# The effect of dolphin observation programmes in the Cres-Lošinj archipelago on encouraging pro-environmental behavior

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**Master thesis**

Zagreb, 2019.

*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, PhD, 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. Sunčica Bosak, PhD. The thesis is submitted to the Department of Biology at the Faculty of Science of the University of Zagreb for the purpose of acquiring a title/degree of Master of Science in Ecology and Nature Protection.*

# Acknowledgements

Firstly, I would like to thank my mentors Peter and Jelena from the Blue World Institute for recognizing my interest and passion for the human dimension of conservation and helping me develop this thesis from the idea that 'I would like to work with people in conservation'. Thank you for investing so much energy and attention to detail when developing the questionnaires and re-organizing the dolphin-watching programme in order to suit my research. Thanks for supporting me and giving me advice whenever I needed it along the way.

I would like to give special thanks to the person without who this thesis would for sure not be done yet, my mentor Sunčica. Thank you so much for helping me make something good and meaningful out of a pile of Excel tables, for investing so much effort in me and teaching me organizational skills when I most needed them. Thank you for teaching me how to recognize what is important and what to focus on. The best thing is that every time after consultations with you, I would have a smile on my face, a lot of optimism and a clear plan of what next.

Thank you Andrea for being a great boss, full of support and understanding for my work in Lošinj Marine Education Centre during the summer 2018.

Great thanks to the guys and girls who helped me with translating the questionnaires to many different languages, Martina, Marko, Matea, Marinela and the eco-volunteers.

Kiki, thank you for being the best co-worker I could have ever had, always caring and keeping everything in mind, and always being such a good company.

A big thank you to my Lošinj-Zagreb sister Taso, for her contagious smile and enthusiasm, introducing me to the work of the Blue World Institute and spending days and nights living together with me through many adventures on Lošinj.

Thank you Tihana, Nikolina, Matea and Grgur for helping me gather the questionnaires from the eco-volunteers from all around the world.

Thanks to all my friends and family and my roomie Mirna for knowing me for who I am and still always believing in me and being a big support!

TEMELJNA DOKUMENTACIJSKA KARTICA

Sveučilište u Zagrebu
Prirodoslovno matematički fakultet
Biološki odsjek

Diplomski rad

**Učinak programa promatranja dupina u lošinjskom akvatoriju na poticanje okolišno odgovornog ponašanja**

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Program promatranja dupina u lošinjskom akvatoriju se provodi u svrhu poticanja zaštite dobrog dupina (*Tursiops truncatus*, Montagu 1821) u Jadranskom moru. Cilj programa je kroz okolišnu edukaciju sudionicima približiti tematiku ugroženosti i zaštite dupina te ih potaknuti na okolišno odgovorno ponašanje kojim bi doprinijeli zaštiti dupina. Cilj ovog istraživanja bio je ispitati učinak dva tipa programa na sudionike. Korištena metodologija uključivala je ispunjavanje anketnih upitnika, a ispitanici su bili sudionici dvaju programa različitih po trajanju i razini uključenosti. U trosatni program promatranja dupina bili su uključeni sudionici 'promatrači', dok su u desetodnevni program istraživanja dupina bili uključeni 'aktivni sudionici'. Kroz upitnike smo istražili motivacije obje skupine sudionika te utjecaj programa na njihove okolišne stavove i okolišno odgovorno ponašanje. Pretpostavili smo da će utjecaj biti jači na aktivne sudionike jer su kroz program bili duže i aktivnije uključeni u tematiku zaštite dupina nego promatrači. Rezultati 206 upitnika promatrača i 71 upitnika aktivnih sudionika su pokazali da se motivacije dvaju skupina razlikuju po tome što je aktivnim sudionicima bilo važnije doprinijeti zaštiti dupina nego promatračima. Dokazan je pozitivan utjecaj programa na stavove i okolišno odgovorno ponašanje obje skupine te se, suprotno očekivanom, pokazalo da je utjecaj na obje skupine podjednak.

(70 stranica, 38 slika, 11 tablica, 44 literaturna navoda, jezik izvornika: engleski)

Rad je pohranjen u Središnjoj biološkoj knjižnici

Ključne riječi: *Tursiops truncatus*, anketni upitnici, promatrači, aktivni sudionici, okolišna edukacija, zaštita okoliša

Voditelji rada: doc. dr. sc. Peter Mackelworth; doc. dr. sc. Sunčica Bosak

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(3) Izv. prof. dr. sc. Petar Kružić

Zamjena: izv. prof. dr. sc. Zrinka Ljubešić

Rad je prihvaćen: 6. lipnja 2019.

BASIC DOCUMENTATION CARD

University of Zagreb
Faculty of Science
Division of Biology

Graduation thesis

**The effect of dolphin observation programmes in the Cres-Lošinj archipelago on encouraging pro-environmental behavior**

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The dolphin observation programmes in the Cres-Lošinj archipelago are conducted in order to contribute to the conservation of the bottlenose dolphin (*Tursiops truncatus*, Montagu 1821) in the Adriatic Sea. The aim of the programmes is to raise environmental awareness of the participants through environmental interpretation and encourage them to adopt pro-environmental behaviors that support dolphin conservation. The main methodology was the questionnaire survey, conducted on the participants from two programmes that differed in duration and level of engagement. In the first programme, the participants were dolphin 'watchers' for three hours, and in the second one they were 'doers', actively engaged in dolphin research for ten days. Through questionnaires, we explored the motivations of both groups and the effect of the programmes on their pro-environmental attitudes and behavior. We expected doers to experience a greater change in pro-environmental attitudes and behavior, as they were more engaged in the programme than watchers. The results of 206 watchers' and 71 doers' questionnaires showed that doers were more motivated to contribute to dolphin conservation than watchers. A positive effect on pro-environmental attitudes and behavior was found in both groups and, contrary to the expected, it was not significantly different between watchers and doers.

(70 pages, 38 figures, 11 tables, 44 references, original in English)

Thesis deposited in the Central Biological Library

Keywords: *Tursiops truncatus*, questionnaires, watchers, doers, environmental interpretation, environmental conservation

Supervisors: Asst. Prof. Peter Mackelworth, PhD; Asst. Prof. Sunčica Bosak, PhD

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Thesis accepted: 6 June 2019

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# 1. Introduction

## 1.1. Bottlenose dolphin in the Adriatic

Dolphins and whales are aquatic mammals that belong to the order Cetacea. Originating from terrestrial ancestors, Cetaceans have fully evolved into the aquatic life form. They spend all the life stages in the water, where they carry out their biological functions, such as breeding, feeding and resting. The modern whales form two suborders: Mysticeti and Odontoceti, which probably originated from a common ancestor in an extinct suborder Archaeoceti, the ancient whales (Pough et al., 2009). Mysticeti and Odontoceti first appeared in the late Eocene or early Oligocene (Pough et al., 2009) and have diverged into two distinct radiations. Modern whales differ from Archaeoceti in developing a specific 'telescoped' skull, moving the nostrils to the top of the head, where they form the blowhole. The blowhole enables them to breathe while swimming through the water, without having to surface with their head.

Mysticeti, the baleen whales, consist of 15 species. The species of this suborder are very large, with the smallest being a 6 m-long pygmy right whale (*Caperea marginata*), and the largest being a 31 m-long blue whale (*Balaenoptera musculus*) (Wikipedia Contributors, 2019a). Even though the earliest Mysticeti had teeth, through the evolution they have lost it and developed a characteristic structure named baleen (Pough et al., 2009). Baleen is a skin derivate, which makes a filtering system inside the whale's mouth, through which it can extract small prey such as krill, copepods and small fish from the seawater. To feed, baleen whales open their mouth widely, collecting large shoals of prey along with the seawater. Then they partly shut their mouth, press their tongue against the upper jaw and force the water out through the baleen, sieving out the prey, which they then swallow. This kind of feeding system makes them obligate filter feeders, able to utilize the food sources from lower trophic levels that are abundant in the open oceans.

Odontoceti, the toothed whales, consist of at least 70 different species. In body size, they follow Mysticeti, ranging from 1,4 m long vaquita (*Phocoena sinus*) to 20 m long sperm whale (*Physeter macrocephalus*) (Wikipedia Contributors, 2019b). Odontoceti are characteristic for their functional teeth as opposed to the filter-feeder Mysticeti. They feed on large, individual prey, such as fish and cephalopods. Odontoceti include dolphins, porpoises and other toothed whales. The radiation of Mysticeti and Odontoceti is probably related to changes in ocean circulation that resulted in the increased productivity of the oceans (Pough et al., 2009). Having more plankton and fish available to feed on resulted in novel feeding strategies, such as filter feeding of Mysticeti and predation assisted with the echolocation of Odontoceti (Pough et al., 2009).

The bottlenose dolphin (*Tursiops truncatus*, fig. 1.) is a cosmopolitan species that inhabits coastal and pelagic marine ecosystems in the temperate and tropical zones. It belongs to the family Delphinidae, the largest family among Odontoceti, as well as among all Cetaceans. The family consists of 32 species including killer whales, pilot whales, and other dolphin species (Animal Diversity Web Contributors, 2014.). Bottlenose dolphins have a robust body that is dark grey on

the dorsal and light grey on the ventral side. They have a characteristic light grey stripe on the side of the body and a curved dorsal fin. In the Adriatic, the adults can grow to the size of 3.2 m and weigh around 250 kg. Females can live up to 50 years and males up to 40-45 years (Wells and Scott, 2002). Bottlenose dolphins are active both during the day and night. Their main everyday activities include travelling, feeding, searching for food, socialization and resting (Wells and Scott, 2002).

**Fig. 1**. The bottlenose dolphin (*Tursiops truncatus*) (Blue World Institute of Marine Research and Conservation, 2019).

Dolphins have clear eyesight in the water and out, and their eyes are adapted to extremely low light intensities. However, considering that the water environment is not suitable for distant vision, their vision is restricted to only a few meters. Therefore, dolphins have developed other senses for navigation and recognition of prey. As water medium is denser than air, sound travels faster in it, and therefore hearing can be used as an effective means for positioning the objects in dark and dim environment. Bottlenose dolphins, as well as other toothed whales, use echolocation like a 'biosonar' to detect their position and the position of other objects underwater. They emit echolocation calls - brief clicks in high and low frequencies. Dolphins use recycled air from their lungs to produce sounds, moving it back and forth between the air sacs distributed in their nasal passages (Fig. 2). The air passes through the structure called 'monkey lips' (or phonic lips, see Fig. 2) in their nasal passages, which vibrates and produces sounds like clicks. These sounds are reflected from the front of their skull into the melon. The melon (Fig. 2) is a fat tissue body situated on the forehead, which acts as the acoustic lens, focusing the sounds reflected from the skull into sound beams. The melon can change shape and move the sound beam around, emitting it from the dolphin's forehead. When the sound beam reaches an object, it echoes back and flows through the acoustic window, a thin part of the bone on the dolphin's lower jaw. The sound is transmitted through the acoustic window and fatty tissue in the lower mandible directly into the inner ear. The

inner ear is isolated from its surrounding by the sound-absorbing tissues (Pough et al., 2009). As the density of water and the dolphin's body tissue is similar, if this system of sound receiving has not been developed, the sound from the water could easily enter through the other body parts and bounce around inside the head, preventing the dolphin to hear clearly (Pough et al., 2009). This way, the sound from the water is conducted directly to the inner ear without dissipating to the surrounding tissues. In the inner ear, the sound is transduced into neural signals and sent to the brain. The brain pictures the environment based on the information received, being able to discriminate the size, shape, direction, speed and distance of the objects, which is especially helpful when identifying and hunting prey.

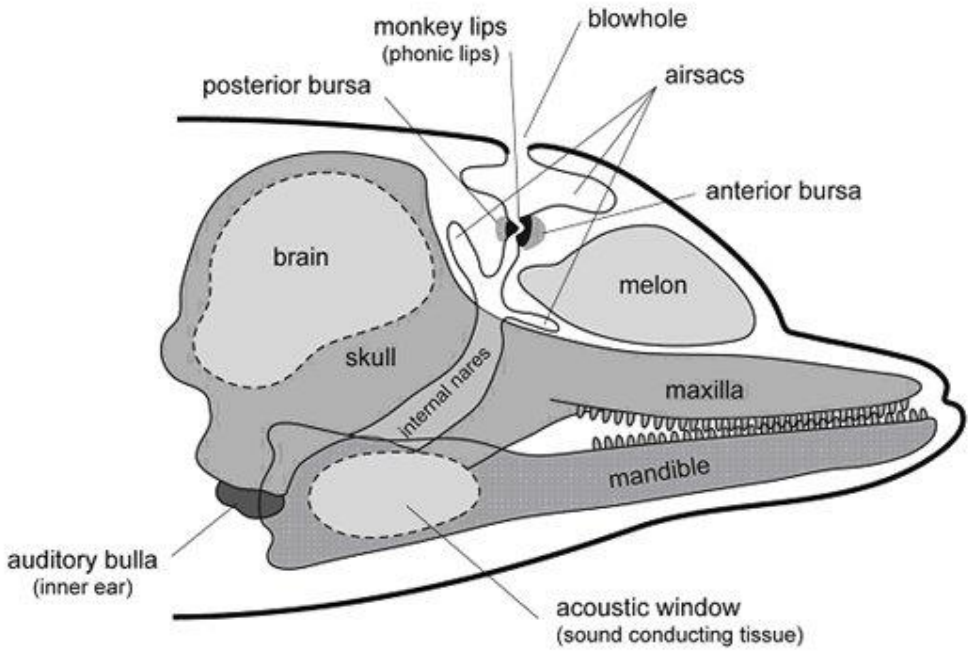


**Fig. 2.** Schematic illustration of a dolphin's head anatomy (López Marulanda, 2018).

Bottlenose dolphins are opportunistic feeders, meaning that they are adapted for utilizing various environments, as they feed on diverse prey, especially fish and cephalopods. In a period between 2000 and 2008, Blue World Institute of Marine Research and Conservation (BWI) has studied the diet of bottlenose dolphins in Kvarnerić and analyzed the stomach content of 25 dead dolphins. According to their results, the dolphin's most common prey is demersal fish from the family Sparidae, hake (*Merluccius merluccius*), horse mackerel (*Trachurus sp.*) and species from the order Teuthoidea (squids) (Blue World Institute, 2019).

Based on the data gained from aerial surveys of the Adriatic Sea conducted in 2010 and 2013, Fortuna et al. (2018) estimated the total number of bottlenose dolphins in the Adriatic to 5,700 with 95% confidence interval (CI) = 4,300–7,600. The Northern Adriatic is found to be an

exceptionally important area for the bottlenose dolphins, with a total number of individuals estimated to 2600 (95% CI= 2,200–2,900), almost the half of the whole Adriatic population. The Central and South Adriatic are estimated to host 1100 (CI= 800–1,500) and 1800 (CI= 1,500–2,400) individuals, respectively (Fortuna et al., 2018). According to the Red Book of Mammals of Croatia (Holcer, 2006), the bottlenose dolphin is categorized as "endangered" and is protected by the Croatian Nature Protection Law. It is also listed under Annexes II and IV of the European Union Habitats Directive. As a result, six sites that are the critical habitats for the bottlenose dolphin in Croatia have been listed under Natura 2000 Network of Protected Areas. These are Western Istrian waters, Cres-Lošinj archipelago, S Molat-Dugi-Kornat-Murter-Pašman-Ugljan-Rivanj-Sestrunj-Molat islands, Kornati National Park, Vis archipelago and Lastovo-Mljet channel. Altogether, these six sites are covering the area of 3,638.6 $km^2$. As a wide-ranging species, bottlenose dolphin is considered an umbrella species, which means that its home range is large enough and habitat requirements wide enough that, if there is a sufficiently large area designated for its protection, it would help protect many other species (Heywood, cited in Ducarme et al., 2013).

The Cres-Lošinj archipelago is the most studied area for the bottlenose dolphins in Croatia. The continuous research of the resident bottlenose dolphin population has been conducted by the Blue World Institute of Marine Research and Conservation (BWI) since 1987, which makes it the longest ongoing study of a dolphin population in the Mediterranean and one of the longest in the world. The Cres-Lošinj archipelago is a part of Kvarnerić, a marine passage and the shortest marine route from Rijeka to North Dalmatia, situated between the islands Cres and Lošinj in the west, Krk, Rab and Pag in the east and Silba and Olib in the south. Currently, the resident bottlenose dolphin population in Kvarnerić counts around 200 individuals throughout the whole year (Plesić et al., 2015), while the total number of the individuals recorded in that area is more than 1000 (Gospić et al., 2018). The other Cetacean species in the Adriatic are striped dolphin, common dolphin, Cuvier's beaked whale, Risso's dolphin and fin whale (Blue World Institute, 2019).

The main threats to the bottlenose dolphins in the Adriatic, according to the Red Book of Mammals of Croatia (Holcer, 2006) are:

1. Chemical pollution, which mainly comes from the land and rivers in the form of xenobiotics, such as DDT, PCB and heavy metals. They accumulate in the tissues, as dolphins are on the top of the food chain and have a relatively long life span (Marsili & Focardi, 1997). Xenobiotics have a long-term effect on the population, reducing the reproductive ability of the individuals, increasing calf mortality, affecting the immune system, causing diseases and parasite infections, etc. (Holcer, 2006).
2. Overfishing the dolphins' prey. The fish and cephalopod species upon which the dolphins are feeding are also economically important and a target of the fisheries. In many local areas in the Adriatic, their populations are overfished. This leaves the dolphins with a lack of prey. Bottlenose dolphins in the Cres-Lošinj Archipelago spend around 80% of their time hunting and searching for food, which means they have only 20% of time left for

socializing and resting (Bearzi et al., 1999).

