Procjena ekonomske vrijednosti glavate želve (Caretta caretta (Linnaeus, 1758)) u sjevernom Jadranu kao potencijal za financiranje njihove zaštite

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University of Zagreb
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Martina Glavaš

Estimating the economic value of the loggerhead sea turtle (*Caretta caretta* (Linnaeus, 1758)) in the North Adriatic Sea, as a potential for financing its conservation

Graduation thesis

Zagreb, 2020.

This master thesis was made at the Blue World Institute of Marine Research and Conservation in Veli Lošinj under the guidance of Asst. Prof. Peter Mackelworth, Ph.D., from the University of Primorska, Slovenia and at the Department of Biology of the Faculty of Science in Zagreb, Croatia under the guidance of Asst. Prof. Petar Kružić, Ph.D. The thesis is submitted to the Department of Biology at the Faculty of Science of the University of Zagreb to acquire the title/degree of Master of Science in Ecology and Nature Protection

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Sveučilište u Zagrebu
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Procjena ekonomske vrijednosti glavate želve (*Caretta caretta* (Linnaeus, 1758)) u sjevernom Jadranu kao potencijal za financiranje njene zaštite

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Ekonomska vrijednost glavate želve (*Caretta caretta* (Lineaus 1758)) sastoji se od uporabne i neuporabne vrijednosti. Mjeri se novčanom vrijednosti koju su ispitanici spremni platiti kako bi sudjelovali u različitim ekoturističkim aktivnostima koje su održive i usmjerene na financiranje njihove zaštite. „*Contingent valuation"* istraživanje provedeno je u Istri, Kvarneru i Primorskoj kako bi se procijenila njihova ekonomska vrijednost i potencijal za financiranje njihove zaštite. Istraživanje je također trebalo prikupiti podatke o podršci ispitanika za efikasnije provođenje mjera zaštite te smjernice za formiranje ciljanih obrazovnih programa u svrhu podizanja javne svijesti o važnosti očuvanja mora i morskih kornjača. Procjenjena neuporabna vrijednosti iznosi 2,3 milijuna € u Kvarneru i 3,4 milijuna € u Istri, dok je iznos uporabne vrijednosti bio isti u obje regije. Srednja vrijednost koju su ispitanici spremni platiti je 7,5 € za ulaznicu u centar za morske kornjače dok su za izlet promatranja morskih životinja u divljini spremni platiti 22 €. Uzorak iz Primorske regije nije bio reprezentativan te se rezultati ne smatraju valjanima. Iako je neuporabna vrijednost bila veća u Istri, Kvarner je pokazao veći potencijal za generiranje sredstava za zaštitu. U sve tri regije velika većina ispitanika (~90%) spremna je poduprijeti zaštitne mjere i formiranje zaštićenog područja u sjevernom Jadranu. Obrazovni programi trebali bi se usredotočiti na podizanje svijesti o važnosti sjevernog Jadrana kao staništa za morske kornjače, o morskim kornjačama kao indikatorskim i prioritetnim vrstama te o slučajnom ulovu i sudaru s brodovima kao uzrocima ugroženosti.

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Graduation thesis

Estimating the economic value of the loggerhead sea turtle (*Caretta caretta* (Linnaeus, 1758)) in the North Adriatic Sea as a potential for financing its conservation

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The economic value of loggerhead sea turtles (*Caretta caretta* (Lineaus 1758)) is made up of use and non-use values. It is measured by respondents' willingness to pay for participation in various sustainable ecotourism activities whose proceeds would be directed towards the conservation of loggerhead sea turtles. A contingent valuation survey was conducted in Istria, Kvarner and Primorska to estimate their economic value and to gauge its potential for generating funds for their conservation. The study also examines the respondents' support for the implementation of more effective measures of marine turtle protection and, consequently, what points the awareness-raising campaigns should focus on. The estimated non-use value was 2.3 million € in Kvarner and 3.4 million € in Istria, while the estimated use-value was the same in both regions. The median value of the amount of money the respondents were willing to pay was 7.5 € for an entrance ticket to a turtle center and 22 € for a ticket for a marine wildlife trip. The results derived from the Primorska region data aren't considered valid because the sample is not representative. Although in Istria loggerhead sea turtles have a higher value, the Kvarner region shows higher potential for generating funds for conservation. In all three regions, the great majority of respondents (~90%) were willing to support mitigation measures and the creation of a protected area in the North Adriatic. Educational campaigns should focus on raising awareness about the importance of northern Adriatic as a sea turtle habitat, of sea turtles as indicator and priority species, and the risks of bycatch and collision with speed boats.

(54 pages, 17 figures, 15 tables, 124 references, original in English)

Thesis deposited in the Central Biological Library

Keywords: *Caretta caretta*, non-use value, use value, contingent valuation survey, questionnaires, conservation

Supervisors: Asst. Prof. Peter Mackelworth, Ph.D.; Asst. Prof. Petar Kružić, PhD

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1. Introduction

The loggerhead sea turtle *Caretta caretta*, (Linnaeus, 1758), is a wide-ranging marine species with known nesting and feeding areas in the Mediterranean region (Casale & Margaritoulis, 2010). There are no known nesting sites on the Croatian coasts of the Adriatic Sea due to its physical characteristics, but the North Adriatic is known as an important neritic feeding and overwintering area for loggerheads (Lazar & Tvrtković, 2003). The biggest threats for loggerhead turtles in the Adriatic include incidental catch, followed by collisions with boats and plastic pollution.

Listed in Annex II of Habitats Directive with a (*) before the name, the loggerhead turtle is a priority species for conservation in the European Union (EU) (Council Directive 92/43/EEC, HD). Annex II of the HD requires the designation of protected areas for listed species, Natura 2000 sites, with ecologically and economically sustainable management, to ensure their long-term survival (Council directive 92/43/EEC, HD). Natura 2000 is a network of protected areas that are important for rare and threatened species and habitats. Currently, there are no Natura 2000 sites for loggerhead sea turtles in the North Adriatic (Fortuna et al, 2018).

As a member of the EU, the Republic of Croatia is obliged to implement commitments to international agreements, harmonize new legislation to establish minimum standards for the environment and establish rules for the integrity of the marketplace (Sladonja et al, 2012). Also, it is important to find sustainable funding mechanisms (Batel et al, 2014) for the established protected area, due to the government's budget deficit (Spuregon et al, 2010). Fortuna et al's (2018) emphasize the importance of implementing mitigation measures for threats throughout the entire habitat of the loggerhead turtle and point out that protected areas should be extremely large for this wide-ranging species, for the spatial conservation to be effective. They, as well as Cazabon-Mannette et al's (2017), point out the need for cooperation and coordinated efforts between countries in the region.

The significant role of tourism in the Adriatic and the Croatian national economy, at almost 20% of revenues in GDP (Ministry of tourism, 2018), makes tourists and their opinion an important component in the conservation policymaking (Batel et al, 2014). Since conservation is often given a low priority due to a low return on investment, demonstrating that it can generate revenue through tourism can lead to a shift in the policy making toward the more appropriate allocation of resources to conservation (Catlin et al, 2013). Special touristic offers serve as a new and exciting way to experience nature in exchange for money (Liu, 2003; Wearing & Niel, 2009) and demonstrate the tangible economic benefit of wildlife, presenting a business case for conservation (Catlin et al, 2013).

In recent years the environment and wildlife have played an important role in making nature-based tourism (or ecotourism) the fastest growing sector of the industry (Bhandari & Heshmati, 2009). Such tourism integrates sustainable development, conservation and the protection of natural resources with meeting human needs (Stronza, 2007; Tisdell & Wilson, 2005; Weaver, 2001). Providing economic benefits, it can serve as an incentive for conservation (Stronza & Gordillo, 2008), foster political support (Wilson & Tisdell, 2003), provide employment for people (Bhandari & Heshmati, 2009) and, through education, affect people's values, attitudes, and behaviors towards the environment (Stronza, 2007; Tisdell & Wilson, 2005; Weaver, 2001).

Economic valuation provides valuable information on the relative value of a species for policy making (White et al, 2001) and its importance in the context of sustainable development (Ledoux & Turner, 2002). The economic value of the sea turtle is estimated within the framework of "Total Economic Value" (TEV), made up of use and non-use values (Pearce & Seccombe-Hett, 2000; Teh et al, 2018). Tourism is used to create such a market (Sala et al, 2013) where use-values refer to recreational use, based on special tourism offers, while non-use values refer to preservation value, based on bequest, existence and option value (Lee & Han, 2002). Although a variety of methods has been developed (Farber & Gringer, 2000; Pearce & Seccombe-Hett, 2000; Nunes & van den Bergh, 2001), contingent valuation method (CVM) is the most commonly used due to its ability to measure non-use values together with use values (Farber & Gringer, 2000; Nunes & van den Bergh, 2001; Carson et al, 2000; Spash, 2000; Jones et al, 2011; White et al, 2001).

The first part of the thesis, or the literature review, provides information about sea turtles with a focus on Mediterranean loggerhead turtle population, ecotourism and its role in marine conservation practices, as well as the economic valuation methods that are used to estimate the value of the environment.

The second part of the thesis provides an estimation of the economic value of loggerhead turtles in the Northern Adriatic Sea context. This is done through analyzing questionnaires that were designed to gather information from tourists and visitors in the region as part of the LIFE EUROTURTLE (LIFE15 NAT/HR/000997) project. It provides information about the potential funding mechanisms for sustainable management, raises awareness of threats to sea turtles, offers possible solutions to mitigate them, and suggests where to target structured educational programs to raise public awareness.

1.1 Sea turtles

Sea turtles have been around for hundreds of millions of years providing nutritional, economic and spiritual sustenance to people, which has been represented in a wide variety of cultures all over the world (Fraizer, 2003). They are reptiles spending their entire life at sea, except when adult females come out onshore to lay eggs. There are seven species of sea turtles in the world: loggerhead, green (*Chelonia mydas* (Linnaeus, 1758)), leatherback (*Dermochelys coriacea* (Vandelli, 1761)), hawksbill (*Eretmochelys imbricata* (Linnaeus, 1766)), Kemp's ridley (*Lepidochelys kempii* (Garman, 1880)), olive ridley (*Lepidochelys olivacea* (Eschscholtz, 1829)) and flatback (*Natator depressa* (Garman, 1880)). The first three are frequent in the Mediterranean, while hawksbill and Kemp's ridley occur occasionally (Casale & Margaritoulis, 2010). Since the loggerhead turtle is most abundant in the Mediterranean (Margaritoulis et al, 2003) and a wide continental shelf in the northern Adriatic represents one of the key neritic feeding and important wintering habitat for them (Lazar & Tvrtković, 2003), they are in the focus of this research.

Exploited for thousands of years and exposed to a variety of threats, sea turtles have become endangered species (Bjorndal & Jackson, 2003). Although their natural threats result in their low survival rate, the real cause of their endangerment is anthropogenic threats as a result of high human presence in their habitats. These include coastal development, exploitation of resources, pollution, climate change, invasive species, agriculture and aquaculture (IUCN, 2018). On a global scale, direct exploitation and trade are the main factors impacting turtle populations, followed by the fishing industry, pollution, and coastal development.

Due to their vulnerable life histories and high human pressure, they are a priority conservation species (Teh, Teh & Jolis, 2018). Six of seven sea turtle species are listed as vulnerable, endangered, or critically endangered in the IUCN (World Conservation Union) Red List of Threatened Species with decreasing population trends. While the flatback turtle is listed as data deficient (IUCN, 2018).

1.1.1 Mediterranean loggerhead turtle population

The Mediterranean Sea is a semi-enclosed basin covering an area of 2.5 million km^2 (Margaritoulis et al, 2003), connected with the Atlantic Ocean through the 14 km wide Strait of Gibraltar (Margaritouilis & Casale, 2010). It is divided into two basins, eastern and western, characterized by different hydrological conditions. The Adriatic Sea is an elongated basin of the eastern Mediterranean Sea covering an area of 139,000 km^2 and it can be divided into three sub-basins, northern, central and southern, with different physical characteristics (Lazar, 2010). Croatia is located on the eastern Adriatic coast covering most of (75%) its coastline, followed by Montenegro (12%), Albania (10%), Slovenia (2%) and Bosnia and Hercegovina (1%) (Lazar, 2010).

The loggerhead turtle is one of the two species with known nesting sites in the Mediterranean (Margaritouilis & Casale, 2010). Nesting activities have been recorded in Greece, Turkey, Cyprus and Libya (Margaritoulis et al, 2003; Margaritouilis & Casale, 2010). There have been no recorded nesting activities in the eastern Adriatic (Casale et al, 2018), although most recent research shows that there are nesting sites in Albania's Drini Bay (Hochscheid et al, 2019). Nursery areas for post-hatchling and small juveniles are unknown in the Mediterranean (Casale et al, 2018). Oceanic foraging areas, off the continental shelf, are

found in all oceanic areas within the Mediterranean (Casale et al, 2018). Neritic foraging areas correspond to the continental shelf in the Mediterranean (Casale et al, 2018) and the two most extensive ones are Gulf of Gabes in Tunisia and northern Adriatic (Lazar, 2010).

The IUCN Red List assessment of the Mediterranean loggerhead turtle subpopulation reported a positive trend (Casale, 2015), but according to Casale et al (2018) caution is necessary due to limitations of methods that estimate population abundances.

1.1.1.1 Threats

The Mediterranean region is highly populated, affected by the fishing and tourism industry, as a result of which loggerhead turtles are threatened in both their terrestrial and marine habitats. The threats they are facing at their nesting sites are coastal development, recreational activities, climate change, erosion and beach armoring (Casale et al, 2018). In marine habitats, they are faced with the fishing industry, human exploitation, recreational activities, climate change, marine debris and pollution (Casale et al, 2018). Changes in legislation and marketing may lead to the end of direct exploitation of sea turtles in the Mediterranean (Caslae & Margaritoulis, 2010). But the fishing industry, pollution, and tourism, which is the biggest contributing factor to the increase in coastal development and recreational activities, are still having a major impact on their population. Since there are no recorded nesting sites in the Croatian and Slovenian coast of Adriatic, due to its physical characteristics (Lazar, 2010), threats in their marine habitats and possible mitigation measures will be explained further.

Fisheries have an enormous impact on sea turtles. Although they do not target the species, a large number are caught accidentally. Pelagic longline, bottom trawl, set net, demersal longline and ghost gear have high bycatch rates which can cause drowning (Casale et al, 2018) or internal damage (Casale et al, 2008b) leading to their death. In Croatian waters of the Adriatic Sea, bottom trawl and gillnet fishery represent major threats, with 2500 (Lazar & Tvrtković, 1995) and 658 captures per year (Lazar et al, 2006), respectively. In Slovenian waters, they are estimated at 70 captures per year for gillnets and 3-5 captures per year for trawls (Lazar & Žiža, 2010). Mitigation measures for reducing bycatch include the modification of the gear, such as a turtle excluder device (TED) (FAO 2009), illuminating the net (Ortiz et al. 2016) and the use of larger hooks (Piovano et al. 2012). In the case of bottom trawling, keeping comatose turtles on board until they recover represents another mitigation measure (FAO, 2009).

The Mediterranean is a semi-enclosed sea and organic and inorganic wastes rapidly affect the ecosystem (Caminas, 2004). Chemical pollutants represent a threat to sea turtles, there is an increasingly important problem of plastic debris. Sea turtles are the best-known species affected by it and they are often used in environmental messaging (Eagle et al, 2016). They are primarily affected through entanglement or ingestion (Schuyler et al, 2015; Wilcox et al, 2016). They often mistake plastic debris for their natural food, which can cause them sub-lethal to lethal effects (Nelms et al, 2016; Wilcox et al, 2016). In the Mediterranean region, entanglement has been reported as a more important cause of stranding than ingestion (Casale et al, 2010). Studies on the ingestion of marine debris show a very small number of lethal cases (Casale et al, 2016) without any clear evidence of direct mortality (Lazar, 2010).

Activities related to high tourist activity on the sea can lead to boat collisions, especially where turtle density is high (Casale et al, 2018). There is obscure documentation on the exact impact of recreational boats, but Hazel et al. (2007) found that turtles are unable to avoid boats at speeds higher than 4 km/h.

