJECTIVES (OVER 11) / POSITIVE

Predictor	Estimate	SE	t	p
Intercept [a]	8.1486	0.499	16.3365	< .001
Frequency of visits to green spaces:				
Every day – Several times a month	0.5922	0.575	1.0295	0.307
Several times a week – Several times a month	0.1348	0.402	0.3355	0.738
Several times a year – Several times a month	−0.6823	1.137	−0.6000	0.551
Gender:				
Male – Female	−0.7399	0.406	−1.8224	0.073
Age:				
35 - 50 – 18 - 35	−0.8412	0.470	−1.7881	0.079
50 - 65 – 18 - 35	−0.3316	0.541	−0.6124	0.542
65 and over – 18 - 35	−0.0409	0.550	−0.0743	0.941
Education level:				
High school and lower – Undergrad	0.2363	0.405	0.5828	0.562
Graduate – Undergrad	0.0254	0.490	0.0518	0.959
Doctorate and higher – Undergrad	−3.3594	1.582	−2.1236	0.038
Approximate monthly income:				
₺40,000 – 70,000 – ₺17,000 – 40,000	0.8240	0.470	1.7535	0.084
₺70,000 – 100,000 – ₺17,000 – 40,000	0.9116	0.591	1.5418	0.128
₺100,000 and higher – ₺17,000 – 40,000	−0.2846	0.752	−0.3786	0.706
City:				
Ankara – İstanbul	−0.7077	0.414	−1.7076	0.093

[a] Represents grand mean

.Table D.2. Linear Regression Analysis for RRP Perceptions (all variables)

Model Coefficients - RRP PERCEPTIONS - ADJECTIVES (OVER 11) / POSITIVE

Predictor	Estimate	SE	t	p
Intercept [a]	8.13529	3.081	2.64057	0.011
INSTRUMENTAL VALUE SCORE	−0.09418	0.270	−0.34835	0.729
INTRINSIC VALUE SCORE	−0.83361	0.348	−2.39673	0.020
RELATIONAL VALUE SCORE	1.21482	0.588	2.06559	0.044
ECOLOGICAL VALUE SCORE	0.11250	0.408	0.27557	0.784
ECOLOGICAL KNOWLEDGE SCORE (OVER 7)	−0.18927	0.108	−1.74690	0.086
RRP KNOWLEDGE SCORE (OVER 8)	−0.21210	0.141	−1.50638	0.138
Gender:				
Male – Female	−0.69922	0.405	−1.72534	0.090
Age:				
35 - 50 – 18 - 35	−0.59776	0.473	−1.26391	0.212
50 - 65 – 18 - 35	−0.18877	0.584	−0.32312	0.748
65 and over – 18 - 35	−0.10187	0.585	−0.17423	0.862
Education level:				
High school and lower – Undergrad	−0.24642	0.447	−0.55096	0.584
Graduate – Undergrad	−0.00240	0.502	−0.00478	0.996
Doctorate and higher – Undergrad	−2.62032	1.581	−1.65786	0.103
Approximate monthly income:				
₺40,000 – 70,000 – ₺17,000 – 40,000	0.34096	0.513	0.66458	0.509
₺70,000 – 100,000 – ₺17,000 – 40,000	1.31929	0.628	2.10157	0.040
₺100,000 and higher – ₺17,000 – 40,000	0.31296	0.765	0.40930	0.684
City:				
İstanbul – Ankara	0.69734	0.438	1.59092	0.117
Frequency of visits to green spaces:				
Several times a month – Every day	−0.83253	0.599	−1.38880	0.171
Several times a week – Every day	−0.65667	0.540	−1.21518	0.230
Several times a year – Every day	−0.72379	1.181	−0.61286	0.543
Pet Ownership:				
Previously – No	0.55454	0.645	0.85968	0.394
Yes – No	0.09200	0.569	0.16173	0.872
Support to environmental causes:				
Yes – No	−0.48337	0.369	−1.31151	0.195

[a] Represents grand mean

Table D.3. Linear Regression Analysis for RRP Attitudes (only demographic variables)