3. Harassment by boats. Aggressive boat driving behavior can be an immense source of stress to the dolphin populations in their critical habitats. The convergence of a large number of vessels around the dolphins from all sides causes stress and increases the chance of injury to the animals by engine propellers. The stress can result in dolphins abandoning their habitat, and in the worst case may lead to their death (Blue World Institute, 2019).
4. Underwater noise pollution caused by large amounts of marine traffic in the summer months makes their communication and orientation extremely difficult.
5. Habitat degradation and fragmentation connected to bottom trawling in the sea and intensive building (e.g. for touristic infrastructure) in the coastal areas.
6. Entanglement in the fishing gear and ghost-nets.
7. Marine litter, especially floating plastic litter, if swallowed can cause suffocation and death.

Bottlenose dolphins do not have natural predators in the Adriatic. However, human activities such as tourism and marine traffic present one of the greatest threats for their population in Kvarnerić (Nimak-Wood et al., 2011, Fortuna, 2007). Dolphins in Kvarnerić are using the area differently depending on the tourist season. In the summer months, the number of boats in the area increases by 400%, which considerably increases the levels of underwater noise (Rako-Gospić et al., 2017). Underwater noise negatively affects their communication and orientation. Acoustic studies around the Cres-Lošinj archipelago have shown that during the tourist season, the dolphins are more frequently observed in the offshore areas, which have lower levels of noise (Rako et al., 2013). Nimak-Wood et al. (2011) also suggest that the presence of the boats affects the overall dolphin behavior so that when the boats are around, the dolphins spend most of their time travelling. This could indicate that the population is under stress when near the boats and has less time for their normal daily activities, such as feeding, socializing and resting.

### *1.1.1. Charismatic species and flagship species*

Bottlenose dolphins belong to the charismatic megafauna, along with other large vertebrate species that engage major public attention and sympathy. Charismatic megafauna is often a basis for the wildlife tourism industry and a focus of many conservationists (Skibins et al., 2013). Most of the charismatic species can also be categorized as flagship species, as they have the ability to raise public awareness of conservation issues and stimulate pro-conservation behavior towards their own species and towards biodiversity as a whole (Simberloff, 1998). That is why many conservationists and activists build purposeful conservation campaigns around the flagship species. In their study in 2013, Skibins et al. have found that direct exposure to wildlife stimulates caring toward the species of interest and pro-conservation behaviors, which are explained later.

### *1.1.2. Code of conduct – a set of rules when encountering dolphins on the sea*

In order to raise awareness of the boat users, Blue World Institute (BWI) developed the code of conduct, a set of rules to follow when encountering dolphins on the sea. The code of conduct incorporates results of long-term research of the local dolphin population and domestic and international rules for sustainable dolphin watching (Blue World Institute, 2019). Respecting the code is on a voluntary basis, but regardless of that, it has improved public awareness regarding behavior around dolphins on the sea and encouraged more public concern for the dolphins in the area (Rako-Gospić et al., 2017). When approaching dolphins on the sea, the dolphin watching boats, as well as tourist and recreational boats must ensure the safety of both people and the animals (Blue World Institute, 2019). A set of rules is the following:

1. The approach should be slow and made from the side, avoiding sudden changes in speed and direction. The boat should not approach the dolphins from the front and from the behind. When approaching from the front, if the boat crosses the dolphins' path it can create a barrier, which would force the group to change direction, split up or dive to avoid it. When approaching from the behind, the boat creates the impression of chasing the dolphins, which can force them to escape. Additionally, as sound travels much quicker through water than air, dolphins can detect the sound of a boat engine at great distances. Therefore, putting the engine in gear and changing speed or direction is alarming to the dolphins and it should be avoided completely. It is recommended not to approach the dolphins immediately and to leave the space of minimum 100 m to accommodate to the presence of the boat.

2. The best position of the boat is parallel and slightly behind the dolphins, as it leaves them space to change directions without constraint. Boat drivers should avoid crossing the path of the dolphins or moving ahead of them. While the dolphins are diving, the boat driver should keep the engine in neutral or continue in the same direction at the same speed until they reappear. The boat should never chase the dolphins after they reach the surface, but rather approach them slowly from the side. If the dolphins themselves approach the boat, the driver should not make any changes in the position or speed until they leave.

3. The boat should leave immediately if the dolphins show any signals of stress, meaning they are not comfortable with the presence of the boat. Some of these signals are loud exhalations, tail slapping, changes in swimming direction, prolonged dives or swimming repeatedly directly towards and away from the boat. Additionally, if one observes mothers with calves, it is a signal to leave because the calves are particularly vulnerable to stress. The members of the group would often try to protect the calves by positioning themselves between the calf and the boat, which is a sign to leave immediately.

4. The minimum distance that drivers should keep from the dolphins is 50 m, with the only exception of dolphins approaching the boat on their own. There should be no more than

three boats within 200 m from the group and they should all be positioned at one side in order to allow dolphins to change their way without obstructions.

5. The maximum time to stay near the dolphins is 30 minutes, as the presence of the boat itself represents a disturbance, even if the boat driver is behaving by this code of conduct. It is important to leave the dolphins in time to allow them to continue with their daily activities. When leaving, the boat should accelerate gradually.

## 1.2. The role of ecotourism in dolphin conservation

Tourism, especially mass tourism, can present a great threat to the natural environment in which it occurs. In the Adriatic, tourism has a negative effect on the dolphins through increasing the marine traffic and underwater noise, fragmentation of habitats by devastating the coastal areas for building touristic infrastructure and adding to marine pollution. As a reaction to destructive mass tourism, new alternative forms of tourism are arising that intend to be consistent with the natural and social aspects of the touristic destination (Newsome et al., 2005). Tourism is recognized to be an important source of funding for natural areas protection and management. Being the most important sector in the global economy, and one of the world's fastest growing industries, it creates millions of jobs and contributes significantly to GDP (World Travel & Tourism Council, 2012).

Many of the alternative forms of tourism are nature-based, as they take place in the natural environment and are focused on the environment, or some of its specific components (Weaver, 2001). The forms of nature-based tourism that we would be discussing here are wildlife tourism and ecotourism which are both becoming increasingly popular worldwide and are highly promoted to improve conservation of the natural resources they are based on (Apps et al., 2018).

By definition, wildlife tourism refers to 'tourism activities that provide encounters with non-domesticated animals in the wild (in situ) or captive (ex situ) settings' (Higginbottom, 2004). Although this definition is very broad and can include captive settings from zoos, aquariums, wildlife parks and rehabilitation centers, in this thesis we do not refer to captive wildlife tourism, but rather to the one that takes place in the wild, in the animals' natural environment. This kind of wildlife tourism is very tightly bound to ecotourism. Ecotourism is a special kind of tourism based on the three following principles: it has to be simultaneously (i) nature-based, (ii) educative and (iii) sustainable (Newsome et al., 2005). The educative characteristic of ecotourism is a key element, which distinguishes it from other forms of nature-based tourism (Newsome et al., 2005). When defining ecotourism, Newsome et al. (2005) point out that 'conservation of the natural resource is essential for planning, development and management of ecotourism'. According to Weaver (2001), ecotourism should be managed sustainably, taking into account long-term conservation of the natural environment, as well as a socio-economic and cultural contribution to the local community. Weaver (2001) explains that 'tourist's desire to understand and appreciate natural attractions implies a desire to ensure that the integrity of those attractions is not undermined'. When it takes place in non-captive settings, i.e. in the wild, wildlife tourism shares

the main principles of ecotourism, being nature-based, educative, conservation-supporting and sustainable (Newsome et al., 2005). Therefore, in this thesis, the terms wildlife tourism and ecotourism would be referring to the same: a tourism activity that is in the same time nature-based, educative and sustainable, undertaken with the aim to view the animals in the wild.

### *1.2.1. Environmental interpretation*

In ecotourism, environmental interpretation can include educational panels, presentations and activities that go along with the tourism experiences. Managers of protected areas have been using interpretation for a long time ago, as a tool to increase knowledge and manage visitor behavior at ecologically sensitive sites (Littlefair and Buckley, 2008). Well-designed interpretive experiences and messages are found to be an effective way of reducing negative behaviors "on-site" such as littering, straying from walkways and feeding wildlife (Hughes, 2013). Environmental interpretation and education are considered to be important conservation tools by many authors. E. g., Sander (2012) discusses that an effective environmental interpretation allows tourists to develop insights into the parts of the world they are visiting and spread them through word of mouth. It is evident that ecotourism supports conservation directly, by educating visitors to be responsible towards the environment they are observing and by gaining income that enables ecotourism sites to be financially sustainable and carry out research and conservation activities. However, if combined with a strong learning environment, ecotourism can add to indirect support of conservation, where ecotourists, upon returning home, act as advocates for the area visited (Sander, 2012). This kind of indirect conservation is made through sustainable practices (pro-environmental behavior), e. g. donating to conservation organizations, writing to politicians and getting tourists' friends and family involved with conservation (Sander, 2012).

Cheng et al. (2018) studied how environmental interpretation can support the sustainable operation of ecotourism activities, precisely dolphin watching tours. They compared two groups of tourists participating in a dolphin-watching tour, one including environmental interpretation (interpretative group) and the control group that did not include interpretation (non-interpretative group). The interpretative group has shown significantly better ecological knowledge, pro-environmental behavior intention, satisfaction and intention of revisiting, than the non-interpretative control. Their study has shown that the interpretation of the tour can be used as an effective tool for environmental education of both tourists and locals, turning them into environmentally aware citizens.

Support for conservation by the general public is usually referred to as environmental citizenship. Environmental citizenship is based on the consideration that individuals can add to the responsible use and protection of the environment through pro-environmental behavior in their everyday life (Fletcher and Potts, 2007). Some examples of the pro-environmental behaviors that have been used in this study are 'reducing the amount of single-use plastics in everyday life', 'investing in re-useable cotton bags and water bottles', 'promoting dolphin conservation among friends and family by encouraging the use of the boat code of conduct', 'supporting nature conservation by writing to politicians', etc. Environmental education is seeking to incorporate

some of these practices into tourists' behavior.

However, studies have shown that it is not easy to change people's behavior, as it is based on their intentions, attitudes and underlying beliefs, as well as many other factors that can be entirely individual (Apps et al., 2018). In order to change behavior, it is necessary to first target the underlying beliefs and attitudes (Ajzen, 1991). Many studies have been conducted to see the specific factors of the ecotourism experience that could affect participants' beliefs and attitudes, as well as pro-environmental behavior.

A study by Beaumont (2001) confirmed that ecotourism, by providing a better understanding of the environment and promoting pro-environmental attitudes and behavior can increase environmental knowledge, views and behaviors and contribute to conservation. Beaumont (2001) explains that ecotourism provides an experiential form of learning, which is found to be more efficient in changing environmental attitudes than formal classroom learning methods. Her study was also testing the ceiling effect, which is an assumption that eco-tourists already have high pro-environmental attitudes compared to conventional tourists so that their attitudes do not change after involving in the ecotourism activity (Beaumont, 2001). Beaumont's study was conducted on four different groups of eco-tourists, among which the group that was initially the least pro-environmental but had relatively strong motivations for ecotourism activity was the most influenced in the short term and achieved the highest gain in knowledge. Additionally, the respondents who were initially most pro-environment and who had learnt the most during their visit were the most influenced in the long term. Therefore, besides confirming the ceiling effect, she found that taking part in an ecotourism experience could reinforce willingness to support conservation of those already influenced by the ceiling effect. The ceiling effect was also found by Hill (2007), who was investigating the effect of an ecotourism activity in one protected area on tourists' pro-environmental attitudes and behavior. 75% of investigated tourists stated that 'neither their attitudes towards conservation nor their environmental behavior would change' after the ecotourism experience. Hill (2007) explained that 'this was largely because visitors felt that they were already conservation-oriented or that they already behaved as environmentally responsible tourists'. However, many authors agree that 'getting everyone to a high level of conservation ethic is important and reinforcing conservation ethic only helps with those who may be affected by the ceiling effect'. Beaumont (2001) suggests that in order to make a short-term effect of the experience last, the visitors' motivation needs to be stimulated and they need to be encouraged to further involvement in conservation and learning about the environment.

### *1.2.2. Emotional engagement*

Apps et al. (2018) investigated the changes in participants' pro-environmental behavior on the case of white shark cage-dive tourism. The tourists experienced diving in close contact with white sharks in their natural habitat. Findings revealed that tourists' awareness, understanding, attitudes and concern for sharks were positively affected and that the majority of participants (69%) increased participation in pro-environmental behaviors following the tour. Attitudes and knowledge towards the environment and a particular species have often been considered key for generating environmental actions (Hughes, 2013). However, in App's study, emotional engagement was shown to be the factor that has the strongest effect on pro-environmental behavior, among other factors such as awareness, understanding attitudes, concern for sharks or knowledge gained (Apps et al., 2018). In the survey questionnaire, tourists were asked to rate the emotional aspects of the tour. They were offered the statements such as: 'It was exciting to see live sharks', 'I felt a sense of wonder or awe', 'I had an enjoyable experience', 'The experience was engaging', 'I found myself reflecting on new ideas about white sharks and their habitat', 'I felt an emotional connection with one or more of the animals I saw', etc. The results suggest that emotional engagement during the tour is associated with enhancing participants' knowledge and attitudes towards sharks and that it has the potential to increase pro-environmental behaviors in the long term. Apps et al. (2018) recommended incorporating emotional aspects into the interpretation of the tour, considering them essential for good conservation results, as they had a stronger effect on tourists than knowledge and responsibility. The abovementioned statements were adapted and used in this study, in order to test the emotional engagement of the participants in a dolphin-watching tour and ecotourism course. The emotional engagement was encouraged in the dolphin watching tour through environmental interpretation, sharing the anecdotes that the Blue World Institute researchers have experienced with the local dolphin population, e.g. encountering the dolphin families and 'friends' – the dolphins that are always together in each other's company, etc. As survey for this thesis started in 2018, considering that the participants of the eco-tourism course from previous years were not encouraged to emotionally engage in the experience, neither were the participants from 2018, in order to have a consistent approach among all the participants.

### *1.2.3. Dolphin watching tour*

Dolphin watching is a wildlife tourism activity aimed to find and observe dolphins in their natural habitat. Dolphin watching tours are widely used as a tool for environmental education aimed at improving participants' environmental awareness and concern about dolphin conservation (García-Cegarra and Pacheco, 2017; Jacobs and Harms, 2014).

Blue World Ltd. is a company owned by the Blue World Institute (BWI). This company conducts dolphin watching tours in the Cres-Lošinj archipelago, as a part of the programme Dolphin Watching Adriatic. The company operates using the Code of Conduct, a set of rules for boat drivers when encountering dolphins on the sea (see section 1.1.2). To ensure the welfare of the animals and long-term sustainability of this touristic activity, the BWI carries out regular

monitoring of the dolphin watching activities and tries to evaluate its impact on the local bottlenose dolphin population (Blue World Institute, 2019). Any profit generated from the dolphin watching tours is directed to support the activities and research of the BWI (Blue World Institute, 2019). The regular ticket price is 50 EUR per person and the tour lasts up to 3 hours. It starts in Lošinj Marine Education Centre (LMEC), with an educator giving an introductory presentation. Through the presentation the participants are introduced to the BWI's work, the Cres-Lošinj archipelago being an EU - Natura 2000 site for the bottlenose dolphins and to biology, ecology and behavior of the bottlenose dolphins. They are also briefly introduced to other marine life in the area. The presentation is conservation-themed and the emphasis is put on the threats dolphins are facing in the area, such as boat traffic, underwater noise and marine litter, and the importance of mitigating those threats in order to protect the local bottlenose dolphin population. Participants are encouraged to follow the boat code of conduct, whenever they encounter the dolphins on the sea, and to avoid single-use plastics in their daily lives, as it is potentially dangerous to bottlenose dolphins and other marine life. The educator gives them ideas of alternative solutions to single-use plastic products, such as reusable cotton bags and water bottles. The participants are encouraged to connect emotionally to the dolphins they see on the tour, as explained in section 1.2.2. At the end of the presentation, they are encouraged to get more involved with dolphin conservation through lectures, workshops and an eco-tourism programme organized by the BWI.

The boat tour is conducted by the skipper and the educator who search for dolphins using their sight and experience. When they spot the dolphins, they approach them following the code of conduct and stay with them up to half an hour. During that time, the participants can observe the dolphins and take the pictures, while the educator provides them with basic information about the dolphin group, counts the dolphins and explains each behavior they encounter. The educator also provides additional information on dolphins' life history, biology, ecology, etc.

**Fig. 3.** Eco-tourist watchers – dolphin-watching participants on a tour with an educator and a skipper. (Blue World L td., 2018)

For the participants of the dolphin-watching tour, we have developed the term eco-tourist watcher (Fig. 3.). A watcher is someone who, whilst on holiday, may partake in an eco-tourism programme for a period of up to several hours, but the eco-tour itself is not the primary goal of the holiday. Their involvement in the activity is passive, as an observer of wildlife.

### *1.2.4. Ecotourism course*

Every summer, the Blue World Institute (BWI) organizes the ecotourism course. It is a 10-day immersive course in which people from different backgrounds get the chance to experience work of a marine biologist and investigate the dolphins together with the BWI researchers. The course provides hands-on experience of dolphin research, having an educative purpose. Participants spend many hours on the sea, together with the BWI researchers, observing the local bottlenose dolphin population and collecting scientific data. In the Lošinj Marine Education Centre (LMEC), the participants help to analyze and manage data from the field and to do photo-identification. In addition, there are lectures and educational activities organized by the BWI researchers, which cover different topics and recent scientific discoveries related to bottlenose dolphins and marine ecology. The price of this 10-day course is 900 EUR, together with the food and accommodation. This course plays an important role in securing the continuation of the BWI's research for already 32 years, with participants being actively involved and helping the researchers gather and analyze data, and financially supporting the BWI research, through participation (Blue World Institute, 2019).