1.1.1.2 Conservation

There are several international conventions and supranational agreements that protect sea turtles in the Mediterranean region:

- CITES (1973) Convention on International Trade in Endangered species of Wild Fauna and Flora
- Barcelona Convention (1976) Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean
- Bern Convention (1979) Convention on the Conservation of European Wildlife and Natural Habitats
- Bonn Convention (1979) Convention on the Conservation of Migratory Species of Wild Animals (CMS)
- CBD (1992) Convention on Biological Diversity
- Council Directive 92/43/EEC, Habitats Directive (1992)

The LIFE EUROTURTLES project (Collective action for improving the conservation status of the EU sea turtle populations) started in 2016 intending to improve the conservation status of the EU population of two priority sea turtle species, the loggerhead and the green turtle. The activities of the project are focused on those areas where conservation measures are considered important and could make a difference for sea turtle populations, including six EU countries: Croatia, Cyprus, Greece, Italy, Malta, and Slovenia. The specific objectives of the project are: reducing the impact of anthropogenic threats in their marine and terrestrial habitats, improving the effectiveness of Natura 2000 sites, setting up a consistent approach to the conservation of EU sea turtle populations, contributing to the Marine Strategy Framework Directive, promoting a concept of shared responsibility among EU citizens and setting up an EU network for sea turtle conservation.

1.2 Marine conservation

Marine protected areas (MPAs), reserved by law or other means (Sala et al, 2013), have become a highly advocated form of marine conservation and management (Depondt & Green, 2006). Their primary purpose is to protect and maintain biological value and ecological sustainability (Depondt & Green, 2006; Dharmaratne et al, 2000; Sorice et al, 2007; Becker & Choresh, 2006). Apart from the protection of biodiversity and resources, they provide many other opportunities (Gravestock et al 2008; Becker & Choresh, 2006) ranging from education to recreation, research (Sala et al, 2013) and tourism (Sorice et al 2007; Reid-Grant & Bhat, 2009). An effective shortcut and popular approach to conservation is the use of focal species. These are socially or ecologically valuable for understanding, management and conservation of natural environments together with the assumptions that they will protect habitat and whole community (Andelman & Fagan, 2000; Zacharias & Roff, 2001).

Although the benefits of MPAs are becoming more recognizable (McCrea-Strub et al, 2011), the quality of management is still highly variable (Gravestock et al, 2008). It is hard to compare MPAs, because there are many types (Sala et al, 2013), with a variety of managing bodies (Svensson et al, 2008) and a wide range of objectives (Gravestock et al, 2008). Most of them are failing to reach management aims and are so-called "paper parks" (Depondt & Green, 2006, Dharmaratne et al 2000; Lindberg, 2001; Reid-Grant & Bhat, 2009).

According to Dharmaratne et al's (2000), there are two main causes for the failure of MPAs, the lack of funds and problems with justification. The most common is the lack of funds (Depondt & Green, 2006; Lindberg, 2001; Gravestock et al, 2008; Reid-Grant & Bhat, 2009). Most traditional funding is unpredictable due to fluctuations in governmental priorities and can, therefore, be considered unsustainable (Depondt & Green, 2006), especially in developing countries (Dharmaratne et al, 2000). There is also the problem of central funds and their distribution (Reid-Grant & Bhat, 2009), because of which some well-financed MPAs are still underfunded (Gravestock et al, 2008). To resolve this problem of "paper parks" it is important to identify financial resources and design policies to ensure appropriate money transfer for conservation and regulation (Reid-Grant & Bhat, 2009).

Leisher et al's (2012) emphasize how MPA success or failure is primarily determined by social factors, including government and business community cooperation (Reid-Grant & Bhat, 2009), and cooperation with the local community (Svensson et al, 2008). Giakuomi et al's (2018) study of factors related to failure and success of MPA confirmed previous research. They found that stakeholder engagement is the most important factor for MPA's success and its absence was related to the failure, while other factors could only be related either to success or failure.

The construct of a charismatic or flagship species is important in biodiversity conservation because the fate of conservation is inseparably linked with the fate of particular charismatic species (Kontoleon & Swanson, 2003). Charismatic species are often used to raise public awareness and gain financial support for conservation (Bjorndal & Jackson, 2003; Campbell, 2003). They are an important attraction for the growing tourism industry (Teh et al, 2018; Bhandari & Heshmati, 2009) because the amount of funding spent on conservation largely depends on public appeal and the charisma of the species (Kontoleon & Swanson, 2003).

Sea turtles are seen as charming anachronisms or quaint archaic relies and as such are considered as flagship species (Bjorndal & Jackson, 2003; Campbell, 2003). Conversely, they

provide a range of ecological services (Bjorndal & Bolten, 2003): with an important role in maintaining ecosystem health (Heithaus, 2013), they are considered a keystone and indicator species in marine ecosystems (Cazabon-Mannette et al, 2017; Bjorndal & Bolten, 2003). To raise their conservation profile and priority there is a need for the evaluation of their role as keystone or indicator species (Wilson et al, 2010). A healthy sea turtle population that fulfills their ecological roles requires a healthy ecosystem - this reflects the fact that only a healthy ecosystem can fully provide ecological services and economic benefits to humans (Bjorndal & Bolten, 2003).

1.3 Nature-based tourism

Nature-based tourism refers to travel that is motivated by the natural history of a host location, along with the opportunities for education, recreation, or adventure (Laarman & Gregersen, 1996). Ecotourism is perceived as a form of nature-based tourism with three core elements that distinguish it from other forms of tourism: the attraction is the natural environment or specific component thereof, there is a learning outcome and ecological and economical sustainability is important (Weaver, 2001).

Since conservation is often a low priority policy, due to little obvious return on investment, demonstrating that it can generate revenue through tourism can lead to a shift in policy making toward the more appropriate allocation of resources to conservation (Catlin et al, 2013). Ecotourism is seen as a conservation strategy with great potential for protecting the environment while meeting human needs, with both short-term and long-term effects (Stronza & Pegas, 2008). Short-term effects are seen in the economic benefits it can provide which serve as an incentive for conservation (Stronza & Gordillo, 2008). Long-term effects are seen in strengthening local institutions and catalyzing collective action (Stronza & Pegas, 2008) by fostering political support (Wilson & Tisdell, 2003), employment (Bhandari & Heshmati, 2009) and education, which affects people's values, attitudes and behaviors towards the environment (Stronza, 2007; Tisdell & Wilson, 2005; Weaver, 2001).

In the marine realm, ecotourism is focused on large marine species or megafauna, including whales, turtles, seals, sharks, and rays. The demand for ecotourism focused on marine megafauna is increasing (Cisneros-Montemayor et al, 2012; Gallagher & Hammerschlag, 2011; O'Connor et al, 2009) and activities providing interactions with them are expanding. There is considerable potential for the future growth of this industry since some of the most popular sites have only recently been discovered (Norman & Catlin, 2007).

1.3.1 Economic benefits from tourism

The development of wildlife tourism, a type of ecotourism, has increased, in part, due to a desire to view and interact with marine megafauna (Orams, 1996; Wearing & Neill, 1999). It is classified by a range of experiences from viewing to interacting with wildlife (Higginbottom, 2004). Higginbottom (2004) presents three reasons for its development: increased interest in potential, which could be gained with the cooperation of wildlife conservation and tourism involving wildlife; increased use of flagship species for promoting tourism; and particular interest tourists have for some animals. It is based on visitors' interactions with wild animals (Higginbottom, 2004) and offers a realistic chance for long-term conservation (Wilson & Tisdell, 2000; Ballantyne et al, 2009), with a promising role in financing conservation by creating business and employment for local communities (Arin & Kramer, 2002; Catlin et al, 2013).

The whale watching industry is estimated to be worth billions of dollars (Hyot, 2000), it is economically important for many EU countries (Berrow, 2003) and new frameworks developed could serve as a model for other forms of wildlife tourism (Young, 1998). Parsons et al (2003) study estimate 3.2 million US $ as total expenditure on whale watching and visitor centers in west Scotland. Even though it is seasonal, Wilson & Tisdell (2003) show how turtle and whale watching make a significant contribution to the local economy.

The total economic value of sea turtles in Malaysia is quantified by Teh et al's (2018) at 23 million US$ per year, where non-consumptive use was 21 million US$. Furthermore, they show how protection can contribute by providing 1146 tourism jobs per year.

The non-market value of sea turtles in Tobago is estimated with a choice experiment with divers and contingent valuation method among international tourists. The average diver WTP was over 62 US$ for the first 'in sea' turtle encounter and average tourist WTP for conservation was 31.13 US$ indicating a significant non-use value of turtles (Cazabon-Mannette, 2017). Ahmed et al's (2007) estimation of the value of coral reefs in the Philippines, show the potential net annual revenues to the local economy are worth 4.7 million US$.

Studies have shown that ray (O'Malley et al, 2013) and shark watching tourism provide significant economic value across coastal nations offering long-term benefits to local economies (Gallagher and Hammerschlag, 2011). O'Malley et al's (2013) estimate the direct economic impact of manta ray watching tourism at $140 million annually with the potential for a considerable increase in the future. Cisneros-Montemayor et al's (2013) suggest that global shark watching generates $314 million in economic expenditures per year. This, in turn, shows how marine megafauna is more valuable as a long-term source of tourism than as one-time revenues to fisheries (Gallagher & Hammerschlag, 2011; Vianna et al, 2012).

Although there are certain challenges, properly managed models have been proven to generate sustainable livelihoods and have the potential to provide a long-term solution for marine megafauna's conservation (Brunnschneiler, 2010). According to O'Malley et al's (2013), coastal communities depend heavily upon their surroundings, so they must endeavor to manage marine resources wisely.

Wilson & Tisdell (2000) study shows that the potential for sea turtle-based tourism exists in the world and according to Landry & Taggart (2009), the demand for such tourism is increasing. Such tourism provides an opportunity to use sea turtles in a non-consumptive and sustainable manner (Landry & Taggart, 2009; Wilson & Tisdell, 2000). Economic benefits arising from it contribute to conservation policy. They can strengthen arguments for speed limitations and make "Turtle Excluder Devices" (TED) obligatory on trawls (Wilson & Tisdell, 2000). Experiences and education from such activities have the potential to influence conservation attitudes, knowledge and behavior of participants (Ballantyne et al, 2009).

Behavioral studies show that wildlife tourism can have an impact on target species, influencing their behavior, causing injuries and destroying their habitat, and thus have an impact on itself (Landry & Taggart, 2009). It remains a challenge to carefully manage tourism (Wilson & Tisdell, 2000) and its activities (Ballantyne et al, 2009) because its long-term success depends on how well wild stocks are managed (Wilson & Tisdell, 2000).

Tourism can have significant negative environmental impacts, such as pollution and congestion, on tourism destinations (Taylor et al, 2003). A way to mitigate negative aspects of tourism is the introduction of specific taxes (Taylor et al, 2003; Gago et al, 2009; do Valle et al, 2012) and fees (Nyaupane et al, 2009; Arin & Kramer, 2002). They also serve as a funding mechanism for conservation management (Taylor et al, 2003; Nyaupane et al, 2009; Gago et al, 2009). But they should not be used as the only form of potential funding (Lindberg, 2001).

The tax charged is usually below the amount visitors are WTP, as well as below the amount required to finance proper conservation management (Laarman & Gregersen, 1996). The hotel industry is usually strongly opposed to taxing tourists (Reid-Grant & Bhat, 2009) and

increasing user fees (Dharmaratne et al, 2000), as they can introduce distortions and bad practices (Gago et al, 2009). Collaboration is therefore needed between park managers, revenue authorities, tour and hotel operators, and the leaders of local communities on type and amount of fees that will contribute to national objectives for tourism and nature conservation (Laarman & Gregersen, 1996).

Analysing tourist attitudes toward the implementation of taxes has important implications for policy making. A study of accommodation taxes shows that tourists are not willing to pay them (do Valle et al, 2012) and another study on eco-taxes shows general support from tourists, but political and legal barriers for implementation still exist (Taylor et al, 2003). Svensson et al's (2008) study shows how tourists appreciate taxes if they directly contribute towards conservation. It also demonstrates how the vast majority of tourists select NGOs as the most credible organizations to collect and manage entrance fees (Arin & Kramer, 2002).

Jones et al's (2011) investigate visitors' perceptions of two proposed policy instruments which would secure funding for the improvement of the environmental management of Natura 2000 site for loggerhead turtles in Greece. They found that the average WTP for a daily accommodation tax was 1.13 €, yet for an entrance fee to the beach, the amount was 1.59 €.

1.3.2 Non-economic benefits from tourism

The most significant non-economic benefit from ecotourism is education. Several studies investigated the role of education in promoting pro-environmental behavior. Adler (1996) shows how educational programs have more influence on the pro-environmental behaviors, by changing awareness, attitudes, and behaviors than more expensive enforcement.

Wilson & Tisdell's (2005) study of sea turtle based tourism show how experience involving environmental knowledge and seeing turtles has a significant positive impact on visitor's desire and intended behavior to protect turtles. They emphasize how learning and interaction of tourists with wildlife are extremely important for promoting pro-environmental behavior and thus overall conservation. Leshier et al's (2012) support the argument of the role of education contributing to long-term conservation success. Liu et al's (2011) study shows how non-economic benefits arising from tourism can impact resident's pro-environmental behavior, which is important in local support for conservation.

Economic benefits arising from tourism, employment, and cash flow, have a short-term influence on resident's values and attitudes toward the environment (Stem et al, 2003). While their participation in decision making can have a long-term influence on their values, attitudes, and behavior (Liu et al, 2011).

1.4 Economic valuation of biodiversity

Economic valuation of environmental resources is becoming increasingly recognized as a method for policy decision making, due to its ability to provide valuable information on the relative value of resources involved for policymakers (White et al, 2001). The inclusion of economic criteria in conservation policy decision-making encourages the use of economic valuation techniques (Martin-Lopez et al, 2008), which should be a part of a holistic approach in the decision-making process (Ledoux & Turner, 2002). Economic valuation techniques are being used more widely (Pearce & Seccombe-Hett, 2000), because of an increased interest in understanding the economic consequences of environmental regulation and the focus of federal environmental protection shifting from human health to concerns about ecosystem integrity (Bockstael et al, 2000).

Economic valuation of environment involves the assignment of money values, prices, to biodiversity (Nunes & van den Bergh, 2001) and changes in environmental services, functions, stocks of environmental assets (Pearce & Seccombe-Hett, 2000). The main framework used in economic valuation is the total economic value which slightly differs depending on the subject of the research (The World Bank et al, 2004). Total economic value (TEV) of species (Teh et al, 2018), ecological resource (White et al, 2001) and of protected area (Dharmaratne et al, 2000) is made up of use and non-use values (Pearce & Seccombe-Hett, 2000) and it is determined by the willingness to pay (WTP) (Dharmaratne et al, 2000).

Economists have developed a variety of methods for environmental valuation (Farber & Gringer, 2000; Pearce & Seccombe-Hett, 2000; Nunes & van den Bergh, 2001), which have a variety of uses. These include cost-benefit analysis (CBA) of projects, CBA of policies, pricing policies, design of environmental taxes, national accounting, a management tool to participatory exercise (Pearce & Seccombe-Hett, 2000). Methods are divided into revealed-preference and stated preference techniques to measure the values of environmental services (Pearce & Seccombe-Hett, 2000; Farber & Gringer, 2000). Stated-preference techniques include contingent valuation method (CVM), conjoint analysis (CJ) (Pearce & Seccombe-Hett, 2000; Farber & Gringer, 2000) and contingent grouping (CG) (Riera et al, 2013).

Due to its ability to estimate non-use values, CVM is the most used method for estimating the economic value of biodiversity (Farber & Gringer, 2000; Nunes & van den Bergh, 2001; Carson et al, 2000; Spash, 2000; Jones et al, 2011; White et al, 2001). It requires setting up a hypothetical market where participants state bids for various goods based on information they are provided (White et al, 2001). Participants are presented with a hypothetical scenario and explicitly asked what that scenario is worth to them (Farber & Gringer, 2000; Carson, 2000; Jones et al, 2011).