Model Coefficients - RRP ATTITUDES (OVER 5) / POSITIVE

Predictor	Estimate	SE	t	p
Intercept [a]	3.5129	0.456	7.7102	< .001
Frequency of visits to green spaces:				
Every day – Several times a month	1.0213	0.487	2.0982	0.039
Several times a week – Several times a month	0.3528	0.342	1.0317	0.306
Several times a year – Several times a month	1.5098	1.032	1.4627	0.148
Gender:				
Male – Female	−0.2659	0.344	−0.7730	0.442
Age:				
35 - 50 – 18 - 35	−0.2612	0.403	−0.6475	0.519
50 - 65 – 18 - 35	−0.0352	0.453	−0.0777	0.938
65 and over – 18 - 35	−0.2542	0.474	−0.5358	0.594
Education level:				
High school and lower – Undergrad	−0.2685	0.347	−0.7728	0.442
Graduate – Undergrad	0.1579	0.442	0.3573	0.722
Doctorate and higher – Undergrad	−0.8831	1.450	−0.6092	0.544
Approximate monthly income:				
₺40,000 – 70,000 – ₺17,000 – 40,000	−0.1328	0.388	−0.3427	0.733
₺70,000 – 100,000 – ₺17,000 – 40,000	0.0339	0.509	0.0667	0.947
₺100,000 and higher – ₺17,000 – 40,000	0.1778	0.683	0.2604	0.795
City:				
Ankara – İstanbul	−1.7579	0.318	−5.5200	< .001

[a] Represents grand mean

Table D.4. Linear Regression Analysis for RRP Attitudes (all variables)

Model Coefficients - RRP ATTITUDES (OVER 5) / POSITIVE

Predictor	Estimate	SE	t	p
Intercept [a]	1.9597	1.3008	1.5065	0.138
INSTRUMENTAL VALUE SCORE	−0.1388	0.1142	−1.2163	0.229
INTRINSIC VALUE SCORE	−0.0910	0.1469	−0.6195	0.538
RELATIONAL VALUE SCORE	0.6366	0.2483	2.5637	0.013
ECOLOGICAL VALUE SCORE	0.0397	0.1724	0.2303	0.819
ECOLOGICAL KNOWLEDGE SCORE (OVER 7)	−0.0662	0.0457	−1.4474	0.154
RRP KNOWLEDGE SCORE (OVER 8)	−0.0518	0.0595	−0.8716	0.387
Gender:				
Male – Female	−0.2321	0.1711	−1.3565	0.181
Age:				
35 - 50 – 18 - 35	−0.1099	0.1997	−0.5505	0.584
50 - 65 – 18 - 35	−0.0764	0.2467	−0.3098	0.758
65 and over – 18 - 35	−0.0169	0.2469	−0.0684	0.946
Education level:				
High school and lower – Undergrad	−0.0998	0.1888	−0.5285	0.599
Graduate – Undergrad	−0.2301	0.2118	−1.0863	0.282
Doctorate and higher – Undergrad	−1.3174	0.6674	−1.9741	0.053
Approximate monthly income:				
₺40,000 – 70,000 – ₺17,000 – 40,000	0.1149	0.2166	0.5306	0.598
₺70,000 – 100,000 – ₺17,000 – 40,000	0.0279	0.2651	0.1051	0.917
₺100,000 and higher – ₺17,000 – 40,000	−0.1531	0.3228	−0.4742	0.637
City:				
İstanbul – Ankara	0.1298	0.1851	0.7013	0.486
Frequency of visits to green spaces:				
Several times a month – Every day	−0.4265	0.2531	−1.6850	0.098
Several times a week – Every day	−0.3395	0.2282	−1.4878	0.143
Several times a year – Every day	0.3096	0.4987	0.6209	0.537
Pet Ownership:				
Previously – No	0.1285	0.2724	0.4718	0.639
Yes – No	0.2470	0.2402	1.0283	0.308
Support to environmental causes:				
Yes – No	−0.3919	0.1556	−2.5183	0.015

[a] Represents grand mean

APPENDIX E: NATURE-RELATEDNESS & RELATIONAL VALUE QUESTIONS COMPARISON

Table E.1. Nature-relatedness & Relational Value Question Comparison

NATURE-RELATEDNESS QUESTIONS *(Based on Pirzio-Biroli et al, 2024)*	**RELATIONAL VALUE QUESTIONS**
My ideal vacation spot would be a remote, wilderness area.	(Not applicable on our research)
I always think about how my actions affect the environment.	I feel a great responsibility towards all beings in nature as a human being.
My connection to nature and the environment is a part of my spirituality.	Spending time in nature positively affects people's physical and mental health.
I take notice of wildlife wherever I am.	I think that wild animals that I encounter in the city, such as seagulls and hedgehogs, have a positive effect on my quality of life.
My relationship to nature is an important part of who I am.	I think that local species such as fallow deer, cranes, and Anatolian leopards have an important place in our culture.
I feel very connected to all living things and the earth.	I form strong emotional bonds with plants and animals.