**Fig. 4.** Eco-tourist doer - a participant of the eco-tourism course collecting data on the research boat (Blue World Institute of Marine Research and Conservation, 2019)

For the tourists participating in the ecotourism course, we have developed the term eco-tourist doer (Fig. 4.), which explains the level of engagement in the tourism activity. The eco-tourist doer is someone whose primary goal is to contribute towards the environment, nature conservation and/or cultural activities while on their holiday. As opposed to watchers, doers are actively engaged in the programme, collecting and analyzing data, participating in scientific and conservation discussions and are as well involved for a longer period of time.

# 2. The aim of the research

The aim of this thesis is to investigate the potential of the two different dolphin observation programmes to induce pro-environmental attitudes and behavior of their participants, i) watchers and ii) doers, that contribute to the conservation of the bottlenose dolphin population in the Adriatic Sea. We compare these two types of social engagement, which differ greatly in their level of investment, in terms of money and time, in the observation of dolphins in the wild.

Specific aims are:

1. Investigate the motivations of watchers and doers when joining the dolphin observation programmes;
2. Study if positive environmental attitudes and pro-environmental behavior intention increase post-experience and compare the effect on watchers and doers;
3. Study the effect of emotional response to wildlife on increasing pro-environmental behavior intention;
4. Analyze the interest of participants to engage further in dolphin conservation.

Hypotheses:

H1: Doers are more motivated to join the programme in order to contribute to dolphin conservation than watchers.

H2: Both programmes positively affect environmental attitudes and pro-environmental behavior intention. However, we expect doers to exhibit bigger changes due to their larger investment in the activity.

H3: Emotional response to wildlife positively correlates with pro-environmental behavior intention.

H4: The dolphin observation programme encourages watchers to become further involved in dolphin conservation, and has the potential to convert them into doers.

H5: Price and duration of the programmes are the factors that could prevent watchers from further engaging in dolphin conservation as doers.

H6: Dolphin observation programme inspires doers to engage further in dolphin conservation.

# 3. Material and methods

## 3.1. Survey design

The main method for this survey were the questionnaires that the participants of two eco-tourism programmes, dolphin-watching tour and eco-tourism course, filled in the post-experience period. After returning from the dolphin watching tour, the participants were asked to fill in the dolphin watching questionnaire (DWQ). The DWQ was available in six languages: English, Croatian, German, French, Italian and Dutch. The DWQ survey was conducted between August and September 2018. The participants of the eco-tourism course who took part in it during August and September 2018 filled-in the eco-tourism questionnaire (ETQ) by the end of their stay. All the other participants that took part in the course previously (from 2000 to 2018) were asked to complete the ETQ via e-mail.

### *3.1.1. Dolphin watching questionnaire*

The dolphin-watching questionnaire (Fig. 5.) included six sets of questions that were designed to obtain the following information:

1. General information about the tour:

A set of questions to investigate if the respondents had any previous experience with dolphin/whale watching tours if they knew dolphins inhabited the area before visiting Lošinj and if they saw dolphins on the tour that day.

2. Motivation

The respondents were supposed to rank the importance of factors connected to the tour on a 5-point likert-scale, from 1 – 'not at all important' to 5 – 'very important'. These included (i) Being as close to the dolphins as possible, (ii) Seeing the dolphins in their natural environment, (iii) Learning about dolphin biology, (iv) Contributing to dolphin conservation and (v) The connection to the Blue World Institute research. The purpose of this question was to test the main motivation factors for joining the tour.

3. Pro-environmental behavior intention

The set that researched whether the programme motivated the participants to adopt different pro-environmental behaviors, as well as if they had been applying these behaviors prior to the tour. It was a multiple-choice question with offered answers: 'Yes', 'I already do that', 'No' and 'No opinion'. The pro-environmental behaviors are listed in fig.5. under question no. 5.

4. Review of the tour

The respondents were asked to rank the statements about the tour on a 5-point likert-scale, from 1 – 'strongly disagree'; to 5 – 'strongly agree'. The statements are listed in fig.5. under question no. 6.

5. Intention to further involve in dolphins and their conservation

This set was designed to research if the tour had encouraged the respondents to learn more about dolphins and their conservation. If they responded positively, they continued to the next question (q. 8) which asked them if they were interested in further involvement by joining the programmes organized by the Blue World Institute (BWI). The offered programmes, together with specified duration and price are listed in fig. 5. Under question no. 8. The respondents could indicate if the price and duration would be an obstacle for them if they wanted to join each programme.

6. Demographic characteristics

The information of respondents' country of origin, gender, age and education level. The respondents were encouraged to add their comments and suggestions, as well as to provide their e-mail address for further information or a follow-up survey on-line.

**DOLPHIN-WATCHING 2018**

**1.** How many times have you been dolphin/whale watching before going with Blue World?_____First time? Write 0

**2**. Did you know before coming to Losinj us that dolphins inhabit this area? _____(Yes/No)

**3.** Did you see dolphins today? _____ (Yes/No)

| **4.** Please rate how **important** the following aspects are to you by checking the appropriate box. *There are no right or wrong answers* (**1 = "not at all important"; to 5 = "very important"**). | **1** | **2** | **3** | **4** | **5** | **No opinion** |
|---|---|---|---|---|---|---|
| **4.1** Being as close to the dolphins as possible | | | | | | |
| **4.2** Seeing the dolphins in their natural environment | | | | | | |
| **4.3** Learning about dolphin biology | | | | | | |
| **4.4** Contributing to dolphin conservation | | | | | | |
| **4.5** The connection to the Blue World Institute research | | | | | | |

| **5.** Has this experience encouraged you to **adopt more positive environmental behaviors,** such as to: | **Yes** | **No** | **I already do this** | **No opinion** |
|---|---|---|---|---|
| **5.1** Follow dolphin and marine conservation organisations on social media | | | | |
| **5.2** Reduce the amount of single-use plastics in your daily life e.g. giving up plastic straws and balloons | | | | |
| **5.3** Recycle plastics, metals and paper | | | | |
| **5.4** Invest in re-useable cotton bags and water bottles | | | | |
| **5.5** Promote dolphin conservation among my friends and family by reducing our use of plastics | | | | |
| **5.6** Promote dolphin conservation among my friends and family by encouraging the use of the boat code of conduct | | | | |

| | | | | |
|---|---|---|---|---|
| **5.7** Volunteer on a beach clean-up action | | | | |
| **5.8** Support the development of obligatory measures within the Natura 2000 site that would improve dolphin conservation (e.g. speed limits) | | | | |
| **5.9** Support nature conservation via petitions (e.g. on social media) | | | | |
| **5.10** Support nature conservation by writing directly to your politicians | | | | |

| **6.** Following this experience please indicate to which extent you agree or disagree with the following statements.<br>*There are no right or wrong answers to what you believe.*<br>(**1 = "strongly disagree"; to 5 = "strongly agree"**). | **1** | **2** | **3** | **4** | **5** | **No opinion** |
|---|---|---|---|---|---|---|
| **6.1** I am satisfied with this trip | | | | | | |
| **6.2** I was excited to see dolphins in the wild | | | | | | |
| **6.3** I felt an emotional connection with the animals I saw | | | | | | |
| **6.4** I felt this trip enriched the value of my vacation | | | | | | |
| **6.5** I would encourage my friends and family members that are interested in dolphins to undertake this trip | | | | | | |
| **6.6** I have learned more about dolphin biology thanks to this trip | | | | | | |
| **6.7** I feel personal obligation to support dolphin conservation | | | | | | |
| **6.8** This trip made me reflect on new ideas about dolphin conservation | | | | | | |

**7.** Has this experience encouraged you to learn more about dolphins and their conservation?

☐ Yes → continue to next question  No → go to question **no.9**

| **8.** Below are the programs that the Blue World runs through which you can learn more about dolphins and get involved in their conservation. Would you like to join some of them? **(Please mark one answer only for each program)** | Yes, I would like to participate | Yes, but it would take **too much time** | Yes, but it would take **too much money** | No, I am **not interested** |
|---|---|---|---|---|
| **8.1** Hands-on activity (2 hours, 15 EUR) | | | | |
| **8.2** Workshop (half a day, 30 EUR) | | | | |
| **8.3** Immersive eco-tourism course (10 days, 900 EUR) | | | | |

**ABOUT YOU:**

**9**. Where are you from (Country)?_____

**10.** Gender: □ male □ female **11.** Age:_____

**12.** Highest level of education: □ Primary School □ High School □ College /University

**13.** Would you be prepared to fill a follow-up survey online? If so, please leave your email here:

_____

**14.** Any comments/suggestions?

**Thank you very much! By filling out this survey, you are helping our student Kora with her Master's thesis research.**

**Fig. 5.** Example of a dolphin-watching questionnaire (DWQ)

### *3.1.2. Ecotourism course questionnaire*

The ecotourism course questionnaire (ETQ) (Fig. 6.) was very similar to DWQ. It included six sets of questions:

1. General information about the programme:

To see which year respondents visited the Blue World Institute (BWI), how many times have they been on a similar eco-tourism course before and after participating in this programme and how many times they have seen dolphins with the BWI.

2. Motivation – the same as in DWQ

3. Pro-environmental behavior intention – the same as in DWQ

4. Review of the tour – the same as in DWQ

5. Inspiration to continue with dolphin conservation

The respondents were asked to choose on a 5-point likert-scale (from 1 = “strongly disagree” to 5 = “strongly agree”) how much the programme inspired them to (i) Repeat it once again with the BWI, (ii) Undertake a similar programme with another organization and (iii) Change their career towards biology/environmental sciences. In case they were already working or studying in the field of biology/environmental sciences, they could skip the last question.

6. Demographic characteristics – the same as in DWQ

**ECO-VOLUNTEERS**

**1.** How many times have you been on a similar immersive eco-tourism programme **before** coming to the Blue World Institute? _____ Never? Write 0

**2.** How many times did you see dolphins with the BWI? _____

**3.** Which year did you visit the BWI?_____

**4.** How many times have you been on a similar immersive eco-tourism programme **after** coming to the Blue World Institute? _____ None? Write 0

| **5.** Please rate how **important** the following aspects were to you by checking the appropriate box. *There are no right or wrong answers* (**1 = "not at all important"; to 5 = "very important"**). | **1** | **2** | **3** | **4** | **5** | **No opinion** |
|---|---|---|---|---|---|---|
| **5.1** Being as close to the dolphins as possible | | | | | | |
| **5.2** Seeing the dolphins in their natural environment | | | | | | |
| **5.3** Learning about dolphin biology | | | | | | |
| **5.4** Contributing to dolphin conservation | | | | | | |
| **5.5** The connection with the Blue World Institute research | | | | | | |

| **6.** Did this experience encourage you to **adopt more positive environmental behaviors,** such as to: | **Yes** | **No** | **I already did this** | **No opinion** |
|---|---|---|---|---|
| **6.1** Follow dolphin and marine conservation organizations via social media | | | | |
| **6.2** Reduce the amount of plastics you use in daily life<br>e.g. giving up plastic straws and balloons | | | | |
| **6.3** Recycle plastics, metals and paper | | | | |
| **6.4** Invest in re-useable cotton bags and water bottles | | | | |

| | | | | |
|---|---|---|---|---|
| **6.5** Promote marine conservation with my friends and family, by reducing our use of plastics | | | | |
| **6.6** Promote dolphin conservation with my friends and family by encouraging the use of the boat code of conduct | | | | |
| **6.7** Volunteer on a beach clean-up action | | | | |
| **6.8** Support the development of obligatory measures within the Natura 2000 site that would improve dolphin conservation (e.g. speed limits) | | | | |
| **6.9** Support nature conservation via petitions (e.g. on social media) | | | | |
| **6.10** Support nature conservation by writing directly to your politicians | | | | |

| **7. Following this experience** please indicate to which extent you agree or disagree with the following statements.<br>*There are no right or wrong answers to what you believe.*<br>(**1 = "strongly disagree"; to 5 = "strongly agree"**). | **1** | **2** | **3** | **4** | **5** | **No opinion** |
|---|---|---|---|---|---|---|
| **7.1** I was satisfied with this programme | | | | | | |
| **7.2** I was excited to see dolphins in the wild | | | | | | |
| **7.3** I felt an emotional connection to the animals that I saw | | | | | | |
| **7.4** I felt this programme enriched the value of my vacation | | | | | | |
| **7.5** I would encourage my friends and family members that are interested in dolphin conservation to undertake this programme | | | | | | |
| **7.6** I have learned more about dolphin biology thanks to this programme | | | | | | |
| **7.7** I feel personal obligation to support dolphin conservation | | | | | | |
| **7.8** This programme made me reflect on new ideas about dolphin conservation | | | | | | |

| **8.** Please indicate to which extent you agree or disagree with the following statements. **This programme inspired me to…** *There are no right or wrong answers to what you believe.* (**1 = "strongly disagree"; to 5 = "strongly agree"**). | **1** | **2** | **3** | **4** | **5** | **No opinion** |
|---|---|---|---|---|---|---|
| **8.1** Repeat the progamme again with Blue World Institute | | | | | | |
| **8.2** Undertake a similar programme with another organization | | | | | | |
| **8.3** Change my career towards biology/environmental sciences* | | | | | | |

*IF you already work or study in a field of biology/environmental sciences, you don't need to answer this question, just check this box ☐

**9**. Country:_____

**10.** Gender (bold the right answer): □ male □ female **11.** Age:_____

**12.** Highest level of education: □ Primary School □ High School □ College /University

**13.** Would you still like to get regular information from the Blue World Institute? If so, please leave your email here:

**14.** Any comments/suggestions?

**Thank you very much! By filling out this survey, you are helping our student Kora with her Master's thesis research.**

**Fig. 6.** Example of an ecotourism course questionnaire (ETQ)

## 3.2. Survey data analysis

### *3.2.1. Statistical analyses*

The answers were entered and analyzed in MS Office Excel and the statistical analysis was made in Statistica version 13.3. To compare the difference between the two groups, we presented the data in box-whisker plots for key questions. For significance between investigated parameters, we used non-parametric Mann-Whitney U Test and a chi-square test (Pearson Chi-square, M-L Chi-square and Spearman Rank R, with df=1). For correlation analyses, we used non-parametric Spearman rank order correlation.

### *3.2.2. Data analyses and hypothesis testing*

First, a descriptive analysis of all the answers to both questionnaires was made. If some parts of questions in a questionnaire were left unanswered, we treated this as the 'no opinion' answer. Using the model of Apps et al. (2018), we expressed the 'overall agreement' as a sum of responds 4 = 'agree' and 5 = 'strongly agree' in 5-point likert scale questions (precisely, q.6 in DWQ and q.7 and 8 in ETQ). To highlight the statements with the most positive responses, we picked the ones that had the high value of "5 - strongly agree" alone (higher than 70%) and to highlight the statements with the least positive responses, we picked the ones with the lowest values of "5 - strongly agree" alone (lower than 50%). In the question set regarding pro-environmental behavior intention, we treated the double answers ('Yes' and 'I already do that') for the same behavior as 'I already do that' answer, considering that it would best present the respondent who stated they already adopted a specific behavior. However, to check if the double answers would affect our results, we showed them in a separate table. We considered that, by giving a double answer, some respondents wanted to express 'I already did that, but yes, this experience has encouraged me to do it more'. In the question investigating watchers' interest to further involve in other programmes (q. 8 in DWQ) we also wanted to see if duration and price would be an obstacle for them to join. Therefore, we analyzed only the ones that were interested in the programmes and from them calculated from them the percentage of watchers that stated it would take too much time or money.

**Hypothesis 1**

To compare the motivations of doers and watchers for taking part in eco-tourism, we compared two key motivation factors regarding the tour (question 4 DWQ, question 5 ETQ): 'Being as close to the dolphins as possible' and 'Contributing to dolphin conservation'. The statement 'Being as close to the dolphins as possible' was used to see whether participants cared about the effect of the eco tour on the wellbeing of dolphins, or they only cared about getting a close look at the dolphins. Both watchers and doers were acquainted with the fact that driving a

boat close to the dolphins is something that could negatively affect them. Therefore, high rates for this question (5='very important') indicate that the participants' priority for the tour was not the wellbeing of dolphins. On the other hand, high rates of the statement 'Contributing to dolphin conservation' clearly suggest that that was one of the participants' priorities connected to the tour. We used we made a box-whisker plot to depict the key differences between the groups. We tested significance with Mann-Whitney U Test.

**Hypothesis 2**

The effect of ecotourism on environmental attitudes was tested through the statement 'Following this experience, I feel a personal obligation to support dolphin conservation', ranked on a 5-point likert-scale. In order to statistically test the effect on the pro-environmental behavior in general, we have grouped all the environmental behaviors into one group of answers. To prepare our data for a chi-square test, we have grouped four categories of answers to question 5 (DWQ) or 6 (ETQ) into two categories:

1. A positive or neutral effect on behavior = 'Yes' + 'I already did that'
0. No effect on behavior = 'No' + 'No opinion'

We used chi-square test significance (Pearson Chi-square, M-L Chi-square and Spearman Rank R, with df=1)

**Hypothesis 3**

To test the connection between emotional response to wildlife and pro-environmental behavior intention, we searched for a correlation between the statement 'I felt an emotional connection with the animals I saw' (q. 6.3 DWQ, q. 7.3 EVQ), with:

- overall pro-environmental behavior intention (the question 5 (DWQ) or 6 (ETQ) grouped);
- two categories of pro-environmental behavior intention, which are highly applicable to all participants and which need some effort and commitment to be achieved. Those were 'Reduce the amount of single-use plastics in your daily life e.g. giving up plastic straws and balloons' (5.2 6.2) and 'Promote dolphin conservation among my friends and family by reducing our use of plastics' (5.5 5.6). If participants answered 'yes' or 'I already do that' for these categories, we assumed that they intend to make some effort to act towards conservation.