People's judgments over environmental options are formed during the valuation process by the information provided. One potential concern is that information bias can lead to distorted estimates of the worth of environmental entities, so pre-testing is necessary (Spash, 2002). Another concern in CVM is whether respondents will truthfully reveal their opinion (Champ et al, 1999). Respondents tend to agree with questions regardless of content, yea-saying, leads to an overestimation of WTP values (Blamey et al, 1999), and protest bidders are often excluded from analysis (Halsted et al, 1992). Carson et al's (2000) say that WTP measures are limited by wealth and actual preferences of future generations, which are not explicitly considered.

There is much debate over the methods used to try to value the environment (Carson et al, 2000). The implementation of these methods still lags due to the limited number of research studies and misunderstandings of the techniques (Pearce & Seccombe-Hett, 2000). Slow development of methods is because of economists' difficulty in understanding ecosystems and their interrelationships (Bockstael et al, 2000). To overcome this problem, there is a great need for cooperation between economists and ecologists (Bockstael et al, 2000), together with psychologists and anthropologists for better understanding how individuals form their preferences and which factors influence them (Martin-Lopez et al, 2008; Spash, 2002; Sagoff, 1998). Problems of CVM can be resolved by careful design and implementation, and key issues are useful guidance for further research (Carson et al, 2000).

A better understanding of WTP (Bhandari & Heshmati, 2009) and careful design of questionnaires (Martin-Lopez et al, 2008; White et al, 2001; Bockstael et al, 2000; Carson, 2000; Bulte & van Kooten, 1999) gives economic valuation a potential to provide valuable information for policy-makers (Carson, 2000; White et al, 2001; Pearce & Seccombe-Hett, 2000). By supporting decisions made in broader political and social contexts (Iverson et al, 2008), economic valuation can promote sustainable use and management (Ahmed et al, 2007) and aid conservation (Loomis, 2000).

Studies show how WTP responses are positively related to age, income and educational level (Bhandari & Heshmati, 2009); low WTP is often a result of low socioeconomic status and free-rider problems attached to public goods (Ahmed et al, 2007). Length of stay and site-specific characteristics are also significant determinants of WTP (Bhandari & Heshmati, 2009). WTP is affected by human attitude toward the species (Martin-Lopez et al, 2008), greater WTP is often shown for marine mammals than terrestrial mammals (White et al, 2001). Low WTP values can indicate that preservation of natural resources and the environment is not a priority among local travelers (Ahmed et al, 2007).

1.5 Aims and objectives

This thesis estimates the economic value of the loggerhead turtle (*Caretta caretta* (Linnaeus, 1758)) population in the North Adriatic Sea as a potential for financing its protection.

The primary objective is to examine the non-use value of sea turtles and the potential for generating income through taxation methodologies as funding management and enforcement if a Natura 2000 site is created.

Secondary objectives are:

- To examine the use-value of sea turtles and its potential for generating income through user fees to further fund marine conservation in the North Adriatic region
- To examine tourist/visitor awareness of threats (collision with boats, plastic /pollution?/, bycatch) to sea turtles in the region, and their support for implementing solutions to mitigate them
- To examine tourist support for the creation of a marine protected area (MPA) for sea turtles in the region
- To identify what the targeted public awareness-raising campaigns should focus on

1.6 Hypothesis

Taking into account the information collected from the literature review, the following hypotheses were developed and will be examined throughout the thesis:

- Hypothesis 1

I expect that sea turtles have a non-use value in the region, with the potential to ensure additional long-term funding for sea turtle conservation in the region.

- Hypothesis 2

I expect sea turtles have a use-value, with the potential to ensure direct income for sea turtle conservation in the region.

- Hypothesis 3

I expect that tourists are most aware of plastic as a threat, less aware of bycatch and least aware of the collisions with boats.

- Hypothesis 4

I expect that tourists are most prepared to support the enforcement of speed limits, less prepared to have only natural cotton bags available in local shops and least prepared to pay 10% more for certified local seafood products.

- Hypothesis 5

I expect that there is the potential for the formation of a marine protected area for sea turtles in the region.

2 Research area

The Northern Adriatic Sea is a shallow basin of the Adriatic Sea whose "boundary" is taken as the 100 m isobath. It is an important neritic feeding and wintering habitat for juvenile and adult Mediterranean loggerhead sea turtles (Lazar, 2010), which was confirmed by the studies analyzing diet, size (Lazar et al, 2008), tag recoveries (Lazar et al, 2004) and high bycatch rates during winter months (Lazar & Tvrtković, 1995,2003; Casale et al 2004). Results of Fortuna et al's (2018) study on the abundance of loggerhead sea turtles in the Adriatic Sea showed that 69% of the total loggerhead sea turtles in Adriatic are located in the northern part. The authors estimated the number of turtles in northern Adriatic to 18 000, but they emphasize that this is underestimated because the results weren't corrected for biases. The study also showed that they are present along the whole coast during the warm months, while, according to Lazar et al's (2003), during winter they tend to migrate south of 45*N, because of the drop in sea temperature.

The research areas were two regions that surround the northern Adriatic, Istria and Kvarner. Since they both cover a large area, a town was taken as the representative area for the region. Mali Lošinj was taken to represent Kvarner, while Poreč represented Istria. Mali Lošinj and Poreč both have a long tourism tradition and are among the most important tourist destinations in the Adriatic during the summer months (Ministry of Tourism, 2018). They differ in their main tourist attraction and offer.

Mali Lošinj is located on the island of Lošinj. The data from Tourism office Mali Lošinj (2018) showed 307 283 arrivals and 2 334 390 overnights of tourists on the island, out of which 1 222 036 overnights were recorded in Mali Lošinj. 86% of the overnights were by international tourists from Slovenia (25%), Germany (22%), Austria (10%) and Italy (11%). The biggest number of overnights was recorded in camps, followed by hotels and private accommodation, with an average stay of 7.6 days. The most numerous age group was 45-54 (18%), followed by 35-44 (17%) and 55-64 (13%). Island nature is the most important destination characteristic for the tourists (Batel et al, 2004) and it is recognized as "the island of dolphins". Eco touristic offer, mainly focused on dolphins, exists on the island, in Veli Lošinj, and is run by Blue world Institute of Marine Research and Conservation. The main ecotouristic offer is the Marine Educational Centre which runs throughout the whole season and provides additional offers such as Adopt a Dolphin and Dolphin Watching tours. The entrance ticket to an educational center costs a little bit more than 2.5 €. The Dolphin Watching tour is offered in spring, summer, and fall when the weather conditions allow it. The trip costs 50 € per person per trip with discounts for children, students, and groups. A sea turtle rescue center located in Mali Lošinj was opened in 2013 as a part of NETCET (Network for the Conservation of Cetaceans and Sea Turtles in the Adriatic) project. Unfortunately, the center does not utilize its ecotouristic capacity to its fullest, it is opened for public only when there are sea turtles in recovery and for pre-arranged visits.

Poreč is a small ancient town located on the west side of the Istria peninsula. Its main touristic attraction is cultural heritage. There were 567 024 arrivals and 3 392 258 overnights recorded in 2017 by the Tourism Office Poreč (2018). Most of the overnights were by international tourists (96%) out of which most of them are from Germany (30%) followed by Austria (16%), Slovenia (9%), Italy (7%), UK (5%), and Netherlands (4%). The biggest number

of overnights are registered in hotels (55%) followed by private accommodation (24%) and camps (10%). The average number of days tourists spend in Poreč is 6 for international and 4 for domestic tourists. Most numerous age group was 45-54 (18%), followed by 55-64 (15%) and 35-44 (14%). An ecotouristic offer, with a focus on sea turtles, exists in the Istria region, but 60km from the city of Poreč. The sea turtle rescue center is located in the Pula Aquarium and opens for visitors all year round. Tickets are 16 € during the season, with discounts for children, students, seniors, and groups. Additionally, the aquarium has an offer to adopt a sea turtle to contribute to the protection of the species.

Additional research data gathered in the same way under the LIFE project in Slovenia was added for the analysis. In Slovenia, the CVM survey was conducted in the Slovenian coastal region Primorska. Surveys were done in Debeli Rtič, Izola, Piran, Portorož and Strujan. According to the Slovenian Tourist board statistics for 2017, 321 448 arrivals and 1 196 908 overnights in the seaside resorts were recorded. 38% of the overnights are attributed to the domestic tourists and 62 % to international tourists from Italy, Germany, Austria, and the Netherlands. Most of the overnights are recorded in hotels (37%), camps and private accommodation (19%). The main tourist attraction on the Slovenian coast is its natural and cultural heritage.

3 Materials and methods

To estimate the economic value of loggerhead sea turtles in the North Adriatic Sea a contingent valuation survey was conducted to measure respondent's willingness to pay.

3.1 Questionnaire design

The questionnaire was designed to gather information from tourists and visitors to assess their level of knowledge and their valuation of the importance of sea turtles. The aim was to assess the awareness of real and perceived threats to sea turtles in the region, to provide details on potential solutions to mitigate threats and identify mechanisms to offset unsustainable practices and provide funding for management. To provide information about where to target structured educational programs for public awareness. Questionnaires were available in 5 different languages, German, English, Italian, Slovenian and Croatian, to avoid possible misunderstandings (Cook and Crang, 1995). The interviewer presented the questions directly to the respondent to minimize protest bids and clarify misunderstandings within the questionnaire, making sure to avoid leading the respondent, thereby discouraging survey acquiescence (Blamely et al, 1999).

Questionnaire (fig. 1.) consisted of 7 sections of questions that were designed to obtain the following information:

1. To identify the category of tourist/visitor

The respondents were asked about the type of accommodation they are staying in, the number of overnights they are planning to stay in the region and how many times in the last five years they have visited the region in question. The first two questions in this section served as filter questions for a tourist/visitor category because only commercial tourists were of interest in this research. This set of questions helped to make sure the structure of the sample is representative.

The respondents are defined as domestic or foreign visitors/tourists visiting the regions. Since all three regions have accommodation facilities, same-day visitors are not an interest group in this research. Same-day visitors are people on a day trip while tourists are overnight visitors. Non-commercial tourists are not an interest group as well, because of their motivations to be in the region (cheap holiday, visiting friends) and due to lack of official data which may complicate the distribution of respondents. This set of questions served to filter out respondents of interest and to help ensure that the sample is representative.

2. To examine the tourists' level of knowledge about sea turtles and how important the marine environment is to them

Respondents were asked to state on a 5-point likert-scale, from 1- "not at all" to 5-"very important" how important was the condition of the marine environment when deciding on their trip, to what extent the condition of marine environment fulfilled their expectations and to what extent the condition of marine environment influenced their decision to return. The first question looks at the motivation of the respondent and the importance of the quality of the marine environment in the decision-making process. The second one follows up from the previous question to ascertain their satisfaction with the marine environment on their trip to the region. The third one looks if their satisfaction is converted into action. The fourth question

asks if they knew that the North Adriatic is one of the most important regions for sea turtles in the Mediterranean, which ascertains a level of knowledge. Finally, the respondents had to state on a 5-point likert-scale, from 1- "not at all" to 5-"very important", whether the presence of sea turtles enhances their opinion on the environmental quality of the sea, to see if sea turtles are perceived as indicator species.

3. To examine the tourists' level of knowledge about sea turtles and their support for the creation of an MPA for sea turtle species in the region.

The respondents were asked if they knew that sea turtles are threatened and if they knew that sea turtles are a priority species for EU protection, to ascertain the respondent's level of knowledge. They were asked whether they would morally support the call for the creation of an MPA for sea turtles in this region and to state on a 5-point likert-scale from 1 - "not at all" to 5 – "very important" whether the presence of marine protected area for sea turtles would make the region more attractive to them.

4. To examine the tourists' awareness about threats to sea turtles in the region

Questions in this set asked the respondents to state how important is the threat of collision with speedboats, entanglement, ingestion of plastic, and bycatch in commercial fisheries on a 5-point likert-scale from 1 - "not at all" to 5 – "very important".

5. To examine the possible solutions to mitigate threats to sea turtles in the region

This set examined possible solutions for mitigation of threats (collision with boats, plastic, and bycatch) from the previous set of questions. Respondents were asked if they were willing to drive more slowly on the sea, support speed limits for boats, support the availability of only cotton bags in local shops and pay 10% more for certified local seafood products where subsidized eco-methods have been used to reduce bycatch. These questions are related to tangible commitments that vary in their requirements in both financial and behavioral actions. Speed limit requires no or small behavior commitment, no plastic bags require small financial (one-off payment) and behavioral commitment, while certified products require larger financial (repeated payment) and behavioral commitment.

6. To examine the economic value of sea turtles in the region

Three distinct willingness to pay scenarios were presented in this section to estimate the economic value of sea turtles in the region. Two scenarios were termed as having use value and one as non-use value. The respondents were asked the use-value questions: (1) if they were interested in dedicated marine wildlife watching; and, (2) visiting a sea turtle rescue or educational center whilst on their holiday (sea turtle center). These two questions represented use scenarios since there is a tangible experience in return for the payment. A question concerning their willingness to contribute to a created trust fund that will support effective sea turtle conservation and public awareness (conservation fund for sea turtles) represented a non-use scenario since there is no tangible experience in return for payment.

For positive responses, respondents were additionally asked how much they are WTP for it. Use-value respondents were asked to indicate the range of values they are WTP. For a wildlife trip, respondents could choose 15 €, representing the amount standard boat tour costs, 16-19 €, 20-24 €, 25-29 €, 30-35 € and more than 35€. WTP for entrance ticket for a turtle

center went from less than 1 €, 1-3 €, 3-5 €, 5-10 €, 10-15 € to more than 15 €. While for non-use scenario respondents were asked to indicate their maximum WTP where they got to choose from 0, 0.5, 1, 2, …, 10 € per person per day or they could write in their value. These questions provide information on the viability of the creation of alternative touristic offers and the potential for funding for management and enforcement if a Natura 2000 site is created.

7. Sociodemographic characteristics of respondents

The last section of questions referred to demographic information, which included age, education, gender, income, and residence, providing contextual information about respondents and helping to ensure that the structure of the sample is representative.