**Hypotheses 4, 5 and 6**

It was possible to test the hypotheses only using descriptive statistics.

# 4. Results

## 4.1. Dolphin watching tour

The number of questionnaires collected by the dolphin watchers was 220, among which 206 were valid and included in the analysis and 14 were not valid. The questionnaires have been collected in a period between August and September 2018.

### *4.1.1. General information about the tour*

The majority of dolphin-watchers (DWs) (67,48%) stated this was their first dolphin watching experience. Some respondents stated they took part in a dolphin/whale watching tour before, once (21,84%), twice (5,83%), or more times (see Fig. 7.). Most of the visitors knew that dolphins inhabit the area before coming to Lošinj (71,36%, see Fig. 8.), but there was still a high percentage of visitors that did not know that fact (28,64%). The majority of the respondents (99,51%) saw dolphins on a tour that day (Fig. 9.).

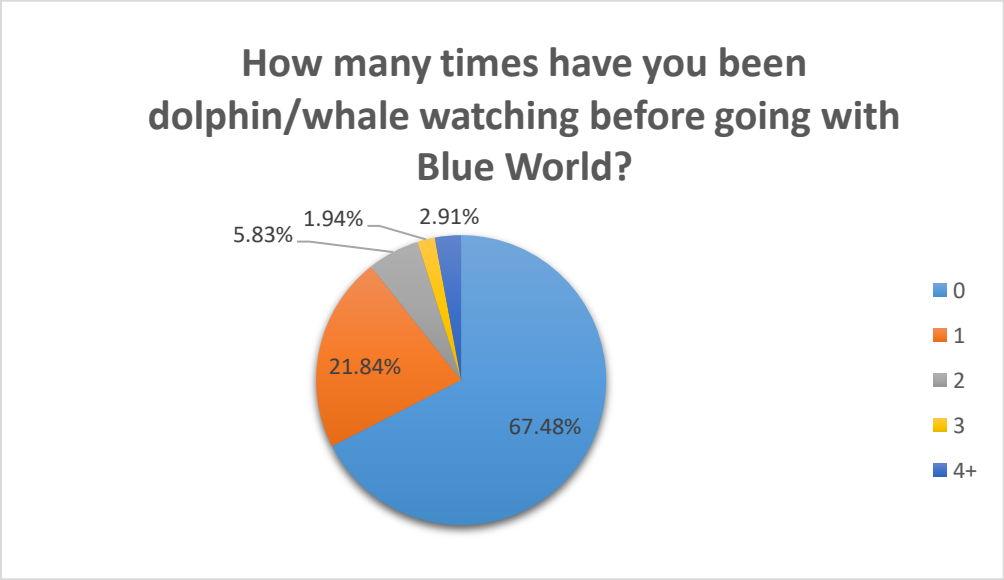


**Fig. 7.** Watchers' responses to question 1 in dolphin watching questionnaire.

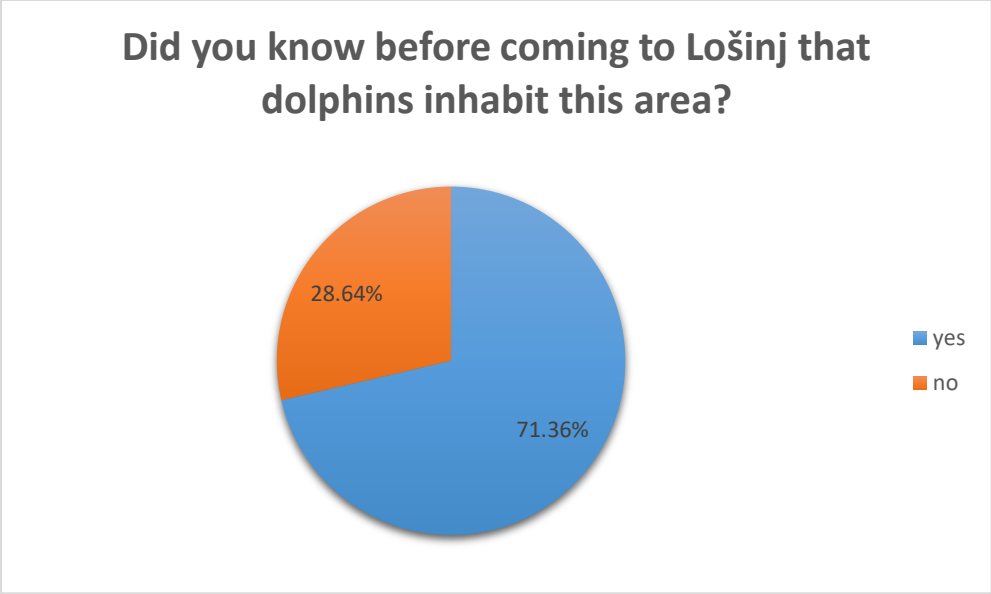


**Fig. 8.** Watchers' responses to question 2 in dolphin watching questionnaire.

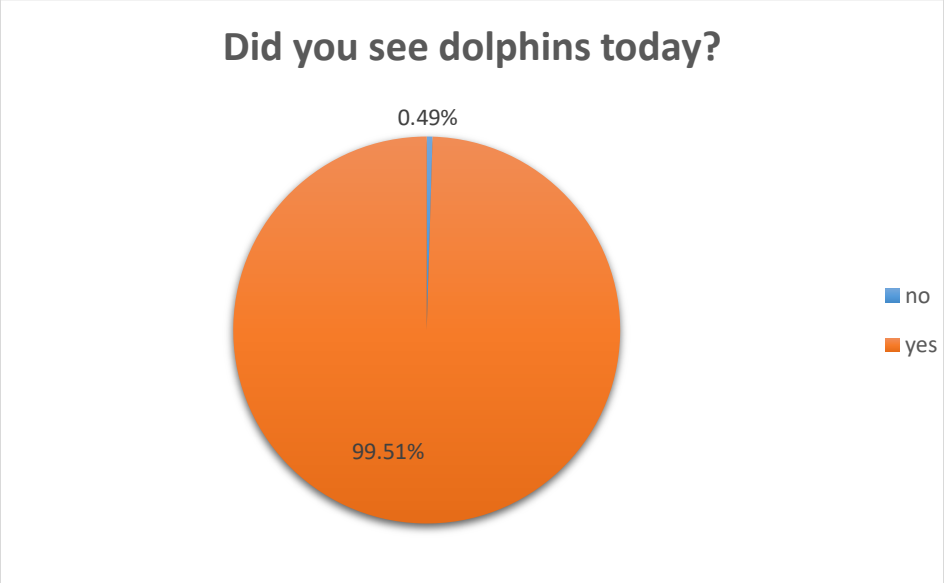


**Fig. 9.** Watchers' responses to question 3 in dolphin watching questionnaire.

### 4.1.2. *The motivation for the tour*

The main motivation factor for the tour was *Seeing the dolphins in their natural environment*, rated 'very important' by 93,20% of respondents (see Fig. 10.). Many respondents found 'Contributing to dolphin conservation' very important (67,95%). 'Learning about dolphin biology' was rated 'very important' by 50% of respondents and 'fairly important' by 39,81%. The factors with the lowest importance for the respondents were 'Being as close to the dolphins as possible' (31% rated 'very important' and 31% 'fairly important') and 'The connection to the Blue World Institute research' (30% rated 'very important' and 33% 'fairly important'). However, only around 3% of the respondents rated two abovementioned factors as 'not at all important'.

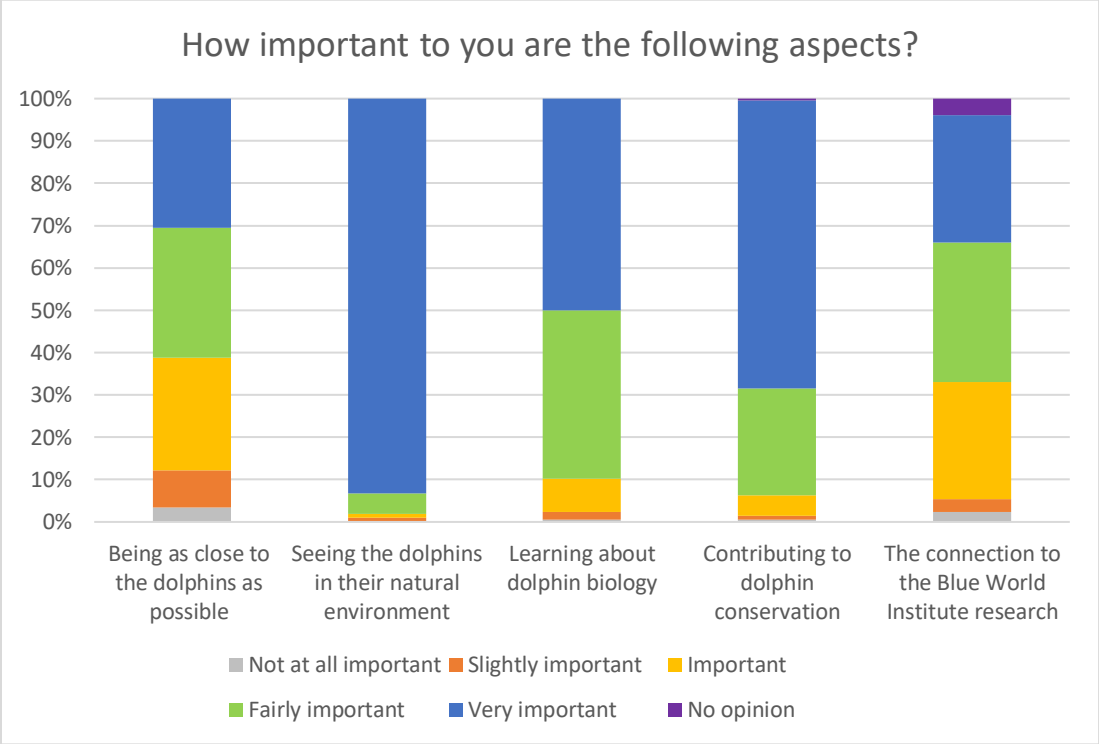


**Fig. 10.** Watchers' responses to question 4 in dolphin watching questionnaire.

**Table 1.** Measures of central tendency and 3rd quartile of factors in question 4 in DWQ.

| | mode | median | 3rd quartile | total |
|---|---|---|---|---|
| Being as close to the dolphins as possible | 4 | 4 | 5 | 206 |
| Seeing dolphins in natural environment | 5 | 5 | 5 | 206 |
| Learning about dolphin biology | 5 | 4,5 | 5 | 206 |
| Contributing to dolphin conservation | 5 | 5 | 5 | 205 |
| Connection to BWI research | 4 | 4 | 5 | 198 |

### *4.1.3. Pro-environmental behavior intention*

More than 50% of watchers stated that the experience encouraged them to adopt pro-environmental behaviors (see Fig. 11.), such as to:

- Promote dolphin conservation among friends and family by encouraging the use of the boat code of conduct (74,76%)
- Support the development of obligatory measures within the Natura 2000 site that would improve dolphin conservation (e.g. speed limits) (71,84%)
- Promote dolphin conservation among friends and family by reducing our use of plastics (60,68%)
- Support nature conservation via petitions (e.g. on social media) (56,80%)
- Follow dolphin and marine conservation organizations on social media (51,46%)

However, less than 50% of the respondents stated that the experience encouraged them to:

- Recycle plastics, metals and paper (28,64%)
- Invest in re-useable cotton bags and water bottles (31,07%)
- Support nature conservation by writing directly to your politicians (35,44%)
- Reduce the amount of single-use plastics in your daily life e.g. giving up plastic straws and

balloons (36,89%)

- Volunteer on a beach clean-up action (43,69%)

The behaviors that most respondents have already been highly applying prior to the tour were:

- Recycling plastics, metals and paper (68,93%).
- Investing in re-useable cotton bags and water bottles (64,56%)
- Reducing the amount of single-use plastics in daily life e.g. giving up plastic straws and balloons (60,19%)

The behavior that was the most rejected by the respondents was to 'support nature conservation by writing directly to politicians' (31,07%), but still, a higher percentage of respondents (35,44%) stated they intend to adopt that behavior.

There were some double answers (see Table 2.), where participants answered both 'yes' and 'I already do this', mostly for behaviors connected to the use of plastics. The watchers' double answers were for reducing the amount of single-use plastic (8,74%), recycling (7,77%), investing in re-useable bags and bottles (5,34% ) and promoting dolphin conservation among friends and family by reducing the use of plastics (4,37%). Double answers suggest that participants were already applying those behaviors, but the ecotourism experience has encouraged them to apply them even more.

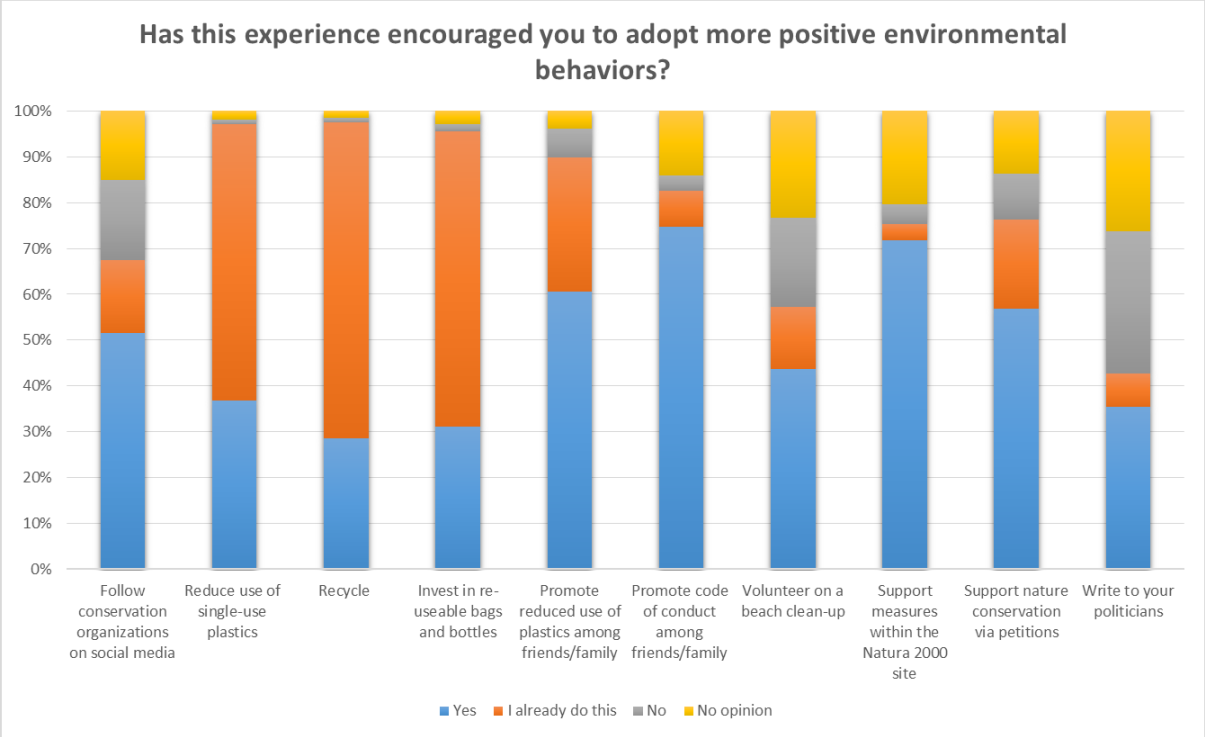


**Fig. 11.** Watchers' responses to question 5 in dolphin watching questionnaire.

**Table 2.** Double answers ('yes' + 'I already do this') to a question 5 in DWQ, regarding pro-environmental behavior

| | **double answer (DA)** | **% DA in total (206)** |
|---|---|---|
| Social media | 2 | 0,97% |
| Reduce | 18 | 8,74% |
| Recycle | 16 | 7,77% |
| Reuse | 11 | 5,34% |
| Promote reduced plastic use to friends/family | 9 | 4,37% |
| Promote code of conduct to friends/family | 3 | 1,46% |
| Beach clean-up | 4 | 1,94% |
| Support Natura 2000 | 1 | 0,49% |
| Support petitions | 1 | 0,49% |
| Write to politicians | 2 | 0,97% |

### *4.1.4. Review of the tour*

The attitudes connected to the tour that received the most overall agreement were (see Fig. 12.): 'I am satisfied with this trip' (98,54%), 'I was excited to see dolphins in the wild' (98,06%), 'I felt this trip enriched the value of my vacation' (98,06%) and 'I would encourage my friends and family members that are interested in dolphins to undertake this trip' (92,23%). The attitudes with which the least respondents agreed were: 'I felt an emotional connection with the animals I saw (72,82%), This trip made me reflect on new ideas about dolphin conservation' (74,76%) and 'I feel a personal obligation to support dolphin conservation' (69,42%).

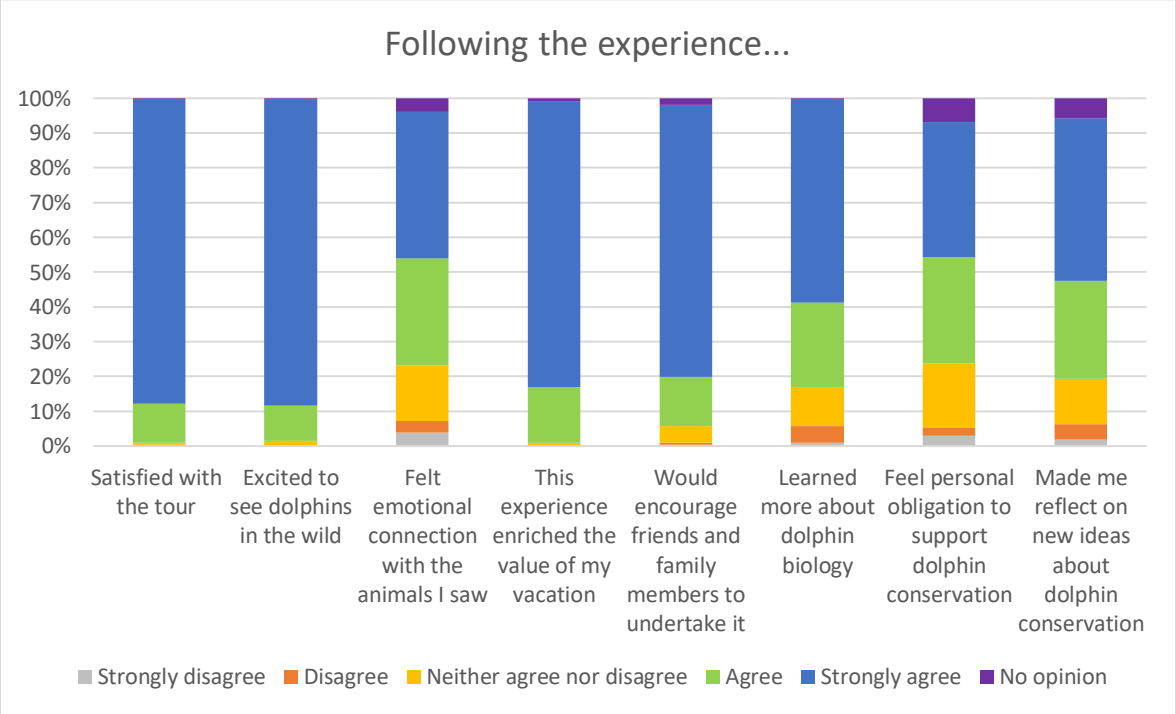


**Fig. 12.** Watchers' responses to question 6 in dolphin watching questionnaire.

**Table 3.** Measures of central tendency and 3rd quartile of factors in question 6 in DWQ.

| | mode | median | 3rd quartile | total |
|---|---|---|---|---|
| Satisfied with this trip | 5 | 5 | 5 | 205 |
| Excited to see dolphins in the wild | 5 | 5 | 5 | 205 |
| Felt emotional connection | 5 | 4 | 5 | 198 |
| Enriched the value of my vacation | 5 | 5 | 5 | 204 |
| Encourage friends/family | 5 | 5 | 5 | 202 |
| Learned about dolphin biology | 5 | 5 | 5 | 205 |
| Personal obligation to support dolphin conservation | 5 | 4 | 5 | 192 |
| Reflect on new ideas about dolphin conservation | 5 | 4 | 5 | 194 |

### *4.1.5. Intention to further engage in dolphin conservation*

The majority of the respondents (78,64%) stated they want to learn more about dolphins and their conservation (Fig. 13.). However, when they were offered particular programmes organized by the Blue Word Institute (BWI), around half of them were not interested in joining them (see grey fields in Fig. 14.). We tested the ones that were interested in order to see if the price and the duration of each programme would present an obstacle for them to join.

After the tour, watchers (total=206) were interested to involve in dolphin conservation through BWI programmes in the following numbers:

- 75 (36,4%) hands-on activity (see Fig. 15.);
- 75 (36,4%) interested in the workshop (see Fig. 16.);
- 85 (41,26%) interested in the eco-tourism programme (see Fig. 17.).

Among 85 watchers interested in eco-tourism course, 26 (30,59%) stated that it would take much money, and 39 (45,88%) that it would take too much time for them to join. Only 20 participants (23,53%) stated that they would join the programme regardless. Time was the most limiting factor for the most participants (highest for eco-tourism course, but did not show much difference among the other programmes, although they differed highly in duration). Among the offered programmes, money was shown to be limiting factor only for the eco-tourism course.

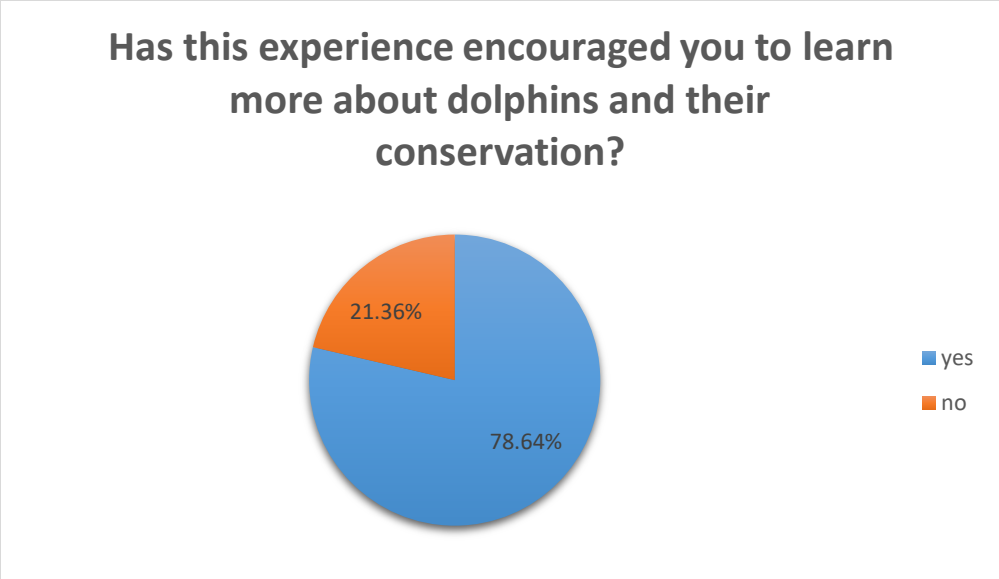


**Fig. 13.** Watchers' responses to question 7 in dolphin watching questionnaire.

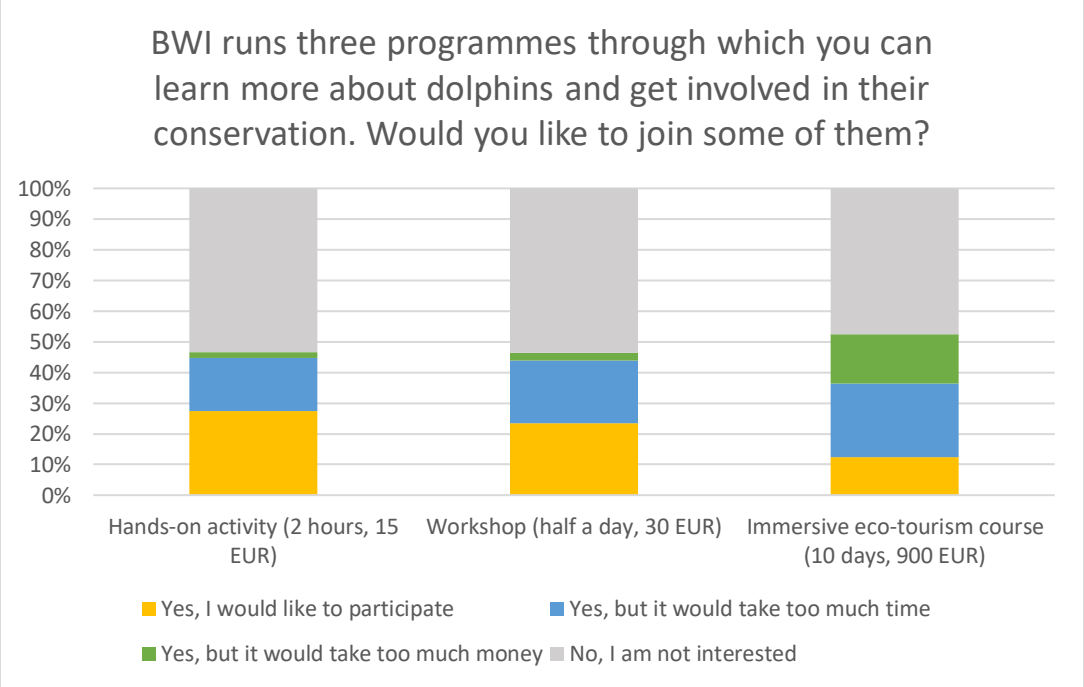


**Fig. 14.** Watchers' responses to question 8 in dolphin watching questionnaire.

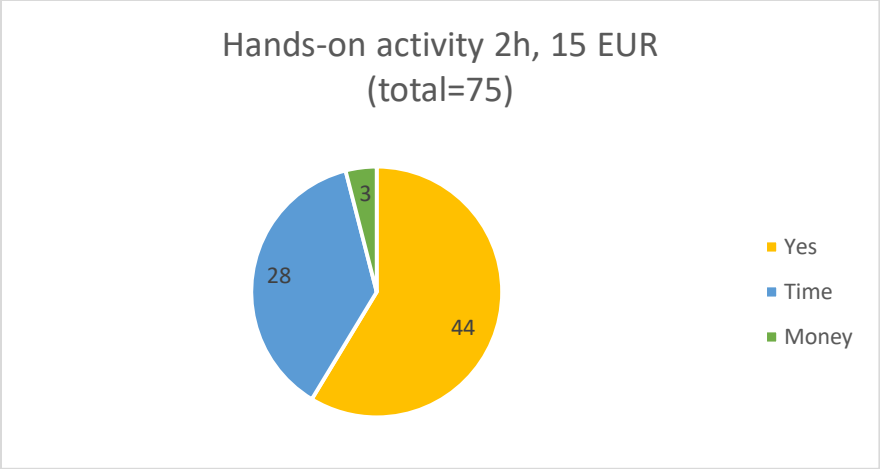


**Fig. 15.** Limitations for watchers to join the programme: hands-on activity.

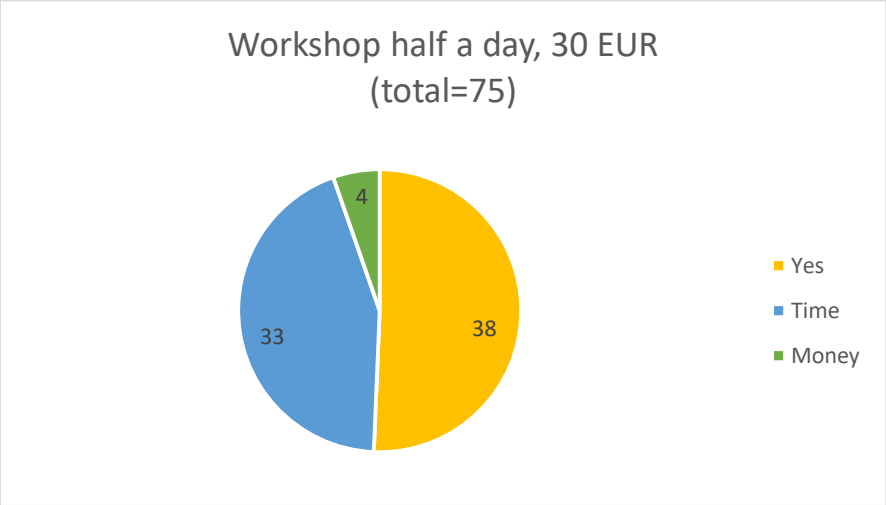


**Fig. 16.** Limitations for watchers to join the programme: workshop.

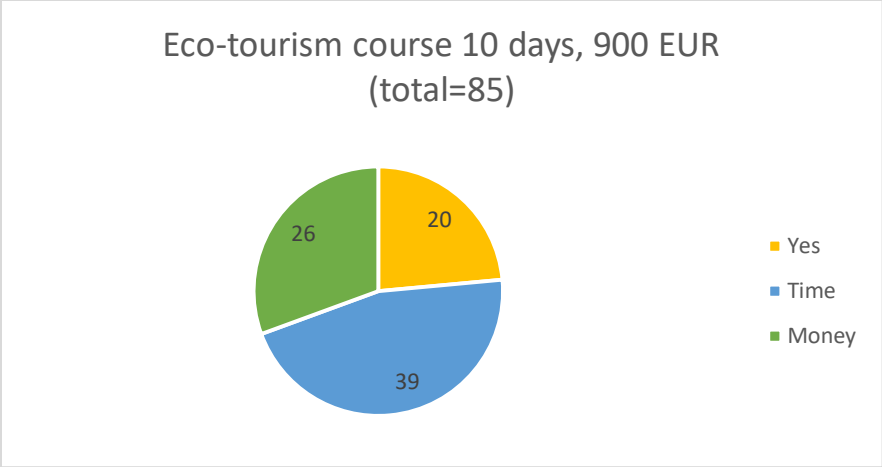


**Fig. 17.** Limitations for watchers to join the programme: eco-tourism course.

### *4.1.6. Demographic characteristics*

The most of watchers came from Germany (36,89% respondents), followed by Austria (13,59%), Netherlands (13,11%), Italy (11,17%) and France (6,31%). The remaining respondents were from 13 other countries listed in Fig. 18. There were more female (59,71%) than male (40,29%) respondents (see Fig. 19.). Regarding the age, we included only the respondents that were older than 18, dividing them into five age groups. In 18-30 group, there was 18,93% of respondents, in 31-40 group 25,24% respondents, in 41-50 group there was 35,92% of respondents, in 51-60 group 14,56%, and in 61+ group 5,34% of respondents. The majority of the respondents were from 41 to 50 years old (see Fig. 20.). As the highest level of education, the most respondents had a college or university degree (71,36%), while 27,18% had high school and 0,97% primary school (see Fig. 21.).