SURVEY ON THE VISITOR-TOURIST PERCEPTION OF SEA TURTLES (ENG)
EURO-TURTLES LIFE15 NAT/HR/000997

CIRCLE ONE: Kvarner Region or **Istria Region** **Date: ____/____/____ Interviewer Initials____**

*The Blue World Institute is conducting this survey as part of an EU funded project for the conservation of sea turtles. We would like to get your opinions about sea turtle conservation while on your trip to **this region – Kvarner or Istria** [please circle region above]. This survey is anonymous; your response will help to inform us on the best methods to improve conservation activities in this region. We thank you for your time!*

1. TYPE OF ACCOMMODATION:

1. Hotel/Hostel
2. Camping
3. Private accommodation/apartment
4. Own or friends 'second home' or boat (non-commercial)
5. Boat/Yacht live-aboard or rental
6. Other_____

2. NUMBER OF OVERNIGHTS YOU PLAN TO STAY IN THIS REGION: _____

3. EXCLUDING YOUR PRESENT STAY, HOW MANY TIMES IN THE LAST 5 YEARS HAVE YOU VISITED THIS REGION?

1. Never (this is your first time)
2. Once
3. Two to five times
4. More than five times

4. WHEN DECIDING ON YOUR TRIP TO THIS REGION HOW IMPORTANT WAS THE CONDITION OF THE MARINE ENVIRONMENT? *(Circle one answer only!)*
1 - 'not at all' TO 5 - 'very much'?
1 2 3 4 5

5. TO WHAT EXTENT HAS THE CONDITION OF THE MARINE ENVIRONMENT FULFILLED YOUR EXPECTATIONS? *(Circle one answer only!)*
1 - 'not at all' TO 5 - 'very much'?
1 2 3 4 5

6. TO WHAT EXTENT WOULD THE CONDITION OF THE MARINE ENVIRONMENT INFLUENCE YOUR DECISION TO RETURN? *(Circle one answer only!)*
1 - 'not at all' TO 5 - 'very much'?
1 2 3 4 5

7. DID YOU KNOW THAT THIS IS ONE OF THE MOST IMPORTANT REGIONS FOR SEA TURTLES IN THE MEDITERRANEAN?
1. Yes 2. No

8. DOES THE PRESENCE OF SEA TURTLES ENHANCE YOUR OPINION ON THE ENVIRONMENTAL QUALITY OF THE SEA IN THIS REGION? *(Circle one answer only!)*
1 - 'not at all' TO 5 - 'very much'?
1 2 3 4 5

9. DID YOU KNOW THAT SEA TURTLES ARE THREATENED
1. Yes 2. No

10. DID YOU KNOW THAT SEA TURTLES ARE A PRIORITY SPECIES FOR EU PROTECTION?
1. Yes 2. No

11. WOULD YOU MORALLY SUPPORT THE CALL FOR THE CREATION OF A MARINE PROTECTED AREA FOR SEA TURTLES IN THIS REGION?
1. Yes 2. No

12. WOULD THE PRESENCE OF A MARINE PROTECTED AREA FOR SEA TURTLES MAKE THIS REGION MORE ATTRACTIVE TO YOU? *(Circle one answer only!)*
1 - 'not at all' TO 5 - 'very much'?
1 2 3 4 5

THREATS TO SEA TURTLES IN THIS REGION:

13.1. IN YOUR OPINION HOW IMPORTANT IS THE THREAT OF COLLISIONS WITH SPEEDBOATS;
(Circle one answer only!)
1 - 'not at all' TO 5 - 'very much'?
1 2 3 4 5

13.2. IN YOUR OPINION HOW IMPORTANT IS THE THREAT OF ENTANGLEMENT AND INGESTION OF PLASTICS; *(Circle one answer only!)*
1 - 'not at all' TO 5 - 'very much'?
1 2 3 4 5

13.3. IN YOUR OPINION HOW IMPORTANT IS THE THREAT OF BYCATCH IN COMMERCIAL FISHERIES;
(Circle one answer only!)
1 - 'not at all' TO 5 - 'very much'?
1 2 3 4 5

SURVEY ON THE VISITOR-TOURIST PERCEPTION OF SEA TURTLES (ENG)
EURO-TURTLES LIFE15 NAT/HR/000997

WOULD YOU BE PREPARED TO SUPPORT MITIGATING ACTIONS FOR THESE SPECIFIC THREATS, SUCH AS:

14.1. DRIVING MORE SLOWLY ON THE SEA AND SUPPORTING SPEED LIMITS FOR BOATS?
1. Yes 2. No

14.2. ONLY HAVING NATURAL COTTON BAGS AVAILABLE IN LOCAL SHOPS?
1. Yes 2. No

14.3. PAYING 10% MORE FOR CERTIFIED LOCAL SEAFOOD PRODUCTS WHERE SUBSIDIZED ECO-METHODS HAVE BEEN USED TO REDUCE BYCATCH?
1. Yes 2. No

WE ARE LOOKING AT POTENTIAL METHODS FOR FUNDING LONG-TERM CONSERVATION, WE WOULD BE GRATEFUL IF YOU WOULD GIVE US YOUR OPINION:

15. HAVE YOU EVER SEEN SEA TURTLES IN THE WILD IN THIS REGION?
1. Yes 2. No

16. WOULD YOU BE INTERESTED IN A DEDICATED MARINE WILDLIFE WATCHING TOUR WHILST ON HOLIDAY IN THIS REGION?
1. Yes (go to Q17) 2. No (go to Q18)

17. IF YES, BEARING IN MIND A REGULAR SIGHTSEEING BOAT TRIP COSTS ABOUT 15 € PER PERSON, WHAT WOULD YOU BE WILLING TO PAY FOR A DEDICATED MARINE WILDLIFE WATCHING TOUR PER PERSON?
(Circle one answer only!)

15 €	16 - 19 €	20 - 24 €
25 - 29 €	30 - 35 €	> 35 €

18. WOULD YOU BE INTERESTED IN VISITING A SEA TURTLE RESCUE CENTRE OR EDUCATION CENTRE WHILST ON HOLIDAY IN THIS REGION?
1. Yes (go to Q19) 2. No (go to Q20)

19. IF YES, WHAT WOULD YOU BE WILLING TO PAY AS AN ENTRANCE FEE PER PERSON? *(Circle one answer only!)*

< 1 €	1 - 3 €	3 - 5 €
5 - 10 €	10 - 15 €	> 15 €

20. ALTERNATIVELY, IF A TRUST FUND WERE CREATED TO SUPPORT EFFECTIVE SEA TURTLE CONSERVATION AND PUBLIC AWARENESS IN THIS REGION WOULD YOU BE WILLING TO CONTRIBUTE?
1. Yes (go to Q21) 2. No (go to Q22)

21. IF YES, WHAT IS THE AMOUNT YOU WOULD BE WILLING TO PAY PER PERSON PER DAY TO SUPPORT SEA TURTLE CONSERVATION WHILE IN THIS REGION?
Considering your budget during your trip. *(Circle the amount or write some other on the line!)*

0 €	0.5 €	1 €
2 €	3 €	4 €
5 €	6 €	7 €
8 €	9 €	10 €

Other amount: _____ €

ABOUT YOU:

22. COUNTRY OF PERMANENT RESIDENCE:
_____

23. AGE: _____

24. GENDER:
1. Male 2. Female

25. HIGHEST LEVEL OF EDUCATION:
(Circle one answer only!)
1. Primary school
2. Secondary school
3. Two or three year college
4. University or higher

26. NET HOUSEHOLD MONTHLY INCOME:
(Circle one answer only!)
1. Up to 1 500 €
2. 1 501 - 3 000 €
3. 3 001 - 5 000 €
4. 5 001 - 10 000 €
5. 10 001 € and more

Thank you for your time and effort in participating in this survey

Fig. 1. Questionnaire on the visitor/tourist perception of sea turtles

3.2 Sampling

A total of 164 interview-questionnaires were completed by visitors to Istria and Kvarner region during the 2017 summer season, out of which 81 were from Istria and 83 from Kvarner. Sampling in the Istria region took place in Poreč during the low season, in June and October. While in the Kvarner region it took place in Mali Lošinj during high and low season, in July, August and September. June, September, and October represent the low season, while July and August represent the high season. Sampling took place in the city center of both cities, either from 10 am to 1 pm or 4 pm to 9 pm. 95 questionnaires collected during the same season in the Slovenian coastal region were included in the statistical analysis. The questionnaire was the same and the survey was conducted using the same methodology by the University of Primorska, also a partner in the LIFE EUROTURTLES project.

3.3 Data analysis

The answers to a total of 259 questionnaires were entered in MS Office Excel and statistical analysis was carried out in the R i386 3.5.0 program and RStudio application for windows.

The first categorization was made for three open-ended questions in the questionnaire: age, number of overnights and country of permanent residence (nationality). Age was categorized into 6 categories, less than 26 (1); 26-35 (2); 36-45 (3); 46-55 (4); 56-65 (5); more than 65 (6). Stay days were categorised into 5 categories, 0 nights (0); 1-2 nights (1); 3-7 nights (2); 8-14 nights (3); more than 15 nights (4). While there were two different categorizations of nationality. The first one was actual nationality and other, which represented nationalities with less than 3 respondents. Austria (1); Croatia (2); Czech (3); Germany (4); Italy (5); Netherlands (6); Slovenia (7); Switzerland (8); Uk (9); Hungary (10); Poland (11); Other (12): Belgium, Bosnia, Canada, Denmark, Finland, France, Ireland, New Zealand, Russia, Slovakia, South Africa, Spain, Ukraine. The second one was the division between domestic and international tourists.

The second categorization of WTP questions examining the use value was made. For the first and last range, a border value was taken to represent a category. While the average value of the interval was taken as a category for middle ranges. WTP for a wildlife trip was categorized as 15, 17.5, 22, 27.5, 32.5 and 35 €. WTP for an entrance ticket was categorized as 1, 2, 4, 7.5, 12.5 and 15 €.

Non-commercial and one day visitors were excluded from the rest of the analysis since they weren't an interest group for this research due to their motivations to be in the region for holiday and lack of official data which may complicate the distribution of respondents. This left a total of 237 questionnaires for North Adriatic, 81 for Slovenia (Primorska), 156 for Croatia (80 Istria, 76 Kvarner) (see table 1.).

Table 1. The number of questionnaires collected and the number of questionnaires used in an analysis.

	Number of questionnaires collected	Number (percentage) of non-commercial tourists in the sample	Number (percentage) of one day visitors in the sample	Number (percentage) of non-commercial tourists and one-day visitors	Number of questionnaires when non-commercial tourists and one day visitors are excluded
Istria	81	1 (1.23%)	0	1 (1.23%)	80
Kvarner	83	7 (8.43%)	0	7 (8.43%)	76
Primorska	95	10 (10.53%)	4 (4.21%)	14 (14.74%)	81
Total	259	18 (20.19%)	4 (4.21%)	22 (24.4%)	237

Descriptive statistics was done to test the hypotheses. Additional nonparametric statistical analysis was carried out to test the relationship between respondents' profile and WTP questions.

Kruskal-Wallis test was used to test the relationship. The Independent variable was residents' profile - it consists of age, education, gender, income, nationality, accommodation, stay days, previous visits and second categorization of nationalities. All independent variables were nominal with two or more categories. Questions examining WTP were considered an ordinal dependent variable.

3.4 Estimation of the economic value of loggerhead sea turtles in the North Adriatic Sea

The economic value of loggerhead sea turtles in the region was estimated with CVM using three distinct willingness to pay scenarios. Visiting a sea turtle center and going on a marine wildlife watching trip are considered use-values since they provide tangible experience in return for the payment and estimation is done by calculating the median value of respondents WTP for an entrance ticket or a trip fee. While WTP to a sea turtle conservation fund while on their holiday is a scenario without tangible experience with sea turtles in return for the payment and it is considered a non-use value.

According to London Economics (2011), the estimation of WTP is done by calculating the median value in the context of public choice, since it represents the amount the majority of people are WTP. The use and non-use values of loggerhead sea turtles are estimated to be the median value respondents are WTP for the entrance ticket, wildlife trip, and conservation fund while on their holiday. Additionally, the median non-use value is multiplied by the number of overnights recorded by tourist offices in research areas to estimate the value which the loggerhead sea turtles could generate per year for funding management and enforcement if a Natura 2000 site is created.

4 Results

4.1 Respondents profile

The number of questionnaires collected in Istria, Kvarner and Primorska was 259, among which 237 were included in the analysis (Table 1.). The questionnaires have been collected in a period between June and October 2017. The structure of the respondents' profile differed between investigated regions (Table 2.)

Table 2. Average, median and standard deviation values of the respondents' age and the number of overnights planned to stay in the region during their holiday. Median values of the respondents' age code (categorized age values), education category, number of overnights category (categorized number of overnights values) and previous visits.

Region	Age			Age Code	Education level	Income	Number of overnights			Number of overnights	Previous visit
	Average	Median	Standard deviation	Median	Median	Median income	Average	Median	Standard deviation	Median	Median
Istria	47.47	53	18.13	46-55 years	two/three year college	1501-3000€	7.87	7	4.38	3-7 nights	Once
Kvarner	44.86	44	14.16	36-45 years	two/three year college	1501-3000€	9.66	8	5.36	8-14 nights	2-5 times
Primorska	47.67	48	17.47	46-55 years	two/three year college	up to 1500€	6.42	5	5.65	3-7 nights	2-5 times

- Istria (Croatia)

The majority of the respondents interviewed were from Germany (28.75%), followed by Netherlands (15%), Austria and UK (10%), Switzerland (7.5%), Croatia (6.25%), Czech (6.25%) and Italy (5%). The remaining respondents were from 8 other countries (see figure 2.A). The nationalities were categorized, for statistical analysis, as domestic (6.25%) and international (93.75%) tourists (see figure 5.). The majority of tourists stay in hotels (45%), followed by private accommodation (35%), camps (17.5%), boat (1.25%) and others (1.25%) (see figure 3.A). The median number of overnights of respondents in Istria was 7 and its average was 7.87 (see table 3.B). The median number of overnights category was 3-7 nights (see table 3.). The median previous visit category was „once" (see table 3.), although the highest percentage was found in „never" (45.68%) (see figure 3.C). There were more male (52,5%) than female (47.5%) respondents (see figure 4.B). The median education level category was

two or three-year college (see table 3.), although the highest percentage had secondary school (42.5%) (see figure 4.C). The median monthly household income category was between 1501-3000 € (see table 3.), although the highest percentage was between 3001-5000 € (28.75%) (see figure 4.D). The median age code was between 46 and 55 years (see table 3.), although the highest percentage was in the category between 56 and 65 years (25%) (see figure 4.A). These results correspond to tourist board statistics for visitors in 2017 (Tourist office Poreč, 2018) and make the sample representative.

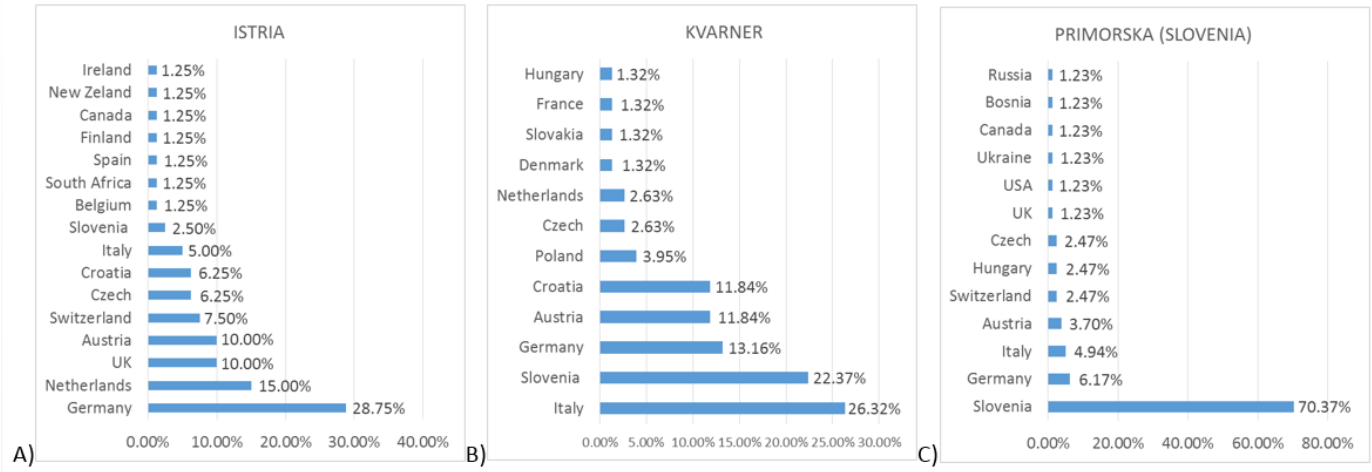

Fig. 2. The graphs show the percentage of respondents' nationalities in A) Istria, B) Kvarner and C) Primorska (Slovenia) sample

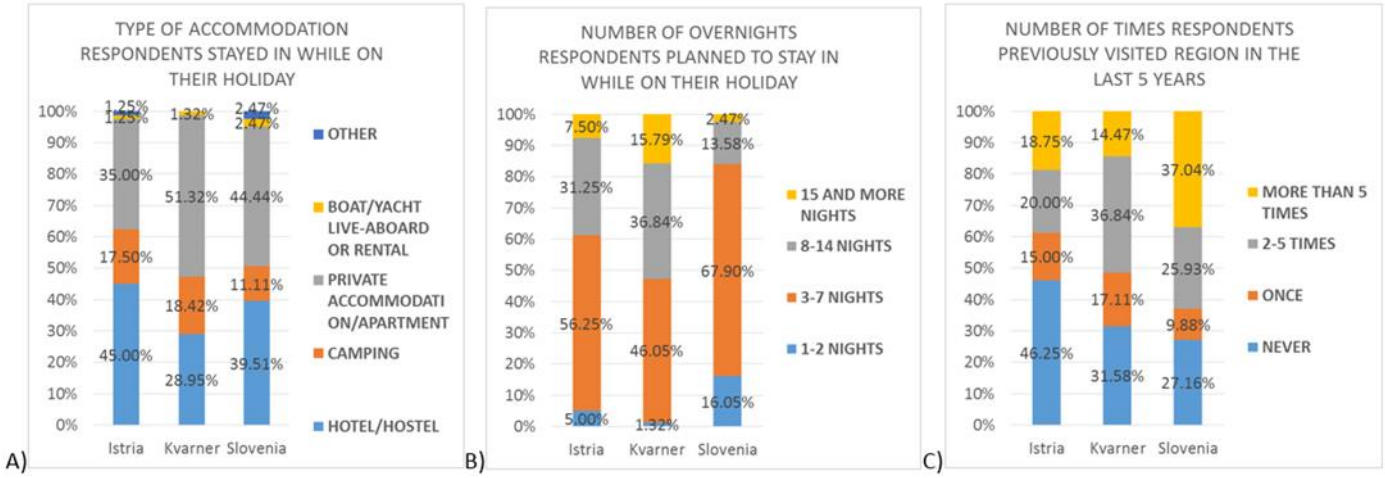

Fig. 3. The graphs show the percentage of A) accommodation type respondents stayed in while on their holiday, B) the number of overnights category and C) respondents previous visits in last 5 years in Istria, Kvarner and Primorska