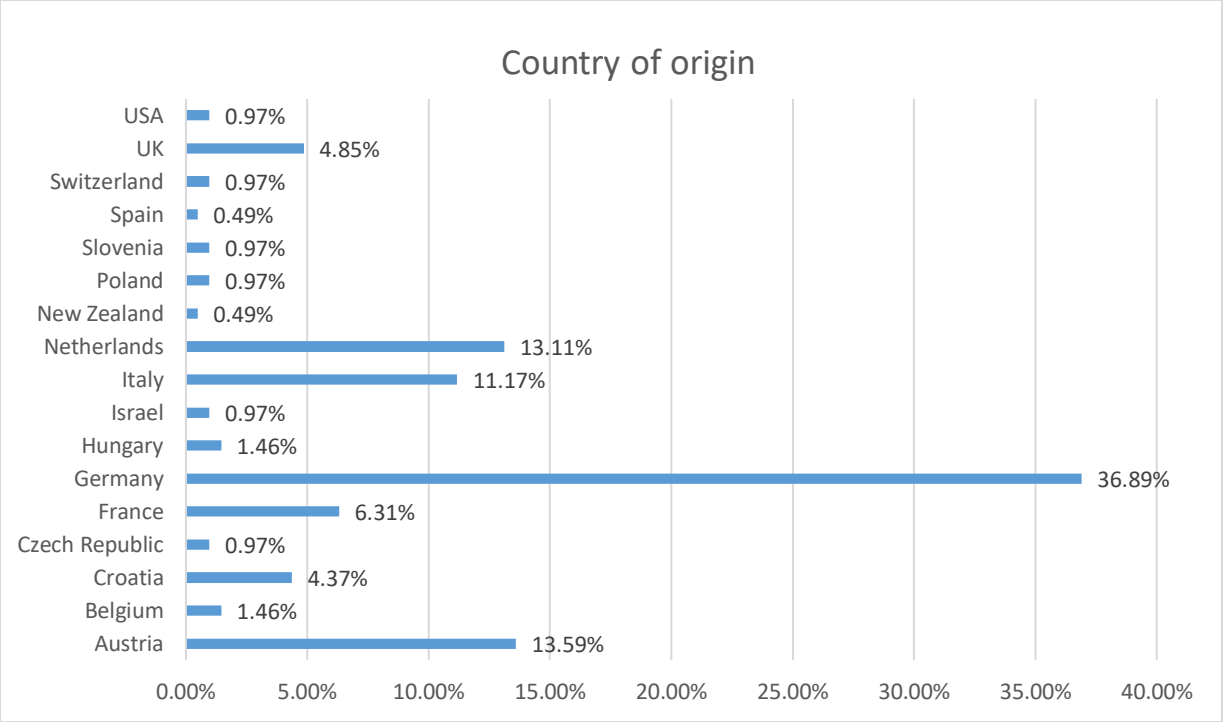


**Fig. 18.** Watchers' responses to question 9 in dolphin watching questionnaire.

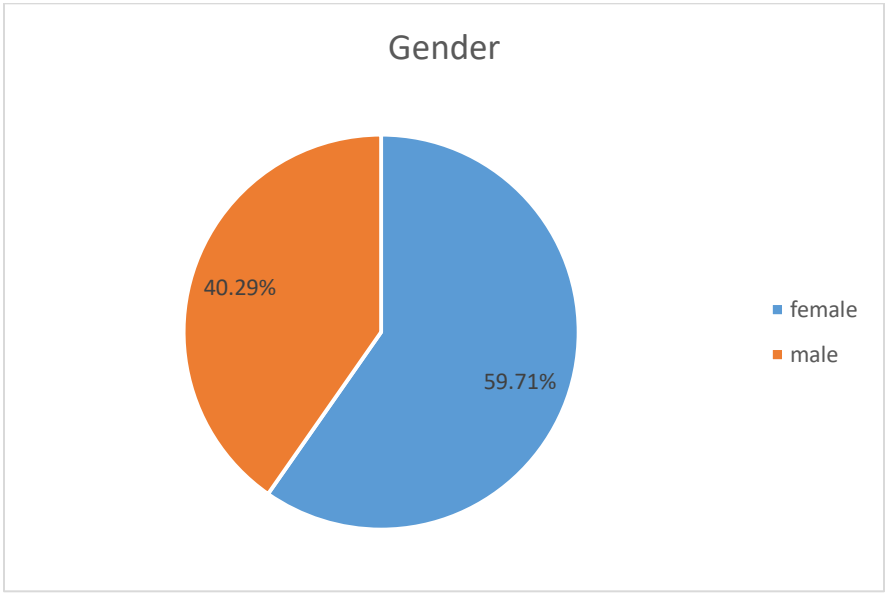


**Fig. 19.** Watchers' responses to question 10 in dolphin watching questionnaire.

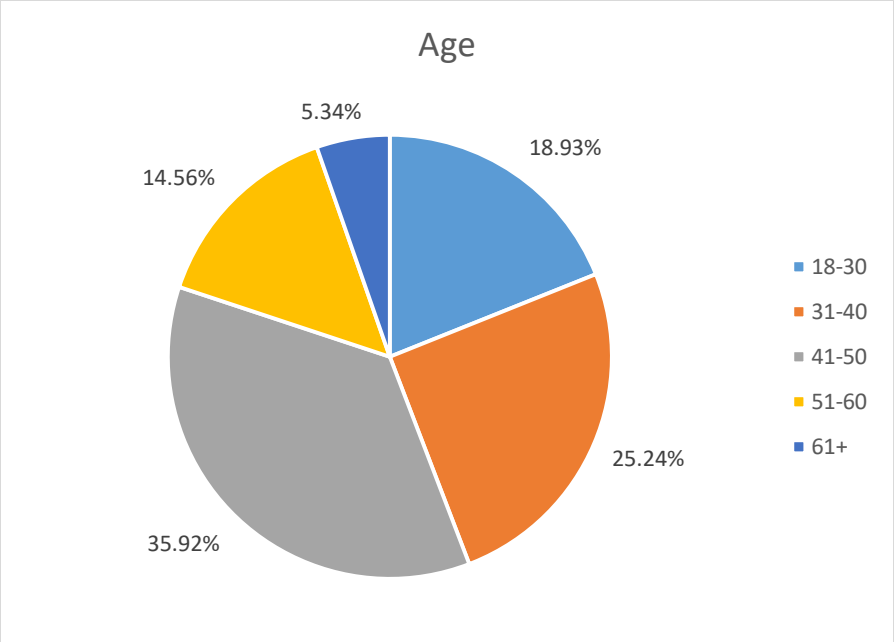


**Fig. 20.** Watchers' responses to question 11 in dolphin watching questionnaire.

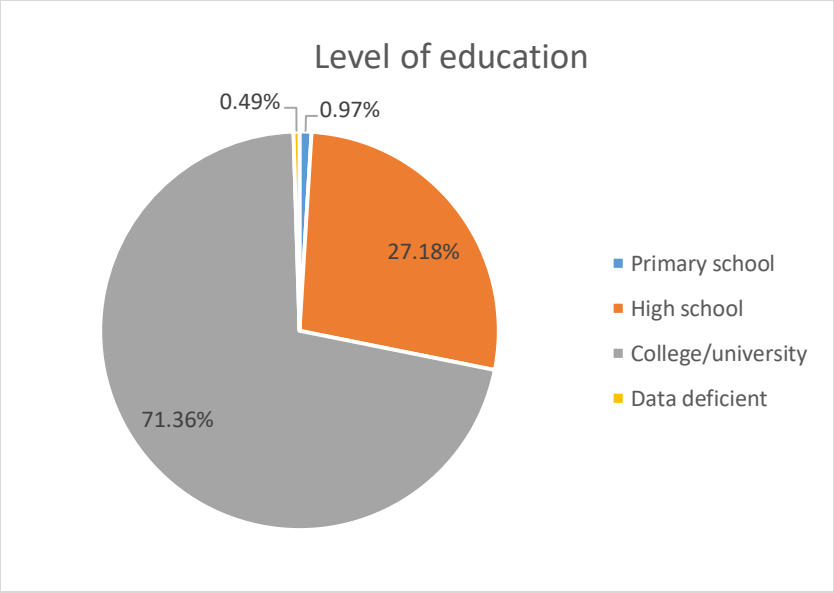


**Fig. 21.** Watchers' responses to question 12 in dolphin watching questionnaire.

## 4.2 Ecotourism programme

In total, 71 valid eco-tourist questionnaires were collected and included in the analysis. The eco-tourists that took part in the programme during August and September 2018 filled-in the questionnaire by the end of their stay. All the other participants that took part in the programme previously (from 2000 to 2018) completed the questionnaire via e-mail.

The respondents from the eco-tourism programme (ETs) participated in a period from 2001 to 2018. Most of the respondents were from more recent years (2010 to 2018), with the majority (18,29%) being from 2018 (Fig. 22). Five respondents (7%) took part in BWI's eco-tourism programme more than once. For the majority of the respondents (80,28%), the eco-tourism course was the first program of that kind (Fig. 23). After it, 24% of the respondents took part in a similar programme (Fig. 25).

### *4.2.1. General information about the experience*

The question how many times did they see the dolphins with the BWI was an open-ended question and we translated the answers into comparable categories ("1-2", "3-4", "5-6", "7 or more"). The majority of the respondents (almost 50%) stated that they saw dolphins 7 times or more with the BWI (Fig. 24).

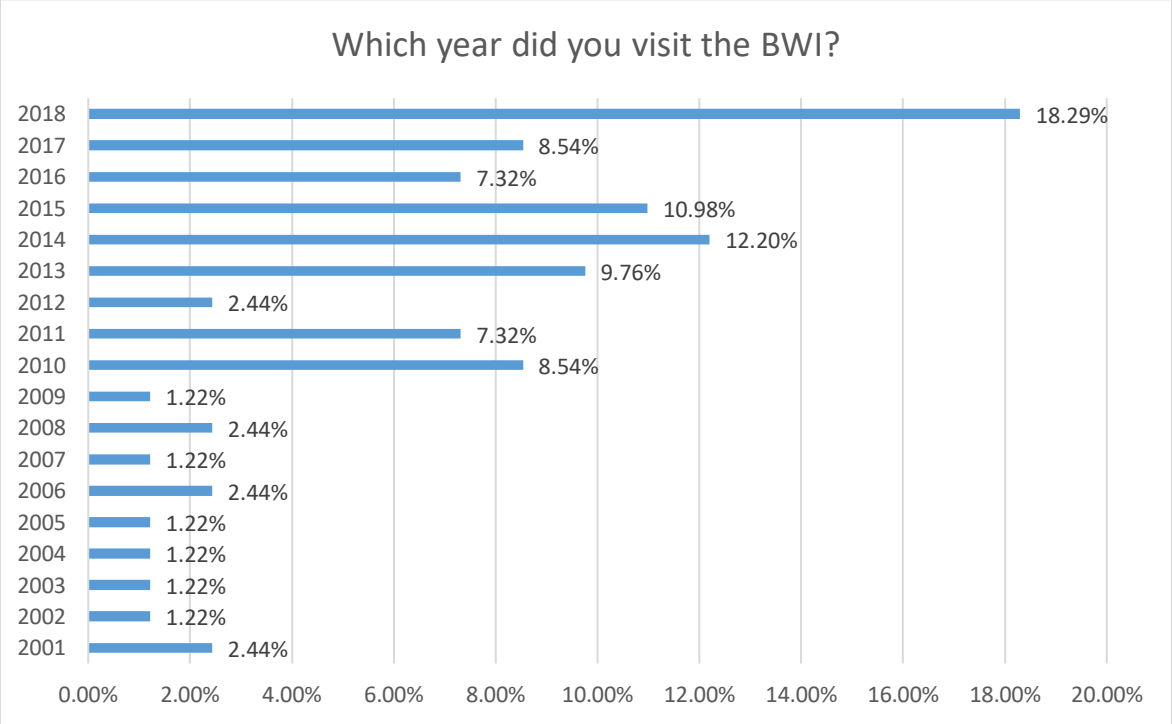


**Fig. 22.** Doers' responses to question 3 in ecotourism course questionnaire.

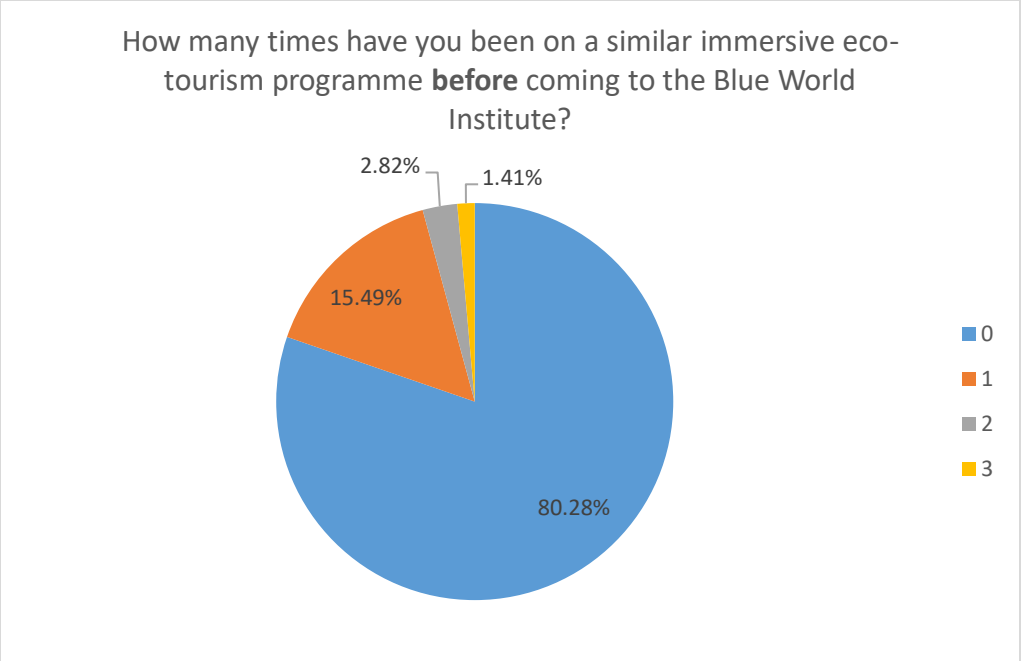


**Fig. 23.** Doers' responses to question 1 in ecotourism course questionnaire.

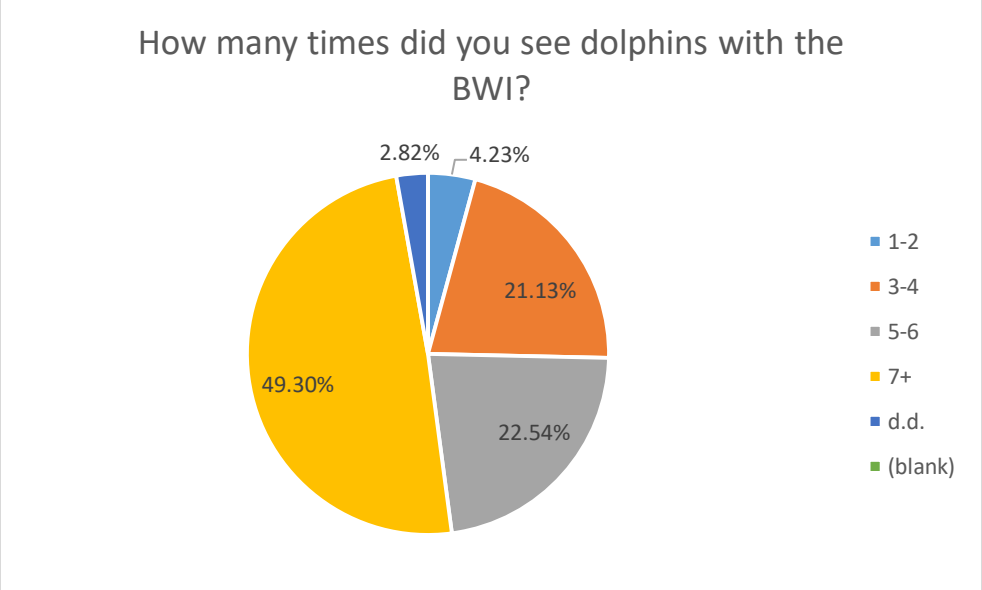


**Fig. 24.** Doers' responses to question 2 in ecotourism course questionnaire.

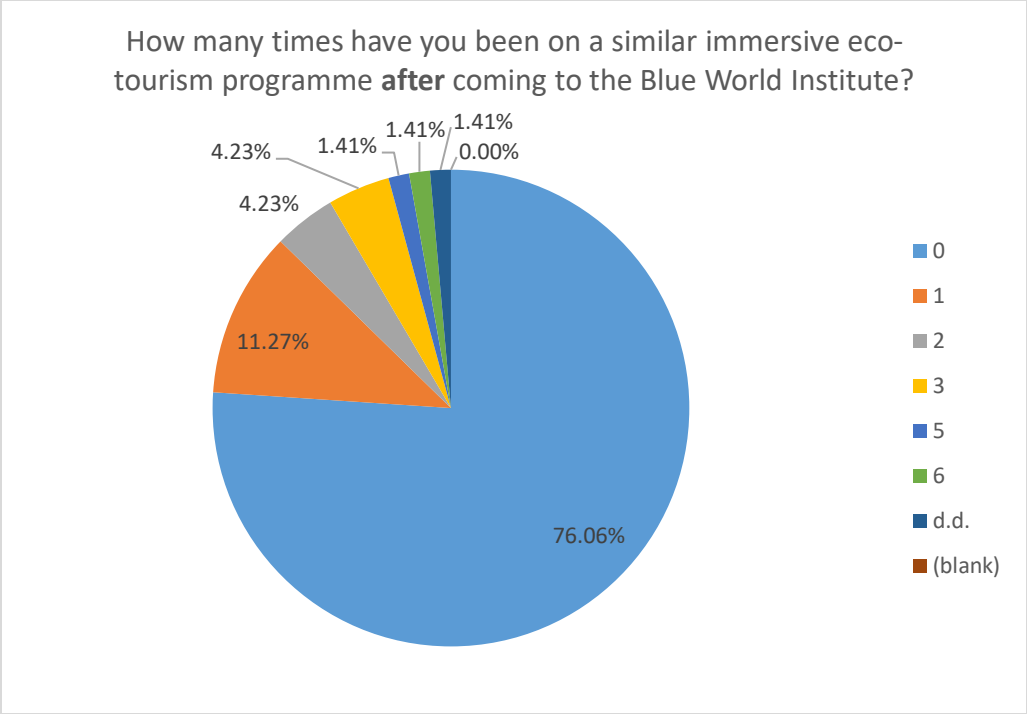


**Fig. 25.** Doers' responses to question 4 in ecotourism course questionnaire.

### *4.2.2. The motivation for the programme*

The main motivation factors for the ecotourism course participants (ETs) were Seeing the dolphins in their natural environment and Contributing to dolphin conservation (both rated 'very important' by 88,73% respondents, see Fig. 26). The lowest importance was given to the factors Being as close to the dolphins as possible (22,54% rated 'very important') and The connection with the Blue World Institute research (36,62% rated 'very important'). Still, those two factors were rated 'not at all important' by only 5,63% respondents (former) and 4,23% (latter), see Fig. 26.

The factors that were more important to ETs, than to DWs (based on how many respondents rated 'very important') were:

- Contributing to dolphin conservation (ET 88,73%, DW 67,96%)
- Learning about dolphin biology (ET 64,79%, DW 50,00%)

The factor Being as close to the dolphins as possible was slightly more important to DWs (30,58% 'very important') than to ETs (22,54% 'very important'), see Fig. 26. The measures of central tendency are presented in Table 4.