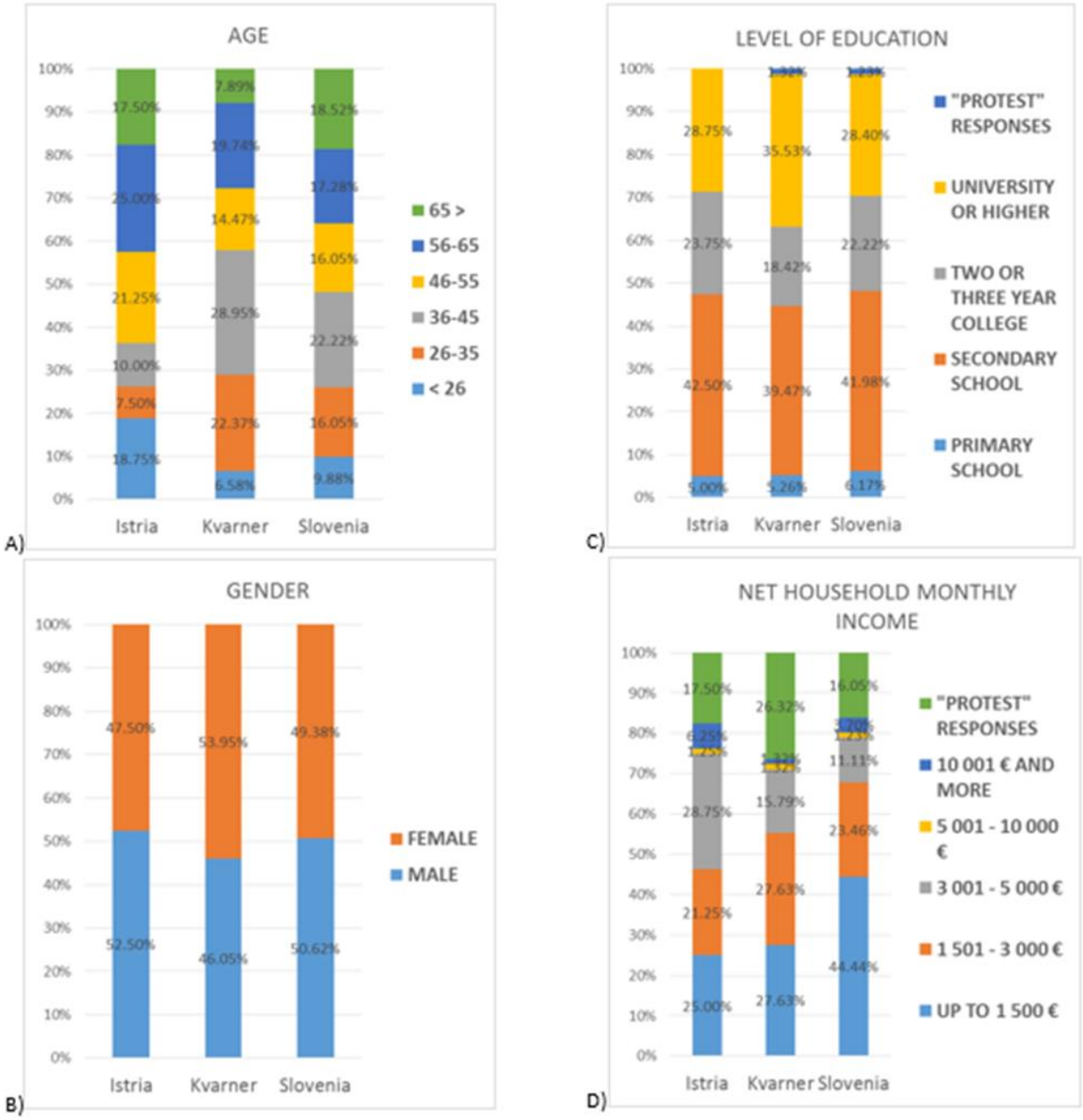

Fig. 4. The graphs show the percentage of respondents' A) age category, B) gender, C) level of education and D) net household monthly income in Istria, Kvarner and Slovenia sample.

- Kvarner (Croatia)

The majority of the respondents were from Italy (26.32%), followed by Slovenia (22.37%), Germany (13.16%), Austria and Croatia (11.84%). The remaining respondents were from 8 other countries (see figure 2.B). There were 11.84% domestic and 88.16% international tourists in the sample (see figure 5.). The majority of respondents stay in private accommodation (51.32%), followed by hotels (28.95%), camps (18.42%) and boat (1.32%) (see figure 3.A). The median number of overnights of respondents in Kvarner was 8 and its average was 9.66 (see table 3.). The median number of the overnights category was 8-14 nights (see table 3.), although the highest percentage was found in category 3-7 nights (46.05%) (see figure 3.B). The median previous visit category was 2-5 times (see table 3.). There were more females

(53.95%) than male (46.05%) respondents (see figure 4.B). The median education level was two or three-year college (see table 3.), although the highest percentage was found in university or higher (35.53%) (see figure 4.C). The median monthly household income category was between 1501-3000 € (see table 3.). The median age code was between 36 and 45 years (see table 3.). These results are in line with tourism board statistics for 2017 (Tourist office Mali Lošinj, 2018), because of which this sample is considered representative.

- Primorska (Slovenia)

The majority of the respondents interviewed in Slovenia were domestic tourists (70.37%), the remaining 29.63% were international tourists (see figure 5.) out of which 6.17% were from Germany, 4.94% were from Italy and 3.7% were from Austria (see figure 2.C). The remaining international respondents were from 10 other countries (see figure 2.C). The majority of respondents stay at private accommodation/apartments (44.44%), followed by the hotel (39.51%), camping (11.11%), boats and other (2.47%) (see figure 3.A). The other was specified as rehabilitation. The median number of overnights in Primorska was 5 and the average number of overnights was 6.42 (see table 3.). The median category of the number of overnights was 3-7 nights (see table 3.). The median category of previous visits was 2-5 times (see table 3.), although the highest percentage is found in „more than five times“ (37.04%) (see figure 3.C). There was almost an equal percentage of male (50.62%) and female (40.38%) respondents (see figure 4.B). The median education level category was two or three-year college (see table 3.), although the highest percentage was found in secondary school (41.98%) (see figure 4.C). The median monthly household income category was up to 1500 € (see table 3.). The median age code was 46 – 55 (table 3.) while the highest percentage was found in the 36-45 category (22.22%) (see figure 4.A). These results show a great difference in the proportion of domestic and international tourists when compared to tourism statistics for Slovenia (Slovenian Tourist Board, 2018), because of which the sample is not considered representative.

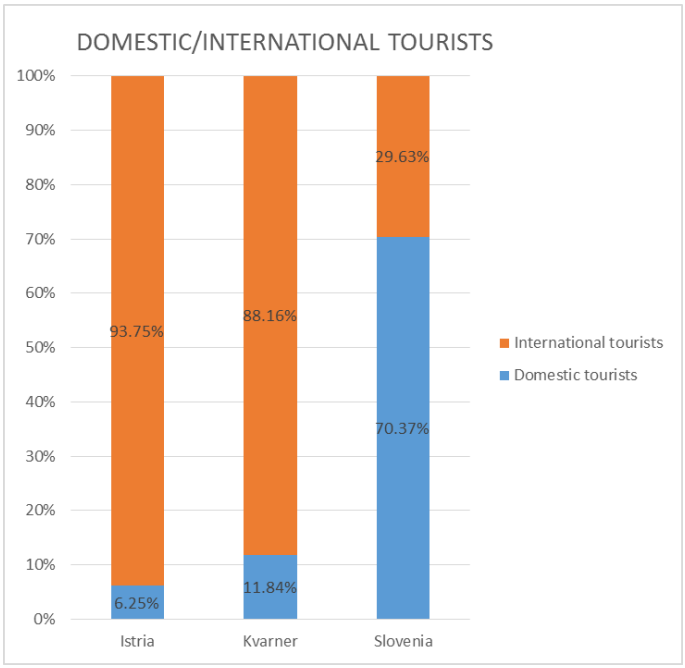

Fig. 5. The graph shows the percentage of domestic and international tourists in Istria, Kvarner and Slovenia sample.

4.2 Respondents' knowledge about sea turtles and their support for their conservation

Results show that, in the Kvarner region, the respondents were most interested in the condition of the marine environment when deciding on their trip, where over 60% of the respondents consider it as very important. While in Primorska and Istria less than 50% of the respondents considered it as very much important (see figure 6.A). In all three regions, expectations of the marine environment were "very much" fulfilled for less than 50% of the respondents. Lowest fulfillment of the expectations is seen in the Primorska region, < 25% of respondents' expectation was "very much" fulfilled (see figure 6.B). Kvarner was the region were respondents were mostly influenced to return, where > 60% of respondents were "very much" influenced to returned because of the condition of the marine environment, while in Primorska region they were least influenced (see figure 6.C).

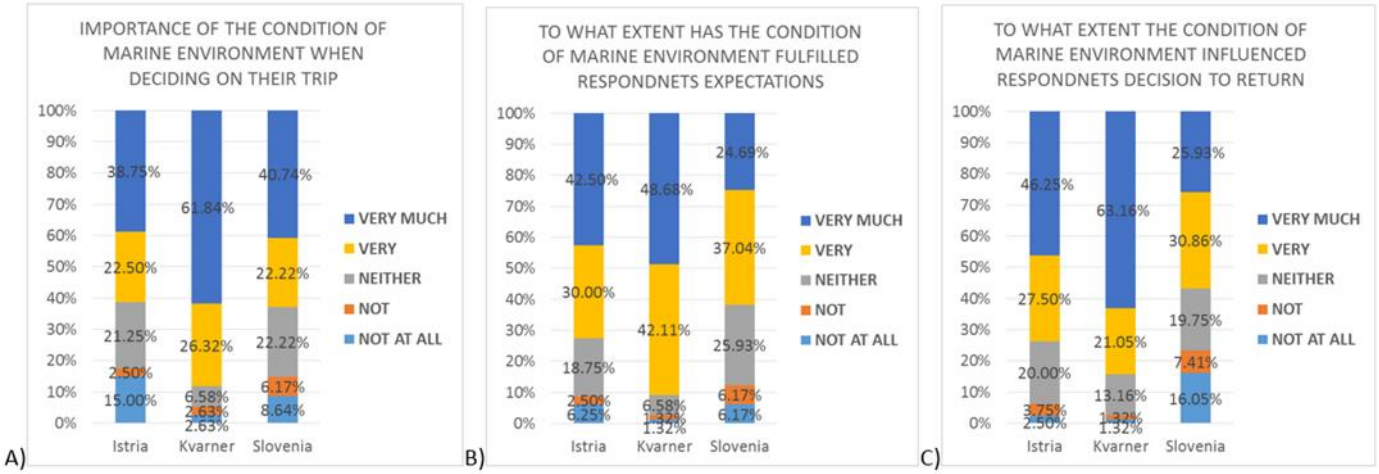

Fig. 6. The graphs show the percentage of respondents' responses to A) how important is the condition of the marine environment when deciding on their trip, B) what extent has the condition of marine environment fulfilled their expectations and C) what extent the condition of the marine environment influences their decision to return in Istria, Kvarner and Slovenia sample

The awareness of the North Adriatic Sea being the loggerhead turtles' habitat was very low (<20%) in all three regions and it was the lowest in the Istria region (see figure 7.A). Still, the presence of turtles enhances opinion on the condition of the marine environment to 67.5% of the respondents in Istria, to 75% of the respondents in Kvarner and 65.4% of the respondents in Primorska (see figure 7.B). As seen in table 5. more than half of these respondents didn't know that northern Adriatic was an important habitat.

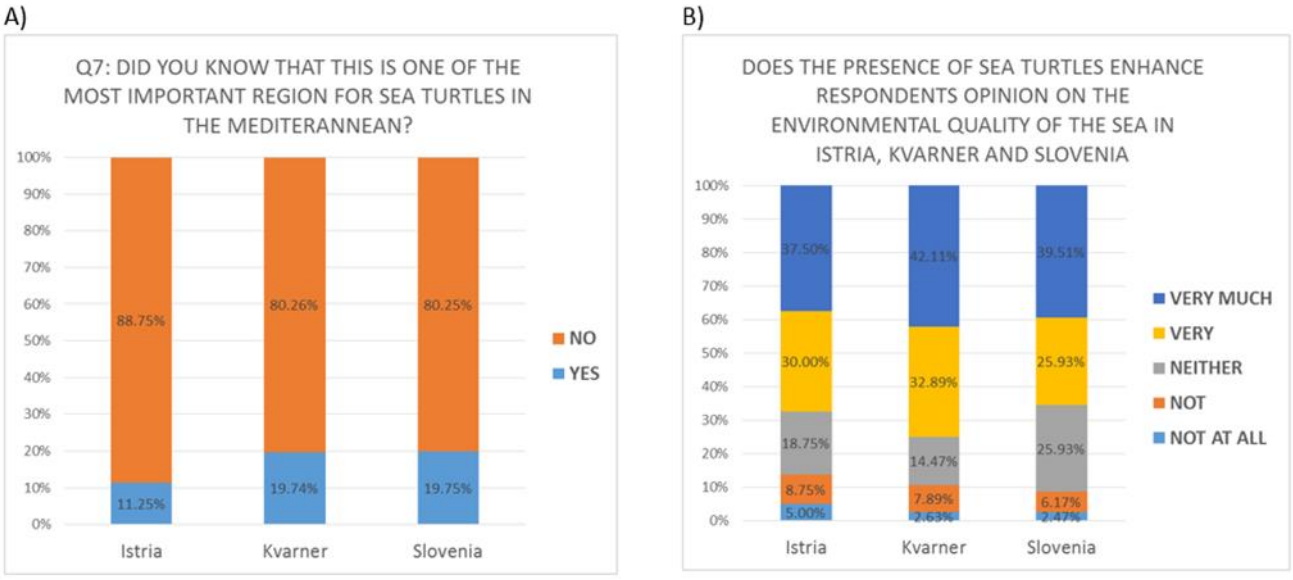

Fig. 7. The graphs show the percentage of respondents' responses to A) question 7 from the questionnaire and B) what extent does the presence of sea turtles enhances their opinion on the environmental quality of the sea in Istria, Kvarner and Slovenia sample.

Around 70% of the respondents knew that sea turtles are an endangered species (see figure 8.A), while only around 30% of the respondents knew that they are a priority species for conservation in the EU (see figure 8.B). Although the majority of the respondents (>90%) would morally support the call for the creation of MPA in the region (see figure 9.A), less than 50% of the respondents stated that the presence of MPA in the region would make this region "very much" attractive (see figure 9.B). The highest shift in opinion is seen in the Kvarner region where 75% of the respondents say/feel this region would be somewhat attractive with MPA for sea turtles in it (see figure 9.B). In table 4. median, mode and 3rd quartile values for likert scaled questions are presented.

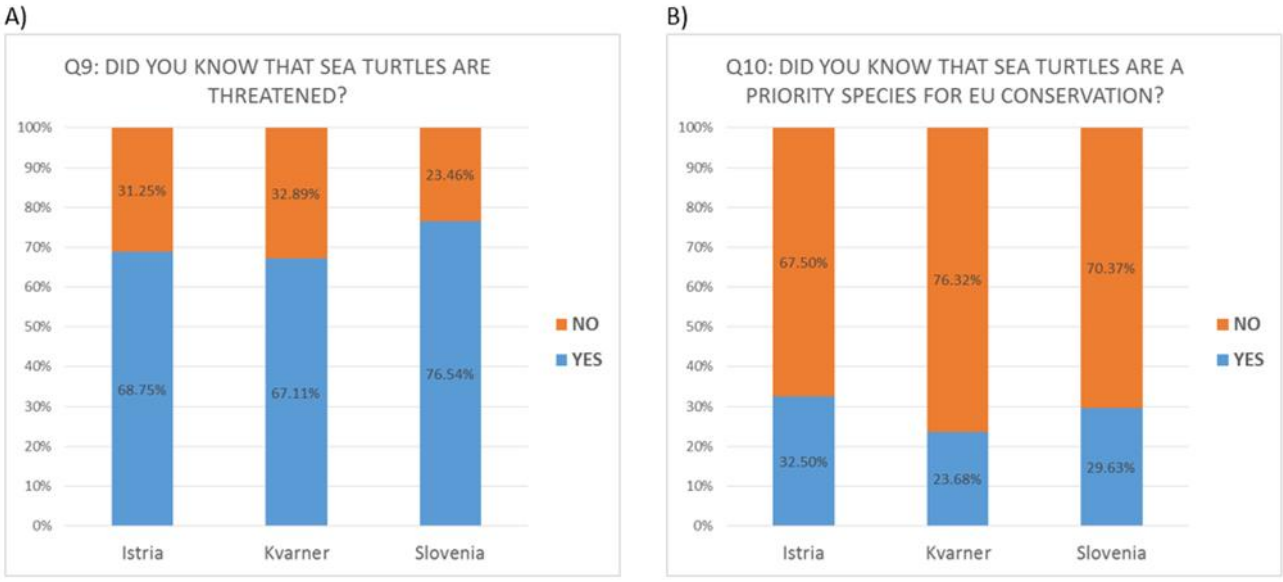

Fig. 8. The graphs show the percentage of respondents' responses to A) question 9 and B) question 10 from the questionnaire in Istria, Kvarner and Slovenia sample.

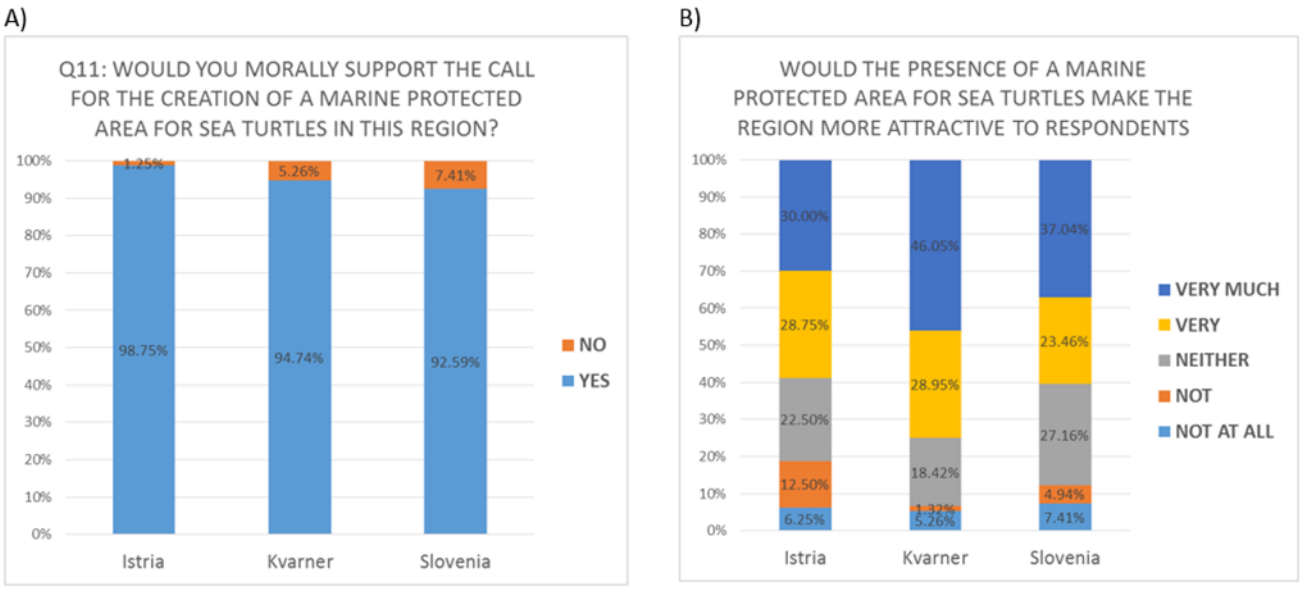

Fig. 9. The graphs show the percentage of respondents' responses to A) question 11 from the questionnaire and B) a question would the presence of a marine protected area for sea turtles make this region more attractive in Istria, Kvarner and Slovenia sample.

Table 4. Measures of central tendency, 1st and 3rd quartile of the respondents' responses to questions 4, 5, 6, 8 and 12 from the questionnaire in Istria, Kvarner and Primorska sample.

	Regions	Median	Mode	1st quartile	3rd quartile
Q4 - Importance of marine quality	Istria	4	5	3	5
	Kvarner	5	5	4	5
	Primorska	4	5	3	5
Q5 – Expectation	Istria	4	5	3	5
	Kvarner	4	5	4	5
	Primorska	4	4	3	4
Q6 - Influence to come back	Istria	4	5	3.25	5
	Kvarner	5	5	4	5
	Primorska	4	4	3	4,5
Q8 - Presence of sea turtles	Istria	4	5	3	5
	Kvarner	4	5	4	5
	Primorska	4	5	3	5
Q12 - MPA enhance perception	Istria	4	5	3	5
	Kvarner	4	5	4	5
	Primorska	4	5	3	5

Table 5. Frequency of respondents' responses to a Q7 (did the respondents knew that the region is one of the most important habitats for sea turtles in the Mediterranean) and Q8 (does the presence of sea turtles enhances respondents opinion on the environmental quality of the sea in the region) in Istria, Kvarner and Primorska sample.

Q7 - Importance of Adriatic	Yes			No		
Q8 - Presence of turtles	Doesn't enhance opinion	Neither	Enhances opinion	Doesn't enhance opinion	Neither	Enhances opinion
Istria	1.25%	3.75%	6.25%	12.5%	15%	61.25%
Kvarner	1.32%	1.32%	17.1%	9.21%	13.16%	57.89%
Primorska	1.23%	4.94%	13.58%	7.41%	20.99%	51.86%

4.3 Respondents awareness of threats to sea turtles and their support for implementing solutions to mitigate threats

Questions investigating tourists' awareness of threats to sea turtles showed that in all three regions respondents were mostly aware of ingestion and entanglement in plastic as a threat, more than 75% of them consider it as a „very much" important threat (see figure 10.B). Awareness of bycatch in commercial fisheries and collisions with speedboats differed between regions. In Istria and Kvarner respondents were more aware of bycatch (>50%, see figure 10.C) as a threat than a collision with speedboats (<50%, see figure 10.A), which confirms the hypothesis 3. Primorska sample didn't confirm the hypothesis, because respondents were more aware of collision with speed boats as a threat than bycatch (see figure 10.A and 10.C).

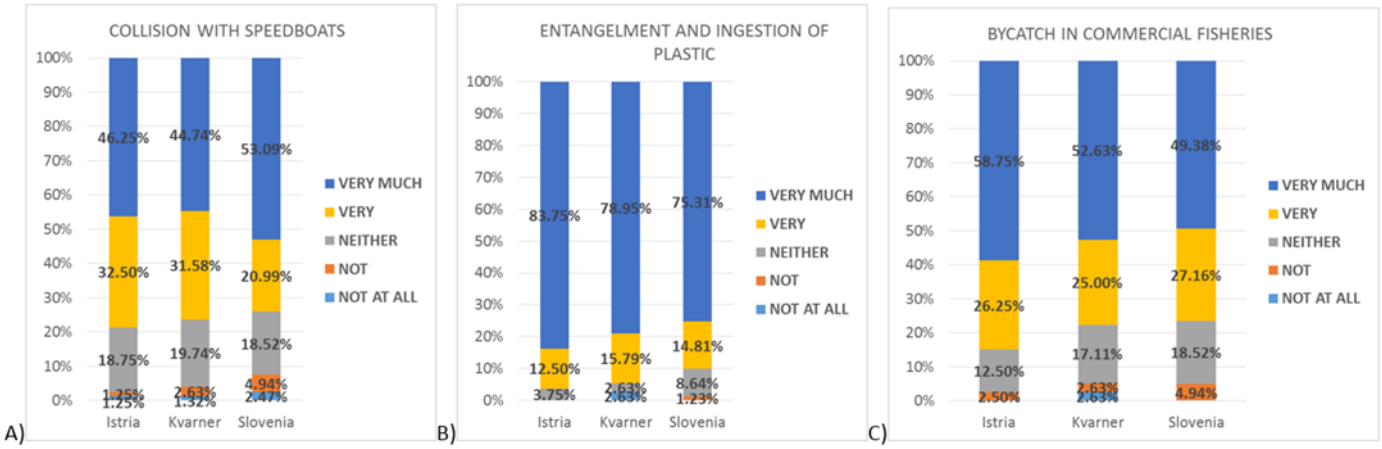

Fig. 10. The graphs show the percentage of respondents' responses to how important is the threat of A) collision with speedboats, B) entanglement and ingestion of plastics, and C) bycatch in commercial fisheries in Istria, Kvarner and Slovenia sample.

Willingness to support actions that would mitigate threats to sea turtles in the northern Adriatic Sea was strong. In all three regions, more than 90% of the respondents were willing to support speed limits for boats and to support only natural cotton bags available in local shops (see figure 11.A and 11.B). Willingness to pay 10% more for certified local seafood products where subsidized eco-methods have been used to reduce bycatch differed across regions: it was highest in Kvarner (>90%), followed by Istria (88%) and Primorska (78%) (see figure 11.C).

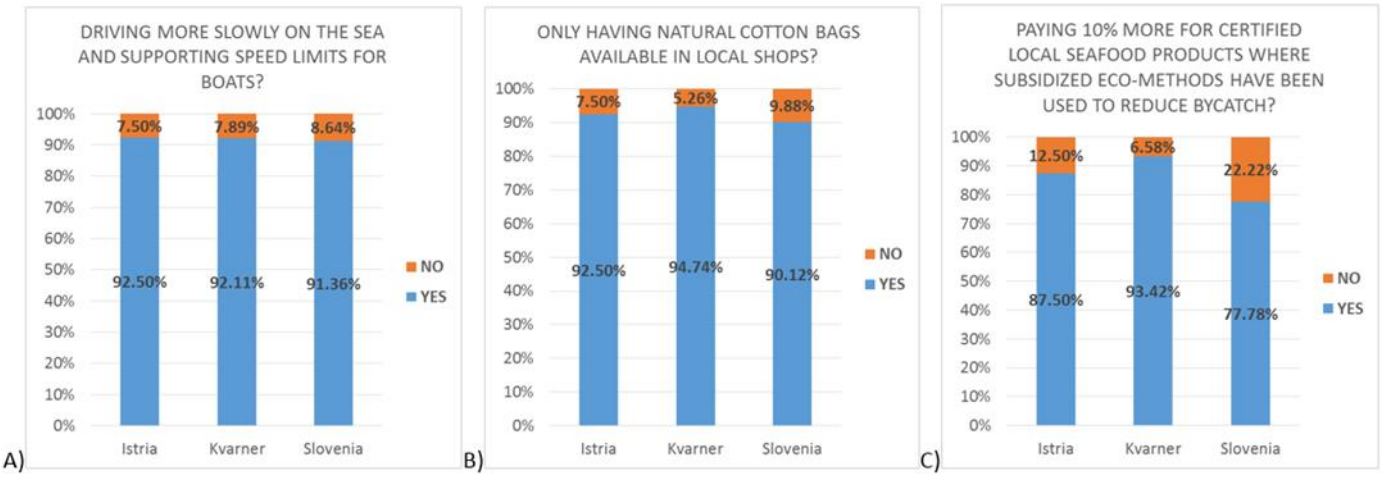

Fig. 11. The graphs show the percentage of respondents' willingness to A) drive more slowly and supporting speed limits for boats, B) support that only natural cotton bags are available in local shops and C) pay 10% more for certified local seafood products where subsidized eco-methods have been used to reduce bycatch in local shops in Istria, Kvarner and Slovenia sample.

Hypothesis 4 wasn't confirmed by the results. In the Kvarner region, they show that the respondents are equally prepared to support all three mitigating actions to reduce threats to sea turtles in the area. While in Istria and Primorska region they showed that respondents are equally prepared to support speed limits and to support only natural cotton bags available in local shops.

Table 6. Measures of central tendency, 1st and 3rd quartile of the respondents' responses to questions examining awareness about threats to the sea turtles in the region (Q13.1., Q13.2. and Q13.3.) in Istria, Kvarner and Primorska sample.

	Regions	Median	Mode	1st quartile	3rd quartile
Q13.1. – Collision with boats	Istria	4	5	4	5
	Kvarner	4	5	4	5
	Primorska	5	5	3.5	5
Q.13.2. – Plastic	Istria	5	5	5	5
	Kvarner	5	5	5	5
	Primorska	5	5	5	5
Q.13.3. – Bycatch	Istria	5	5	4	5
	Kvarner	5	5	4	5
	Primorska	4	5	4	5

4.4 The economic value of sea turtles

Results showed that the majority of respondents, more than 80%, didn't see sea turtles in the wild in any of the three regions (see figure 12.). As seen from figure 13. the demand for developing an ecotouristic offer, which would provide tangible experience with sea turtles and a conservation fund, was highest in the Kvarner region, where more than 70% of the

respondents showed interest in all three WTP scenarios. While Istria was the region with the lowest interest. In Istria region, a little more than 60% of the respondents showed interest in visiting educational or rescue center for sea turtles and are willing to contribute to a conservation fund for sea turtles while on their holiday, while only half of them were interested in a dedicated marine wildlife trip. In Kvarner and Primorska region, the demand for developing an ecotouristic offer that would provide tangible experience with sea turtles was higher than for developing a conservation trust fund, but interest in the type of ecotouristic offer differed between this two regions. Respondents in the Kvarner region were more interested in visiting an educational or rescue center for sea turtles (84%) than going on a dedicated marine wildlife trip (77%, see figure 13.A and 13.B). In the Primorska region, respondents showed more interest in a dedicated marine wildlife trip (71%). Additional analysis was done with the Primorska sample to see if the interest differed between domestic and international tourists. As seen in table 8. international tourists have a higher interest in visiting a sea turtle center (75%).

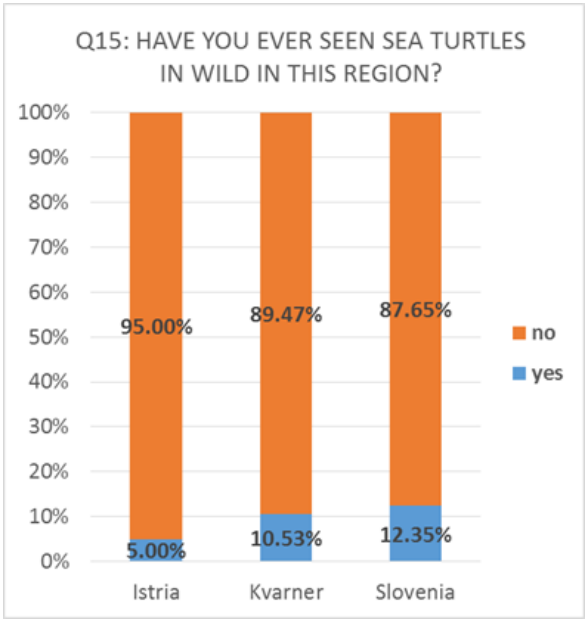

Fig. 12. The graph shows the percentages of how many respondents saw sea turtles in the wild in the region in Istria, Kvarner and Slovenia sample.