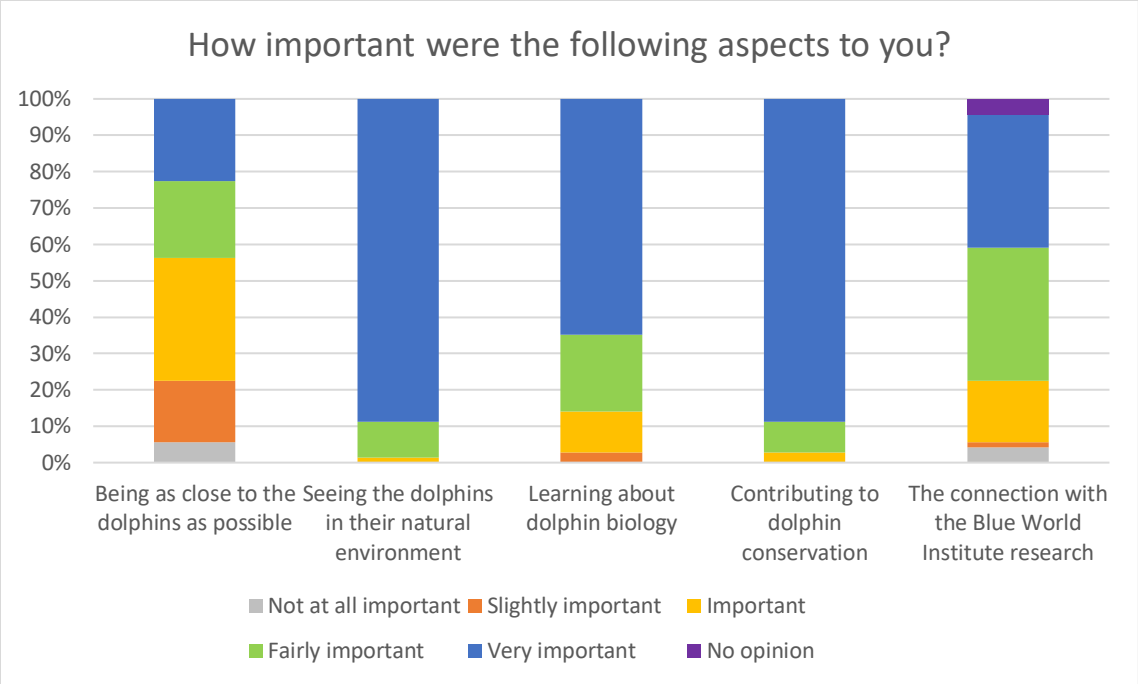


**Fig. 26.** Doers' responses to question 5 in ecotourism course questionnaire.

**Table 4.** Measures of central tendency and 3rd quartile of factors in question 5 in ETQ.

| | mode | median | 3rd quartile | total |
|---|---|---|---|---|
| Being as close to the dolphins as possible | 3 | 3 | 4 | 71 |
| Seeing dolphins in natural environment | 5 | 5 | 5 | 71 |
| Learning about biology | 5 | 5 | 5 | 71 |
| Contributing to conservation | 5 | 5 | 5 | 71 |
| Connection to BWI research | 4 | 4 | 5 | 68 |

### *4.2.3. Pro-environmental behavior intention*

More than 50% of the respondents stated that the experience encouraged them to:

- Promote dolphin conservation with my friends and family by encouraging the use of the boat code of conduct (59,15%)
- Follow dolphin and marine conservation organizations via social media (50,70%), see Fig. 27

However, less than 50% of the respondents stated that the experience encouraged them to:

- Support nature conservation by writing directly to your politicians (14,08%)
- Recycle plastics, metals and paper (18,31%)
- Invest in re-useable cotton bags and water bottles (23,94%)
- Volunteer on a beach clean-up action (30,99%)
- Reduce the amount of plastics you use in daily life e.g. giving up plastic straws and balloons (33,80%)
- Support nature conservation via petitions (e.g. on social media) (42,25%)
- Support the development of obligatory measures within the Natura 2000 site that would improve dolphin conservation (e.g. speed limits) (46,48%)
- Promote marine conservation with my friends and family, by reducing our use of plastics (49,30%)

The respondents that were already applying the abovementioned behaviors could explain some of the 'low' results. The behaviors that most respondents have already been highly applying were (high 'A'):

- Recycle plastics, metals and paper (77,46%)
- Invest in re-useable cotton bags and water bottles (70,42%)
- Reduce the amount of plastics you use in daily life e.g. giving up plastic straws and balloons (59,15%)

The behaviors that were the most refused to adopt by the participants (high 'No') were:

- Support nature conservation by writing directly to your politicians (57,75%)
- Volunteer on a beach clean-up action (38,03%)

All the answers are presented in Fig. 27. The double answers are presented in Table 5.

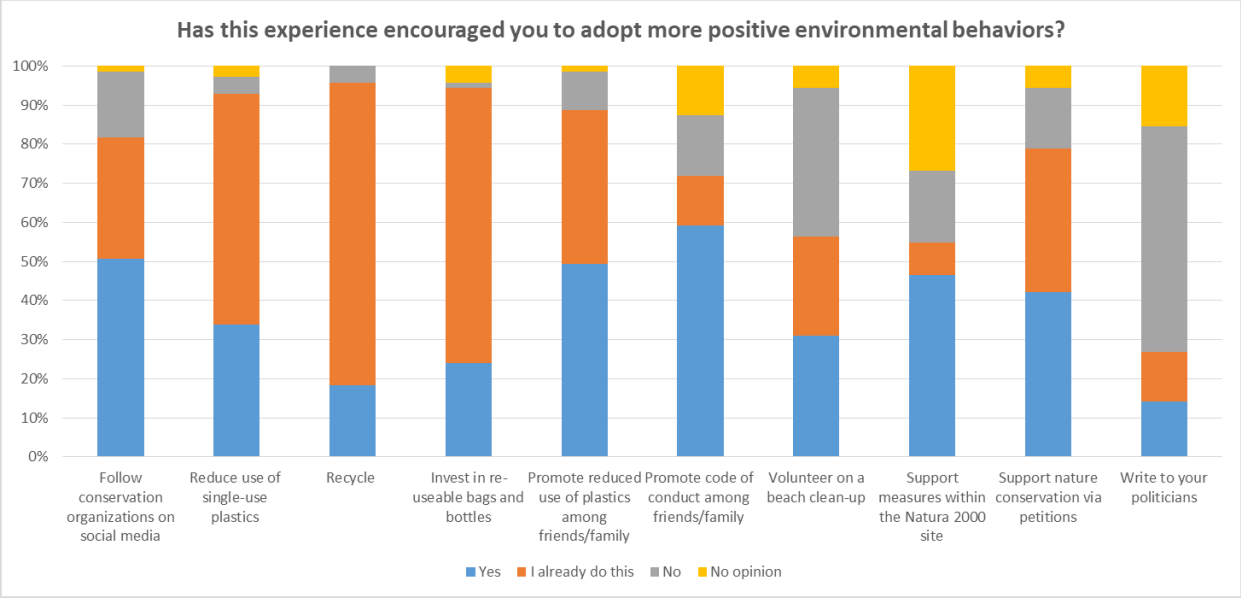


**Fig. 27.** Doers' responses to question 6 in ecotourism course questionnaire.

**Table 5.** Double answers ('yes' and 'I already do this') to a question 6 in ETQ, regarding pro-environmental behavior.

| | **double answer (DA)** | **% DA in total (71)** |
|---|---|---|
| Social media | 4 | 18,18% |
| Reduce | 2 | 4,76% |
| Recycle | 1 | 1,82% |
| Reuse | 2 | 4,00% |
| Promote reduced plastic use to friends/family | 0 | 0,00% |
| Promote code of conduct to friends/family | 0 | 0,00% |
| Beach clean-up | 1 | 5,56% |
| Support Natura 2000 | 0 | 0,00% |
| Support petitions | 1 | 3,85% |
| Write to politicians | 0 | 0,00% |

### *4.2.4. Review of the tour*

The statements that received the most overall agreement (98,59%) were: 'I was excited to see dolphins in the wild', 'I felt this programme enriched the value of my vacation' and I would encourage my friends and family members that are interested in dolphins to undertake this

programme. These were followed by 'I would encourage my friends and family members that are interested in dolphins to undertake this programme' (91,55%). The statement I felt an emotional connection to the animals that I saw received the least agreement (70,42%), see Fig. 28. The measures of central tendency are presented in Table 6.

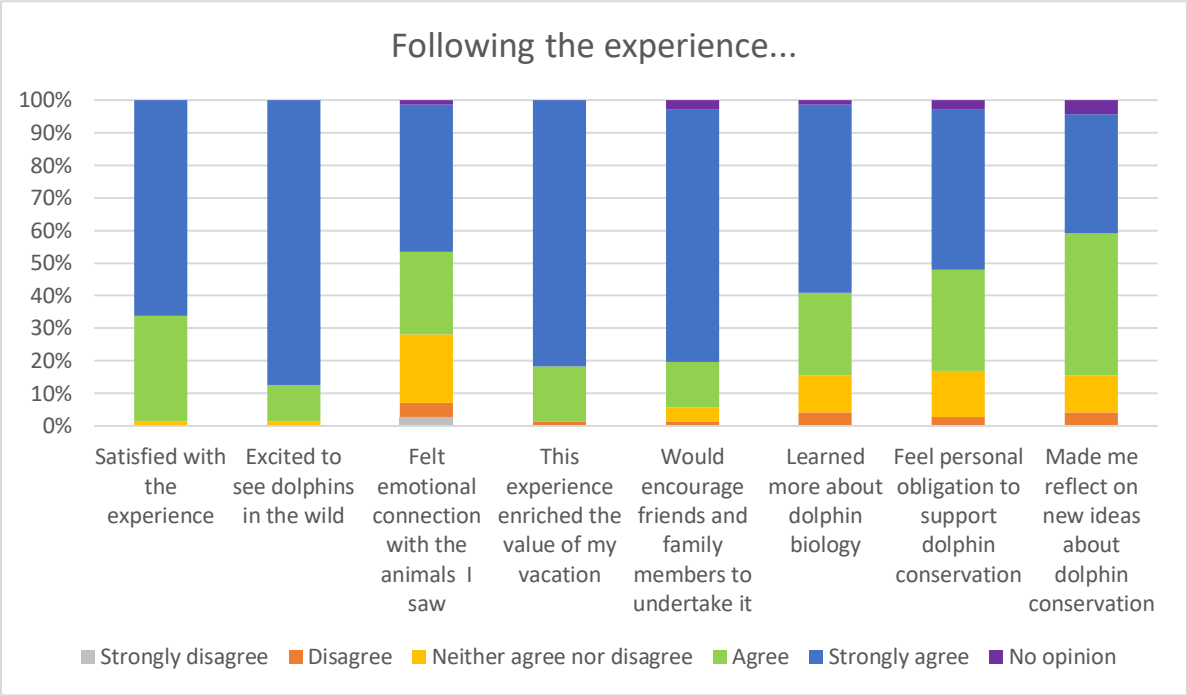


**Fig. 28.** Doers' responses to question 7 in ecotourism course questionnaire.

**Table 6.** Measures of central tendency and 3rd quartile of factors in question 7 in ETQ.

| | mode | median | 3rd quartile | total |
|---|---|---|---|---|
| Satisfied with this trip | 5 | 5 | 5 | 71 |
| Excited to see dolphins in the wild | 5 | 5 | 5 | 71 |
| Felt emotional connection | 5 | 4 | 5 | 70 |
| Enriched the value of my vacation | 5 | 5 | 5 | 71 |
| Encourage friends/family | 5 | 5 | 5 | 69 |
| Learned about dolphin biology | 5 | 5 | 5 | 70 |
| Personal obligation to support dolphin conservation | 5 | 5 | 5 | 69 |
| Reflect on new ideas about dolphin conservation | 4 | 4 | 5 | 68 |

### *4.2.5. Inspiration to continue with dolphin conservation*

The eco-tourism course inspired doers to further engage in dolphin conservation through 'undertaking a similar programme with another organization' (mode=5, with 64,79% overall agreement – strongly agree+agree), see Fig. 30. They were less inspired to 'repeat the programme again with Blue World Institute' (mode=3, with 46,48% overall agreement), see Fig. 29. Not many doers considered 'changing career towards biology/environmental sciences' (mode=2, with 23,08% overall agreement), as shown in Fig. 31. The measures of central tendency are shown in Table 7. Our results show that 22,54% doers already took part in the similar programme after the BWI eco-tourism course (see Fig. 31) and 5 doers (7,04%) already participated in the Blue World Institute's eco-tourism course multiple times.

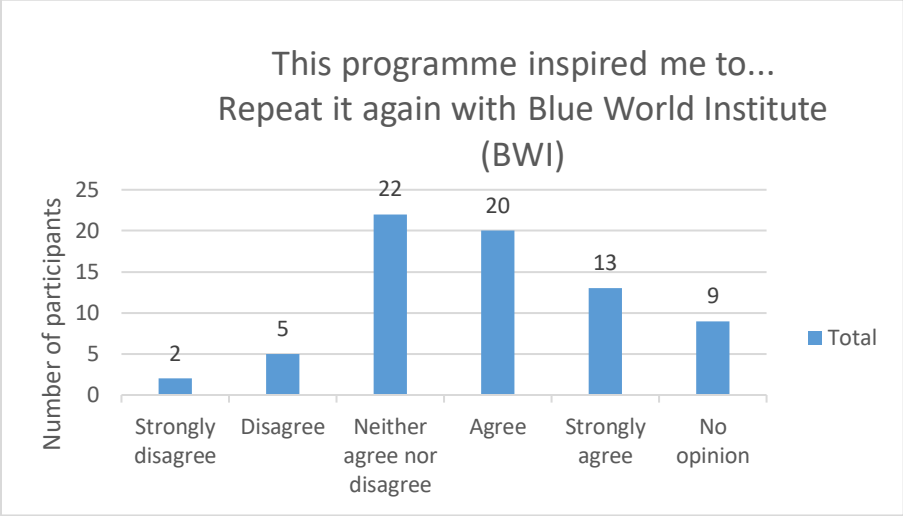


**Fig. 29.** Doers' responses to question 8.1 in ecotourism course questionnaire.

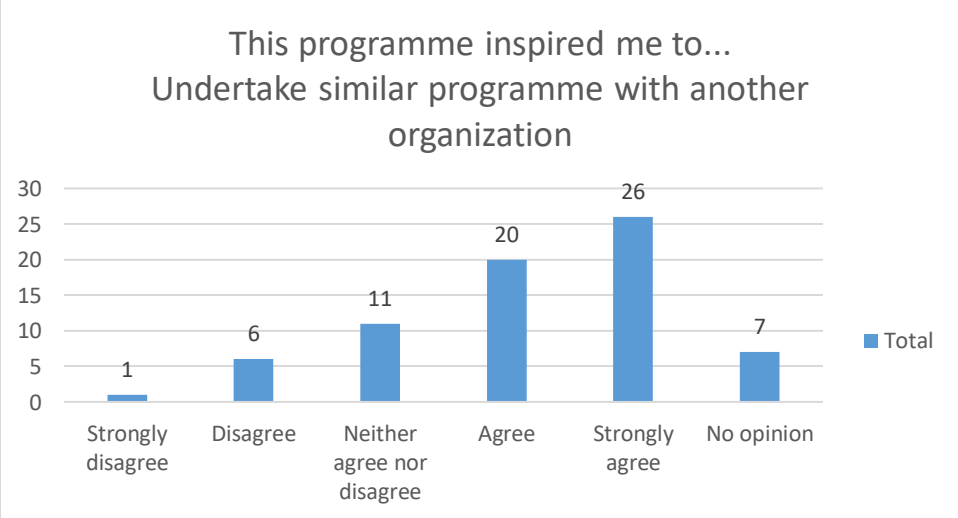


**Fig. 30.** Doers' responses to question 8.2 in ecotourism course questionnaire.

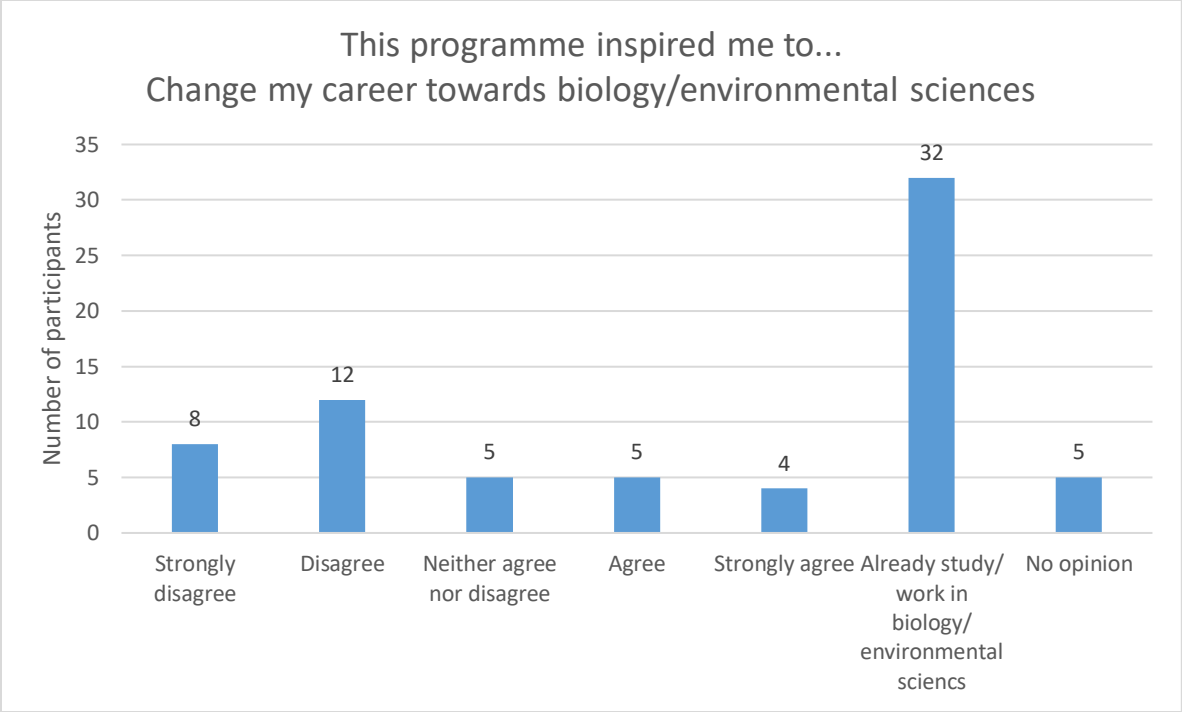


**Fig. 31.** Doers' responses to question 8.3 in ecotourism course questionnaire.

**Table 7.** Measures of central tendency and 3rd quartile of factors in question 8 in ETQ.

| | mode | median | 3rd quartile | total |
|---|---|---|---|---|
| Repeat the progamme again with BWI | 3 | 4 | 4 | 62 |
| Undertake similar programme with another organization | 5 | 4 | 5 | 64 |
| Change career towards biology/environmental sciences* | 2 | 2 | 3,75 | 34 |

*if they do not already study/ work in biology/ environmental sciences

### *4.2.6. Demographic characteristics*

The most doers were from Germany (18,31%), United Kingdom (15,49%), United States of America (11,27%) and France, Belgium and Hungary, equally represented by 5,63% of respondents. The remaining respondents were from 17 other countries shown in Fig. 32. The women made up the majority of the respondents (74,65%), while men made up 23,94% (see Fig. 33). The age structure is shown in Fig. 34. Two respondents were underage and they were 16 and 17. The majority of respondents (60,56%) was in the 18-30 age group. Following are the 31-40 group with 16,90%, 41-50 group with 5,63%, 51-60 group with 9,86% and in 61+ group with

1,41% of respondents. The majority of respondents had a college or university degree (90,14%), while 8,45% had a high school degree as their highest level of education (Fig. 35).