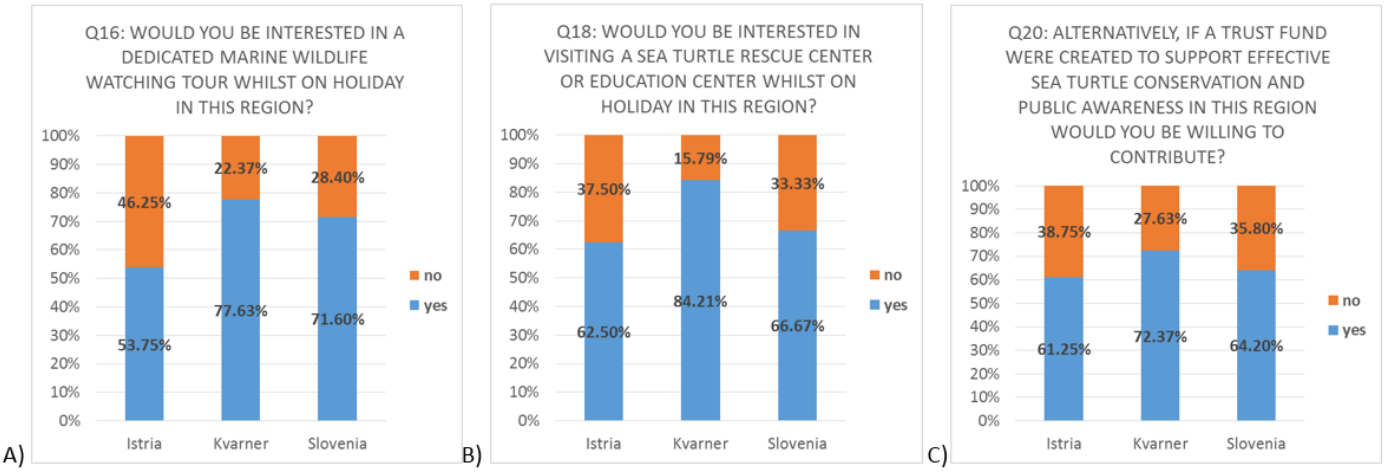

Fig. 13. The graphs show the percentages of respondents' responses to A) question 16, B) question 18 and C) question 20 in Istria, Kvarner and Slovenia sample.

The estimated use-value of sea turtles was equal for Istria and Kvarner and it was higher than in the Primorska region. The median value of the amount of money the respondents are WTP in Croatian regions was 7.5 € for an entrance fee and 22 € for a ticket fee. In the Primorska median WTP for an entrance ticket was 4 € and 17.5 € for a ticket fee, although the highest percentage is seen in 15 € categories (see table 7.). The number of respondents WTP per person per day to support sea turtle conservation is presented in table 7, which shows how values differ between regions. The Primorska region shows the highest median WTP value (4.5 €), but with a 2 € difference between domestic and international tourist median WTP value (see table 9). In the Istria region, the median WTP value was 2 €, although the majority of respondents' WTP is 1 €. The lowest median WTP value (1 €) was in Kvarner. Because some samples show differences between median and mode WTP values, estimation was done with all of them. Estimated non-use values of loggerhead sea turtles in Istria, Kvarner and Primorska are shown in tables 10., 11. and 12. The highest non-use value is seen in the Istria region, where non-use value is estimated to range between 3.4 and 6.8 million € per year (see table 10.). The lowest was estimated in Kvarner, 2.3 million € per year (see table 11.). In the Primorska region non-use value ranges between 2.4 and 6 million € per year (see table 12.).

The results show that loggerhead sea turtles have non-use and use-value in the northern Adriatic with the potential to generate/ensure income for their conservation, confirming hypotheses 1 and 2.

Table 7. Median, mode and average values of the respondents' responses to willingness to pay (WTP) questions (Q17, Q19 and Q21) in Istria, Kvarner and Primorska sample.

	Region	Median	Mode	Average
Q 19 – WTP for the entrance fee	Istria	7.5	7.5	7.76
	Kvarner	7.5	7.5	7.5
	Primorska	4	4	5.81
Q 17 – WTP for the ticket fee	Istria	22	22	22.59
	Kvarner	22	22	22.55
	Primorska	17.5	15	18.98
Q 21 – WTP per person per day to a conservation fund	Istria	2	1	3.39
	Kvarner	1	1	2.82
	Primorska	4.5	5	4.75

Table 8. The percentage of domestic and international respondents' responses to questions 15,16,18 and 20 from the questionnaire in the Primorska sample.

		Yes	No
Q 15 – saw sea turtles in wild in the region	Domestic	15.52%	84.48%
	International	4.17%	95.83%
Q 16 – interested in wildlife trip whilst on holiday	Domestic	75.86%	24.14%
	International	62.5%	37.5%

Q 18 – interested in visiting sea turtle center	Domestic	63.79%	36.21%
	International	75%	25%
Q 20 – interested in supporting a trust fund	Domestic	65.52%	34.48%
	International	62.5%	37.5%

Table 9. Median and mode values of domestic and international respondents' responses to willingness to pay (WTP) questions (Q17, Q19 and Q21) in Primorska sample

		Median	Mode
Q 19 – WTP for the entrance fee	Domestic	4 €	4€
	International	7.5 €	7.5€
Q 17 – WTP for the ticket fee	Domestic	17.5 €	15€
	International	22 €	22€
Q 21 – WTP per person per day to a conservation fund	Domestic	5 €	5€
	International	3 €	2€

Table 10. Estimated non-use value of loggerhead sea turtles in the Istria sample.

		Number of overnights in 2017	Non-use value
Median WTP	2 €	3 392 258	6 784 516 €
Mode WTP	1 €		3 392 258 €

Table 11. Estimated non-use value of loggerhead sea turtles in the Kvarner sample.

		Number of overnights in 2017	Non-use value
Median WTP	1 €	2 334 390	2 334 390 €
Mode WTP	1 €		2 334 390 €

Table 12. Estimated non-use value of loggerhead sea turtles in Primorska sample for all data, domestic tourists and international tourists.

Primorska – all data		Number of overnights in 2017	Non-use value
Median WTP	4.5 €	1 196 908	5 386 086 €
Mode WTP	5 €		5 984 540 €
Primorska – domestic tourists			
Median WTP	5 €		5 984 540 €
Mode WTP	5 €		5 984 540 €

Primorska – International tourists			
Median WTP	3		3 590 724 €
Mode WTP	2		2 393 816 €

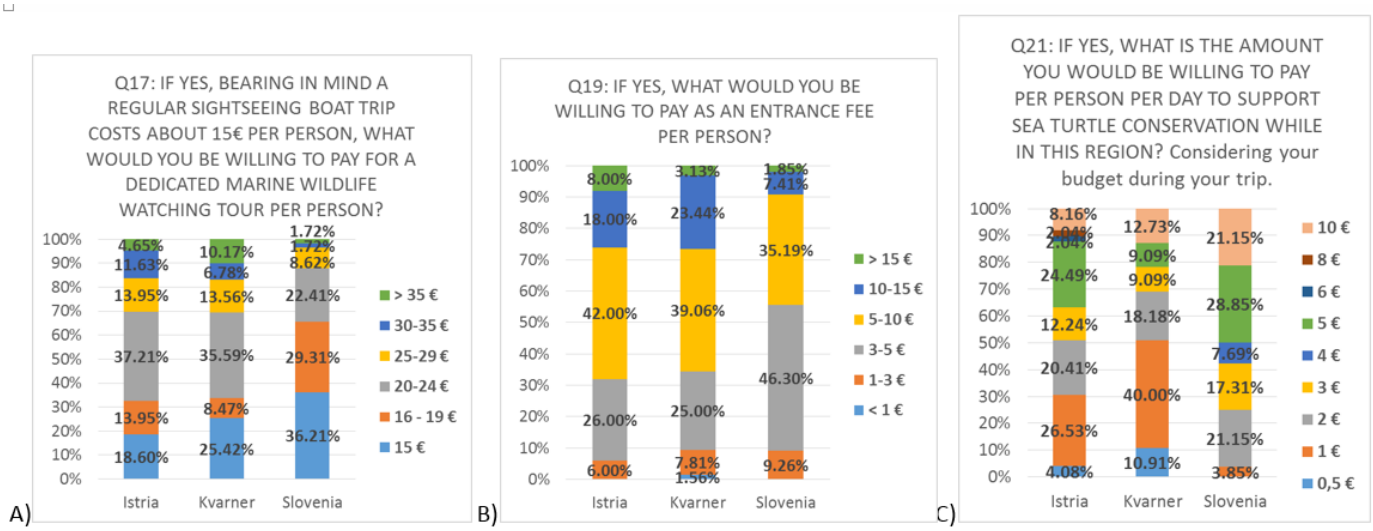

Fig. 14. The graphs show the percentage of respondents' responses to A) question 17, B) question 19 and C) question 21 in Istria, Kvarner and Slovenia sample.

4.5 Non-parametric statistical analysis – factors influencing WTP

Kruskal-Wallis test showed that WTP for dedicated marine wildlife trip is influenced by respondents' accommodation type in Kvarner (see table 14.) and by the respondents' previous visits in Primorska (see table 15.). WTP per person per day to a conservation fund was influenced by respondents' previous visits to Istria (see table 13.). As seen in figure 15.respondents staying in private accommodation are WTP most and the ones staying in hotels, the least. From figure 16. we see that with the increase of monthly household income WTP is rising, but when income is stated to be 5000 € or more we have a decrease in WTP. Figure 17. shows that tourists that came to Istria less than 2 times are WTP more than the ones that came more than 2 times.

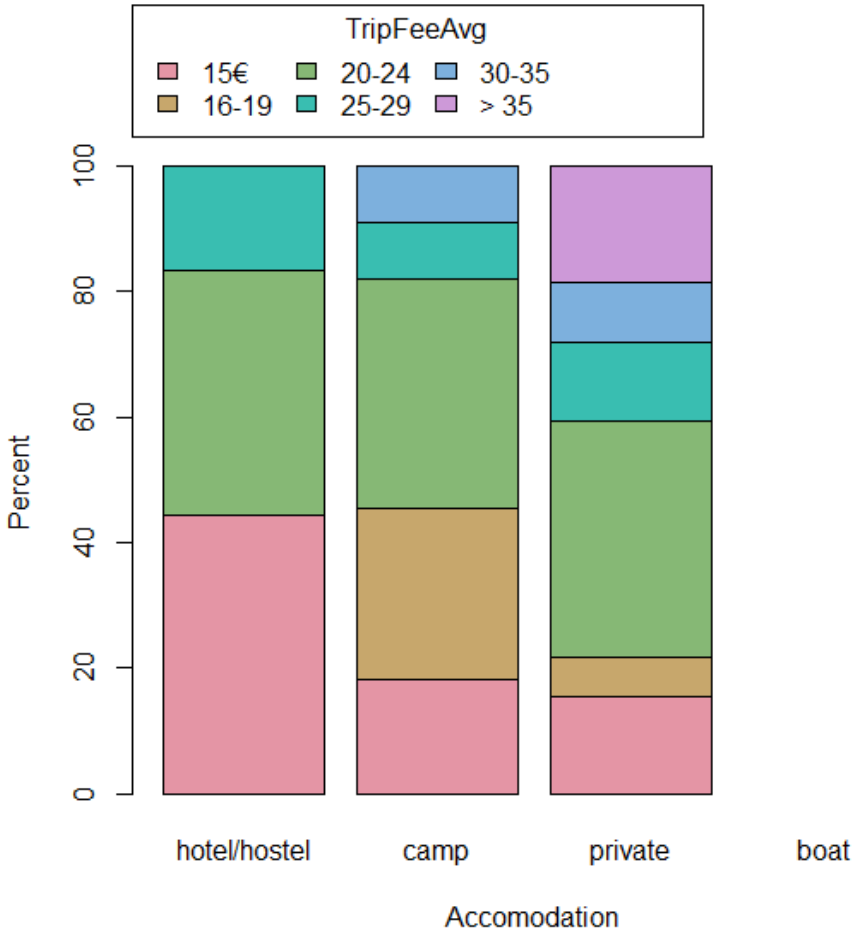

Fig. 15. The graph shows the relationship between respondents' willingness to pay for a ticket for a wildlife trip (TripFeeAvg) and accommodation type of respondents in the Kvarner sample.

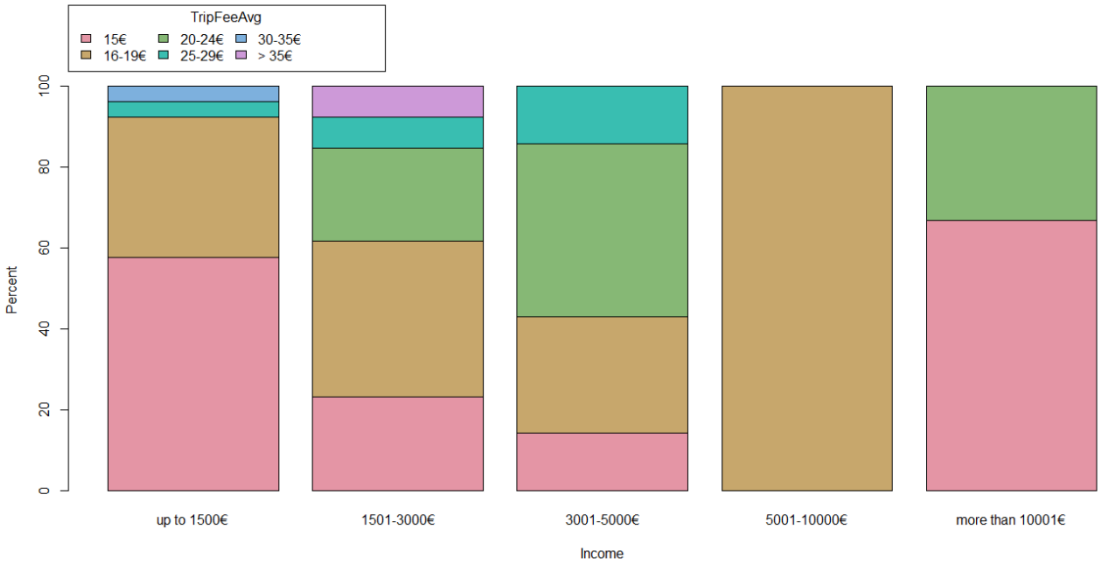

Fig. 16. The graph shows the relationship between respondents' willingness to pay for a ticket for a marine wildlife trip (TripFeeAvg) and monthly household net income in Primorska (Slovenia) sample.

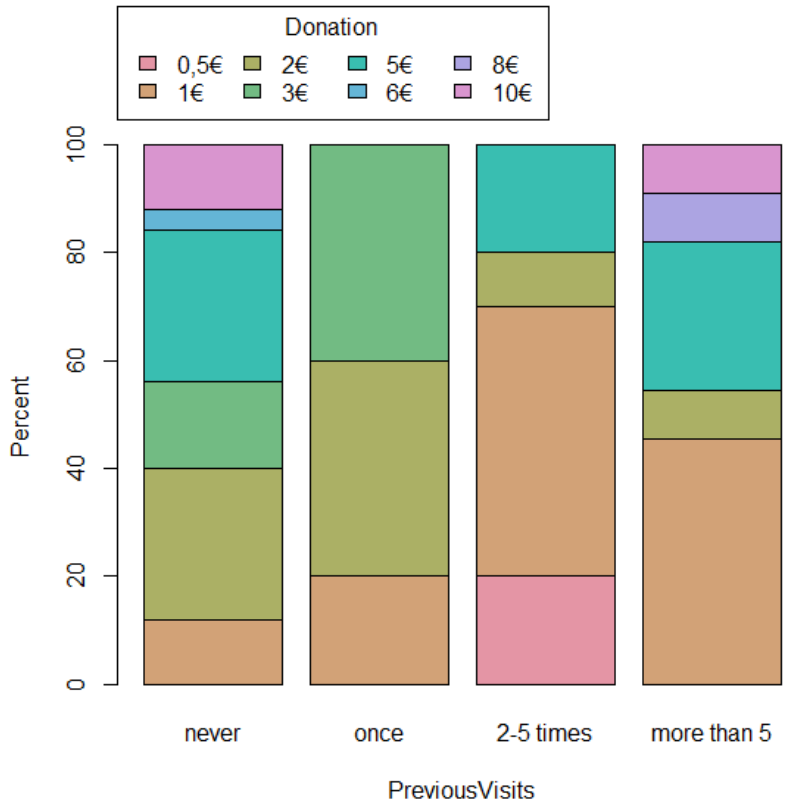

Fig. 17. The graph shows the relationship between respondents' willingness to pay per person per day to a conservation fund (Donation) and previous visits to the region in the Istria sample.

Table 13. Test of significance: Kruskal-Wallis Test: comparing respondents' profile and willingness to pay for ticket fee, entrance fee and donation to a trust fund in the Istria sample. Respondents profile variables were accommodation, age, education, gender, income, previous visits number of overnights, nationality and domestic/international tourists. (Test is significant at p-value < 0.05*).

	Accommodation		Age		Education		Gender		Income		Previous visits		Number of overnights		Nationality		Domestic/International tourists	
	chi-squared	p-value	chi-squared	p-value	chi-squared	p-value	chi-squared	p-value	chi-squared	p-value	chi-squared	p-value	chi-squared	p-value	chi-squared	p-value	chi-squared	p-value

Trip Fee	1.7993	0.7726	1.8794	0.8656	2.279	0.32	1.344	0.2463	4.1009	0.3925	0.82044	0.8446	1.3686	0.7129	12.393	0.192	0.38707	0.5338
Entrance Fee	7.0138	0.1352	2.9304	0.7107	6.6185	0.0851	1.1149	0.291	3.0465	0.5501	3.9523	0.2667	6.4141	0.09311	6.8513	0.6526	2.6931	0.1008
Donation	2.9323	0.5692	7.4488	0.1893	1.1717	0.7598	0.5913	0.4419	3.974	0.4095	8.7967	0.03212 *	4.2843	0.2324	10.485	0.2326	0.65109	0.4197

Table 14. Test of significance: Kruskal-Wallis Test: comparing respondents' profile and willingness to pay for ticket fee, entrance fee and donation to a trust fund in Kvarner sample. Respondents profile variables were accommodation, age, education, gender, income, previous visits number of overnights, nationality and domestic/international tourists. (Test is significant at p-value < 0.05*).

	Accommodation		Age		Education		Gender		Income		Previous visits		Number of overnights		Nationality		Domestic/International tourists	
	chi-squared	p-value	chi-squared	p-value	chi-squared	p-value	chi-squared	p-value	chi-squared	p-value	chi-squared	p-value	chi-squared	p-value	chi-squared	p-value	chi-squared	p-value
Ticket Fee	6.7078	0.03495 *	3.6914	0.5946	2.0848	0.555	0.89227	0.3449	9.3809	0.05225	3.7318	0.2919	3.3441	0.3416	2.7782	0.9724	0.45648	0.4993
Entrance Fee	2.5291	0.47	2.7475	0.7388	6.2102	0.1018	0.46095	0.4972	5.9956	0.1995	6.5773	0.08666	2.156	0.5407	11.968	0.2151	1.5796	0.2088
Donation	2.6627	0.2641	6.9029	0.228	0.45661	0.9283	1.0056	0.316	1.6033	0.8082	4.4917	0.213	2.2121	0.5296	10.426	0.2364	0.93201	0.3343

Table 15. Test of significance: Kruskal-Wallis Test: comparing respondents' profile and willingness to pay for ticket fee, entrance fee and donation to a trust fund in Primorska (Slovenia) sample. Respondents profile variables were accommodation, age, education, gender, income, previous visits number of overnights, nationality and domestic/international tourists. (Test is significant at p-value < 0.05*).

Donation	Entrance Fee	Trip Fee		
2.9919	2.7571	2.5921	chi-squared	Accommodation
0.5592	0.4306	0.6282	p-value	
3.8843	6.0087	9.3278	chi-squared	Age
0.5662	0.3054	0.09668	p-value	
3.4754	5.9219	3.0184	chi-squared	Education
0.324	0.1155	0.3888	p-value	
0.070809	0.14036	1.8117	chi-squared	Gender
0.7902	0.7079	0.1783	p-value	
3.6763	6.1983	9.4882	chi-squared	Income
0.4516	0.1848	0.04999*	p-value	
1.6763	0.8046	6.9515	chi-squared	Previous visits
0.6422	0.8484	0.07346	p-value	
3.6855	1.0345	3.1036	chi-squared	Number of overnights
0.2975	0.7929	0.3759	p-value	
11.284	2.5965	7.8459	chi-squared	Nationality
0.1267	0.9197	0.4487	p-value	
1.9547	0.9438	1.4455	chi-squared	Domestic/International tourists
0.1621	0.3313	0.2293	p-value	

5 Discussion

The main aim of this study was to estimate the economic value of loggerhead sea turtles in the northern Adriatic Sea with the goal of financing and improving their conservation in the region. The economic value is estimated within the framework of "Total Economic Value" (TEV), made up of use and non-use values (Pearce & Seccombe-Hett, 2000; Teh et al, 2018). Tourism is used to create such a market (Sala et al, 2013) where use-values refer to recreational use, based on special tourism offers, while non-use values refer to preservation value, based on bequest, existence and option value (Lee & Han, 2002). Demand for sea turtle tourism is globally increasing (Landry & Taggart, 2009; Wilson & Tisdel, 2000). The potential for the development of this particular touristic branch in the northern Adriatic Sea can be estimated from the results of this study. The Kvarner region was the area with the most expressed demand, where more than 70% of the respondents showed interest in all three proposed scenarios. This could be a result of the specific characteristics of this research area: existing ecotouristic offer and nature as the main tourist attraction (Batel et al, 2014). More than 60% of Kvarner respondents stated that the condition of the marine environment is "very much" important when they are deciding on their holiday and that they are "very much" influenced to return to the region because of it. This indicates that Kvarner already attracts a certain type of tourists oriented towards nature.

When interpreting the results of the Primorska sample, caution is necessary. There was a high proportion of domestic tourists (> 70%) in the sample, which could reflect their willingness to pay rather than the general tourist willingness to pay. Although a statistically significant difference wasn't found in the willingness to pay between domestic and international tourists, there was a difference in their median "willingness to pay" value (see table 9.). The estimated economic value of loggerhead sea turtles in Primorska isn't considered valid because the sample isn't representative. To get a more accurate estimate of economic value, further research should be done, with the focus on getting a representative sample. Even though the estimation isn't valid, the results indicate the opinion of domestic tourists on this topic.

It must be mentioned that the respondents have shown some confusion regarding the third willingness to pay scenario. They were most interested in the way this money would be collected since this wasn't specified, and whether it would go towards sea turtle conservation. Some of the respondents chose high values, which could not be sustained by their monthly income, indicating that the respondents didn't fully understand the concept of payment per person per day. Studies analyzing tourist attitudes toward tax and its implementation show very different results. Do Valle et al's (2012) study shows that tourists are not willing to pay tax, Taylor et al's (2003) study shows general support for tax, while Svensson et al's (2008) study shows that tourists appreciate taxes if they directly contribute towards conservation. Since the collection of tax is a very complex subject, additional research, focused only on the third scenario is recommended before the implementation of such practice.

The results of the study confirm hypothesis 1 in Istria and Kvarner. Sea turtles have non-use economic value with the potential to ensure additional long-term funding for their conservation in the region. The estimated value ranged between 2 and 7 million € annually. The highest value is recorded in Istria, 6.8 million € annually, and the lowest in Kvarner, 2.3 million € annually. The median "willingness to pay" value was 2 € per person per day in Istria and 1 €

per person per day in Kvarner. In the Istria sample mod "willingness to pay" value was lower than the median value, and it was 1 € per person per day. In other words, the majority of respondents are willing to pay less than what is expected that the majority of tourists are willing to pay. Considering the respondents' confusion about the presented scenario, the value of 1 € per person per day is taken as the respondents' most accurate willingness to pay. Consequently, a more accurate estimation of the non-use economic value of loggerhead sea turtles in Istria is 3.4 million € annually. Higher non-use economic value in the Istria region is a result of the accommodation capacity, which is lower in the Kvarner region. But overall results indicate that the Kvarner region has more potential for generating this income because respondents were more willing to support the creation of conservation funds for sea turtles (see figure 31.). In the Primorska region estimated non-use economic value was 5.9 million € annually, with 4.5 € as the median value the respondents were willing to pay per person per day. But when the median "willingness to pay" value of international tourists (3 €) is taken, the estimated non-use value reaches up to 3.5 million € per year.

Hypothesis 2 was confirmed by the results in Istria and Kvarner as well. Sea turtles have use value with the potential to ensure direct income for their conservation in the region. The estimated use value was the same for Istria and Kvarner. The median value the respondents are willing to pay for an entrance ticket to a sea turtle center while on their holiday is 7.5 €. This is more than twice the current ticket price for Marine Center on Lošinj. Very high interest (84%) in visiting a sea turtle center on Kvarner indicates the need for an improvement of the existing turtle rescue center. The sample showed a generally high interest in visiting a sea turtle center, which could be a result of the respondents' desire to learn about sea turtles and their importance in the region. In the Istrian sample, 62% of the respondents showed interest in visiting a sea turtle center. Even though the demand for ecotourism in Istria isn't that strong, opening a sea turtle education center should be considered in the tourism development of Istria. Such a center would diversify the offer and possibly prolong the tourist season in the area by operating throughout the whole year since it doesn't depend on marine conditions like boat watching trips do. This would provide employment opportunities and education for local people (Bhandari & Heshmati, 2009). This is important for conservation success as Leisher et al (2012), Bhandari & Heshmati (2009) and Swanson & Kontoleon (2000) point out. On the other hand, WTP of 22 € for a dedicated marine wildlife trip is half the current ticket price for dolphin watching on Lošinj. It is probably because the amount people are willing to spend largely depends on the charisma of the species (Kontoleon & Swanson, 2003). Even though sea turtles are charismatic species (Bjorndal & Jackson, 2003), the question only asked for an estimation of WTP for a dedicated marine wildlife trip. It didn't specify it as a sea turtle wildlife trip. Primorska region showed lower median "willingness to pay" values, 17.5 € for a wildlife trip ticket and 4 € for an entrance ticket, while the median values of international tourist's willingness to pay were the same as in Istria and Kvarner region. Also, the sample showed a higher interest in going on a wildlife trip rather than to a sea turtle center, which could be a reflection on the opinion of domestic tourists rather than international ones.

Hypothesis 3, where we assumed a scale of respondent awareness regarding threats to sea turtles, was confirmed by the results in Istria and Kvarner. Plastic (>75%) was considered as the biggest threat, which is a result of the presence of sea turtles in environmental messaging for addressing plastic pollution issues (Eagle et al, 2016). It was followed by bycatch (>50%),

which is a globally recognized threat to other marine species, and collision with boats (<50%) as the least important, because there is little evidence of the direct impact of boat hits (Casale et al, 2018) which leads to less environmental messaging regarding that issue. The results from the Primorska region didn't confirm hypothesis 3, it turned out that the respondents were more aware of collisions with speedboats (>50%) than bycatch (<50%). This could also be ascribed to domestic tourists' opinion since they dominated the Primorska sample. Besides, these results could also indicate that there was an attempt to raise awareness about the problem of sea turtles and speed boat collisions on the national level in Slovenia.

On the other hand, hypothesis 4, which considers the willingness to make behavioral and/or financial commitment to mitigate threats to sea turtles in the region, wasn't confirmed in Istria and Kvarner. The results for the Kvarner region show how the respondents are more willing to make both behavioral and small financial commitments, rather than only behavioral, while in Istria no difference was found between the willingness of the respondents to make the only behavioral commitment and their willingness to make both. This could be because plastic pollution represents a global problem and there is existing legislation addressing this problem (Derraik, 2002) as well as strong environmental messaging throughout social media about this specific issue. Another explanation of this could be the limitation of the study, a small number of respondents that were directly connected to boats, renting or owning a boat (1.5%). Despite this, the overall results showed how in all three regions more than 90% of the respondents are willing to make behavioral and/or small financial commitments. Willingness to pay 10% more for certified local sea products was different between regions, but generally, it was high (>75%). Extremely high willingness for it was seen in the Kvarner region (>90%) on the island of Lošinj, which already has an existing ecotouristic offer and therefore attracts a certain type of visitors. These results indicate the existence of a demand for certified local sea products in Kvarner. Primorska sample confirmed the hypothesis, but it wasn't representative.

The results confirmed hypothesis 5: there is moral support from tourists for the creation of an MPA in the region. But caution is necessary because the presence of MPA in the area wouldn't make this region more attractive to tourists. These results implicate that the creation of an MPA in the region could have negative effects on the tourism industry. Since tourism is used to provide economic benefits (Stronza & Gordillo, 2008) important for conservation, such negative effects could reflect on conservation itself. Some of the respondents were confused about which tourist activities if any are permitted in or near a protected area. This shows a lack of knowledge about current conservation practices that involve eco-tourism. Ecotourism is seen as a potential strategy for conservation while meeting human needs (Stronza & Pegas, 2008). The respondents showed less knowledge about the habitat of the loggerhead sea turtles (~80%) than about their priority for conservation (~70%). Around 50% consider them indicator species while showing the most knowledge about their endangerment, probably because of their common use in environmental messaging (Eagle et al, 2016). So educational programs need to focus on raising awareness about northern Adriatic as an important habitat, a priority for conservation, indicator species and new conservation practices, as well as on collision with boats and bycatch as their threats.

6 Conclusion

Loggerhead sea turtles in the northern Adriatic Sea have non-use and use value, with the potential to ensure both long and short term funding for their conservation. The estimated economic non-use value ranges from 2.3 million € in Kvarner to 3.4 million € in Istria. The use value had the same value in Istria and Kvarner, 7.5 € for an entrance ticket to the sea turtle center and 22 € for a marine wildlife trip. The Kvarner region showed a higher demand for sea turtle ecotourism and thus has a higher potential for raising long and short term funds for loggerhead sea turtle conservation. Another advantage of this region is the existing infrastructure and eco touristic offer, which already attracts certain types of visitors. It is also important to consider the interest in visiting the educational center in Istria in the future development of the region since it could lead to greater conservation success.

The values gained for the Primorska region are not considered valid, because the sample wasn't representative. Further research is necessary to obtain a valid estimation of the economic value of loggerhead sea turtles and its potential for generating conservation funds. Additional research focused only on supporting conservation funds for sea turtles is recommended before the implementation of such practice.

The tourists show the most awareness about plastic pollution as a threat, followed by bycatch and collision with boats. Willingness to support mitigating actions to reduce these threats was very high, more than 90% for speed limits and having only natural cotton bags in local shops, and more than 75% would pay 10% more for certified seafood products. There was also very strong support for the creation of an MPA for sea turtles in the area (>95%), but an MPA wouldn't make this region more attractive to tourists. Tourists have little knowledge about North Adriatic Sea as an important habitat for sea turtles (~80%), about their priority for conservation (~70%), about them as indicator species (~50%), about bycatch as a threat (>50%) and collision with boats as a threat (<50%). All of these points should be considered while developing awareness raising programs.

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8. Curriculum Vitae

Martina Glavaš

Date of birth: 9 December 1990

Education:

1. Department of Biology, Faculty of Science, University of Zagreb
   Master of Science in Ecology and Nature Protection, marine module
   Date: September 2015 – March 2020

2. The University of Primorska, Faculty of Mathematics, Natural Sciences and Information Technologies
   Completing The Human Dimension in Conservation Sciences course

   Date: March 2017

3. Department of Mathematics, Faculty of Science, University of Zagreb
   Bachelor of Education in Mathematics, *cum laude*

   Thesis 'The Role of Symbiosis in Evolution'

   Date: September 2009 – July 2015

4. XV Gymnasium – MIOC, Zagreb
   Date: September 2005 – July 209

Working experience:

Expert associations:

1. Blue World Institute for Marine Research and Conservation and Blue World Limited
   Educator

   Giving lectures for dolphin watching tours, working in Lošinj Marine Education Centre

   Date: April – September 2017, 2018

Laboratory professional training:

1. Division of Botany, Department of Biology, Faculty of Science, Zagreb
   Phytoplankton of Adriatic Sea, mentor: Assoc. Prof. D.Sc. Zrinka Ljubešić

   Phytoplankton microscopy and species identification

   Date: March 2015 – June 2015

Personal skills:

Foreign languages:

	understanding		speaking		writing
	listening	reading	interaction	production	
English	C1	C1	C1	C1	C1

(C1 –proficient user)

Computer literacy:

- MS Office (Word, Excell, Access, PowerPoint) – proficient user
- qGIS – basic user
- R (The R Project for Statistical Computing) – basic user