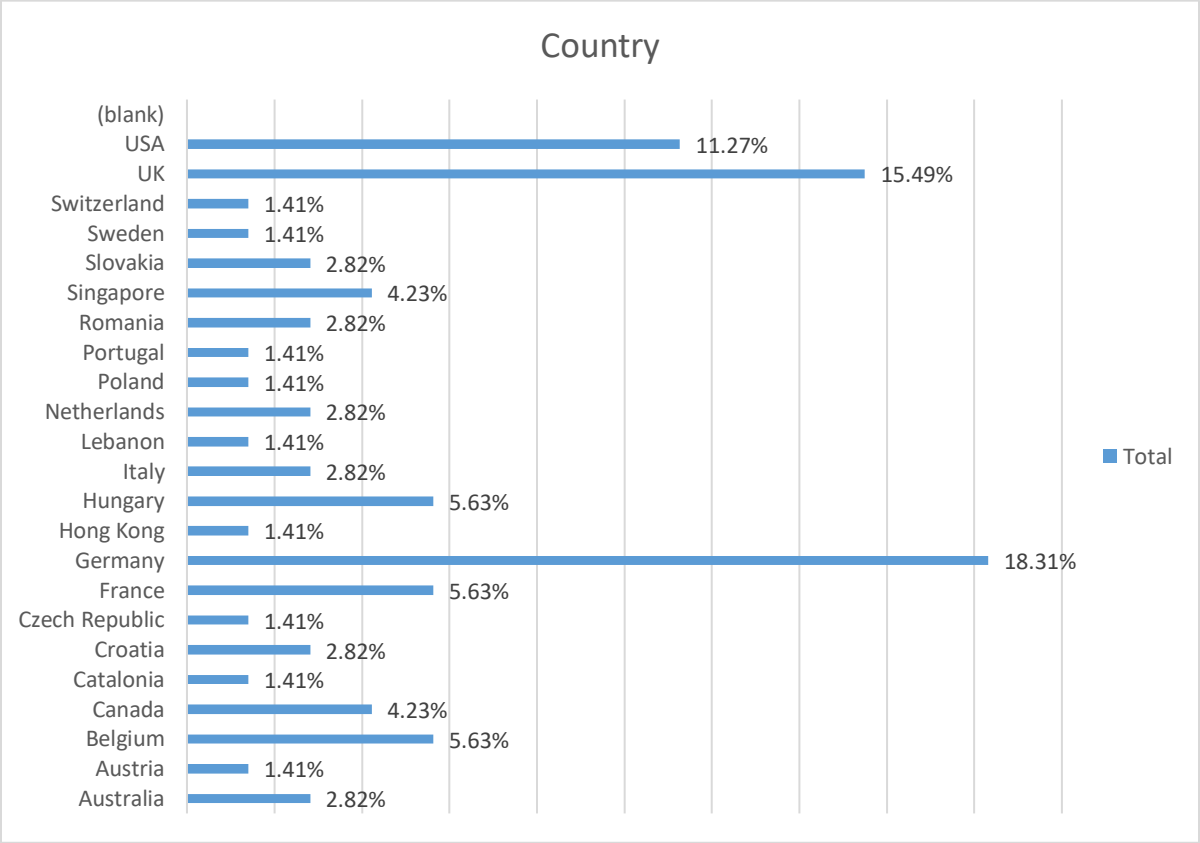


**Fig. 32.** Doers' responses to question 9 in ecotourism course questionnaire.

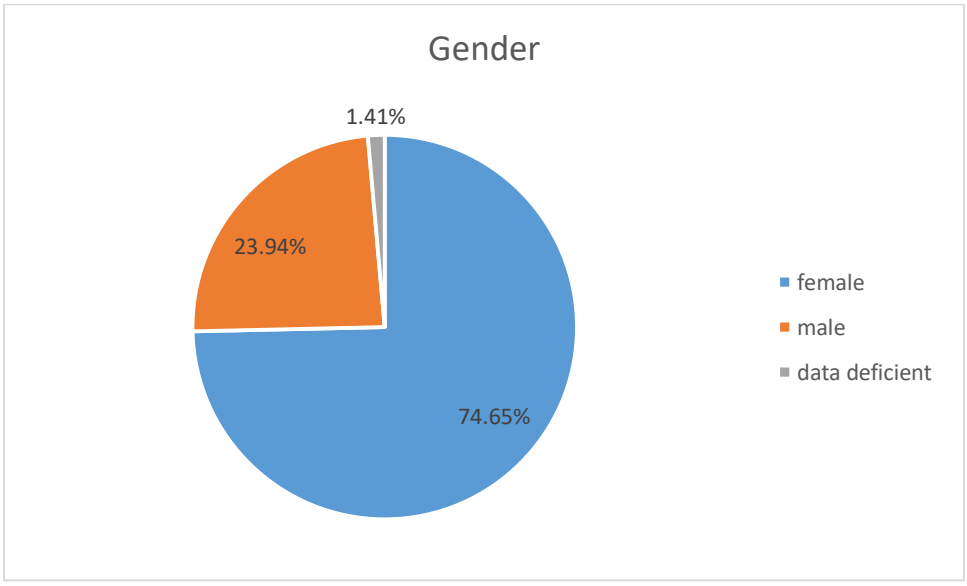


**Fig. 33.** Doers' responses to question 10 in ecotourism course questionnaire.

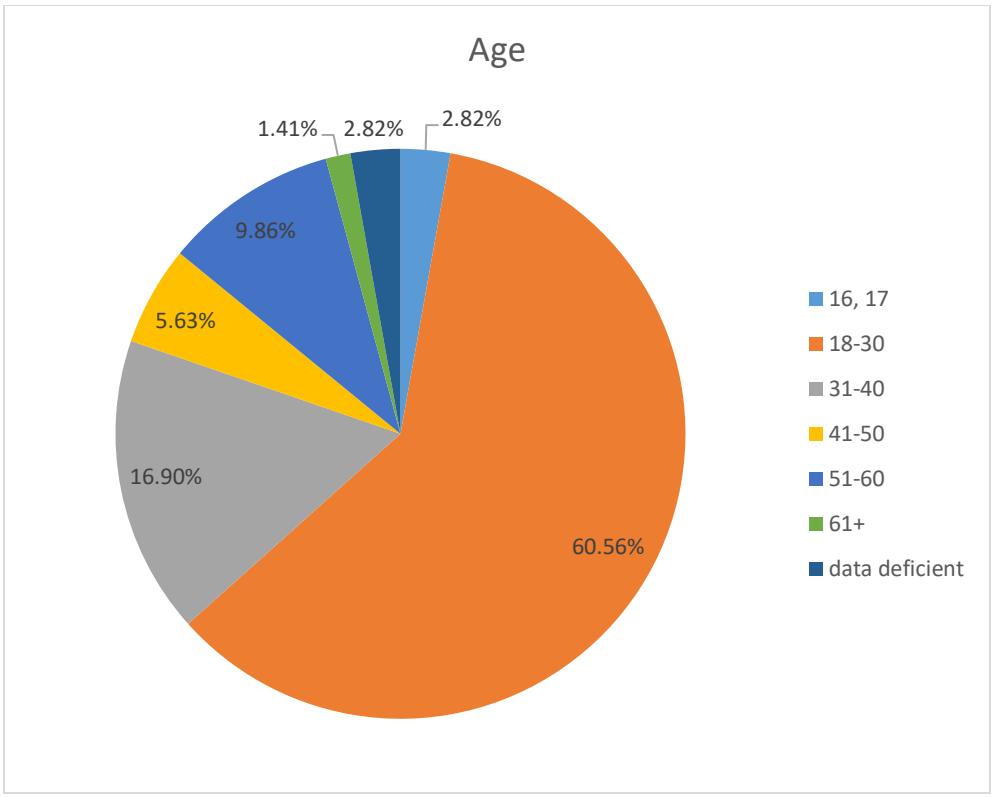


**Fig. 34.** Doers' responses to question 11 in ecotourism course questionnaire.

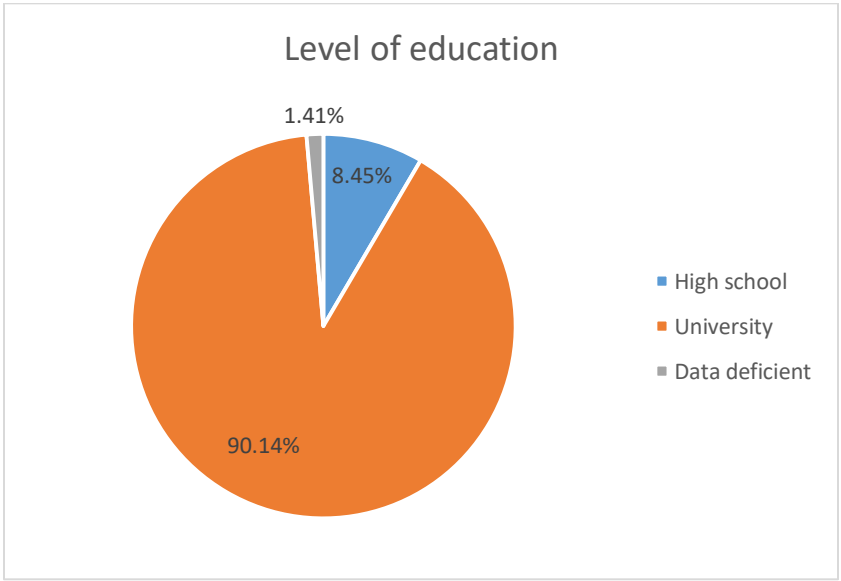


**Fig. 35.** Doers' responses to question 12 in ecotourism course questionnaire.

## 4.3. Comparison of two investigated groups

The two investigated groups (watchers and doers) differed in demographic structure:

- The watcher group consisted of 17 nationalities, with Germans representing the majority, followed by Dutch, Austrian and Italian. The doer group consisted of 23 nationalities, with Germans, followed by British and Americans representing the majority.

- Among doers, the percentage of female respondents (75%) was higher than in the watcher group (59%)

- By age structure (not taking into account the participants that were under-age), in the watcher group, most respondents were between 31-50 years old, while doer group was generally younger, with most respondents being 18-30 years old

- Doer group had a higher percentage of respondents with a university degree (90+%) than watcher (71%)

The main motivation factor for watchers was 'Seeing the dolphins in their natural environment' (93,20% stated 'very important'). For doers, two main motivation factors were 'Seeing the dolphins in their natural environment' and 'Contributing to dolphin conservation' (both rated 'very important' by 88,73%).

Watchers were more encouraged than doers to adopt the following behaviors (percentage of answered 'yes'):

- Support Natura 2000 measures (72% watchers and 46% doers)

- Encourage friends/family to reduce the use of plastics (61% watchers and 49% doers)

- Encourage friends/family to follow the code of conduct (75% watchers and 58% doers)

- Support nature conservation via petitions (57% watchers and 43% doers)

- Support nature conservation by writing directly to politicians (35% watchers and 14% doers)

- Recycle (29% watchers and 18% doers)

- Re-use (31% watchers and 18% doers)

- Volunteer on a beach clean-up (44% watchers and 31% doers)

However, doers were practicing more pro-environment behaviors than watchers prior to the

experience ('I already did that' differs in at least 10% between groups).

- Recycle (69% watchers and 78% doers)
- Encourage friends/family to reduce the use of plastics (29% watchers and 40% doers)
- Support nature conservation via petitions (19% watchers and 36% doers)
- Follow dolphin conservation organizations on social media (watchers 16% and doers 31%)
- Volunteer on a beach clean-up (14% watchers and 25% doers)

Both groups were equally practicing following behaviors prior to the experience ('I already did that' differs in less than 10%):

- Reduce the amount of single-use plastics in your daily life (both groups around 60%)
- Invest in re-usable bags and bottles (65% watchers and 71% doers)
- Encourage friends/family to follow the code of conduct (8% watchers and 13% doers)
- Support Natura 2000 measures (3% watchers and 8% doers)
- Support nature conservation by writing directly to politicians (7% watchers and 13% doers)

The opinions and attitudes affected by the ecotourism experience upon which both doers and watchers highly agreed (percentage of overall agreement= 'strongly agree' and 'agree') were:

- I am satisfied with this trip (98,54% watchers, 98,59% doers)
- I was excited to see dolphins in the wild (98,06% watchers, 98,59% doers)
- I felt this trip enriched the value of my vacation (98,06% watchers, 98,59% doers)
- I would encourage my friends and family members that are interested in dolphins to undertake this trip (92,23% watchers, 91,55% doers)

The attitude upon which both doers and watchers showed the least agreement (percentage of overall agreement= 'strongly agree' and 'agree') as 'I felt an emotional connection with the animals I saw' (72,82% watchers, 70,42% doers)

The most attitudes were almost the same among doers and watchers (differed less than 3%):

- I am satisfied with this trip (99% both)

- I was excited to see dolphins in the wild (98% both)
- I felt an emotional connection with the animals I saw (73% watchers, 70% doers)
- I felt this trip enriched the value of my vacation (98% both)
- I would encourage my friends and family members that are interested in dolphins to undertake this trip (92% both)
- I have learned more about dolphin biology thanks to this trip (83% both)

The only attitudes to which the doers agreed more were 'I feel a personal obligation to support dolphin conservation' (69,42% watchers and 80,28% doers) and 'This trip made me reflect on new ideas about dolphin conservation' (74,76% watchers and 80,28% doers).

## 4.4. Statistical tests

### *4.4.1. Hypothesis 1*

'Doers are more motivated to join the programme in order to contribute to dolphin conservation, than watchers.'

'Being as close to the dolphins as possible' was a more important motivation factor to watchers (DW) than to doers (ET). Watchers showed higher median value of importance (4,0) than doers (3,0) and 50% of the watchers rated the importance of this factor between 3,0 and 5,0, while 50% of the doers rated between 3,0 and 4,0 (see Fig. 36). The minimaland maximal values were the same (Fig. 36). The Mann-Whitney U Test showed that the difference between the answers of the two groups was significant (p-values < 0.05, see Table 8).

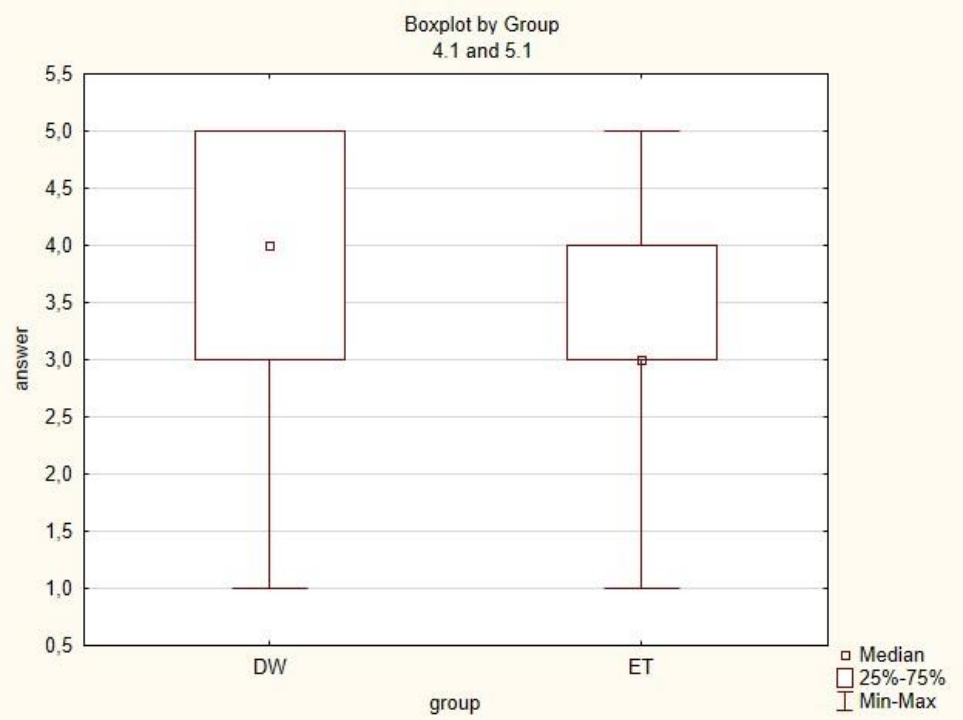


**Fig. 36.** Boxplot comparing the distribution of answers of watchers (DW) and doers (ET) to the question 4.1 in DWQ and 5.1 in ETQ ranking the importance of a factor 'being as close to dolphins as possible' on a 5-point likert scale.

The motivation factor 'Contributing to dolphin conservation' was more important to doers (ET) than to watchers (DW). The medians among groups were the same (5,0), but 50% of the doers rated importance between 4,0 and 5,0, while 50% of the watchers' rated importance at the highest value (5,0), as shown in Fig. 37. Watchers' minimum (1,0) was lower than doers' (3,0). The Mann-Whitney U Test has shown that the differences among the groups are significant, as p-values are smaller than 0,05 (see table 8, answer 4.4 5.4).

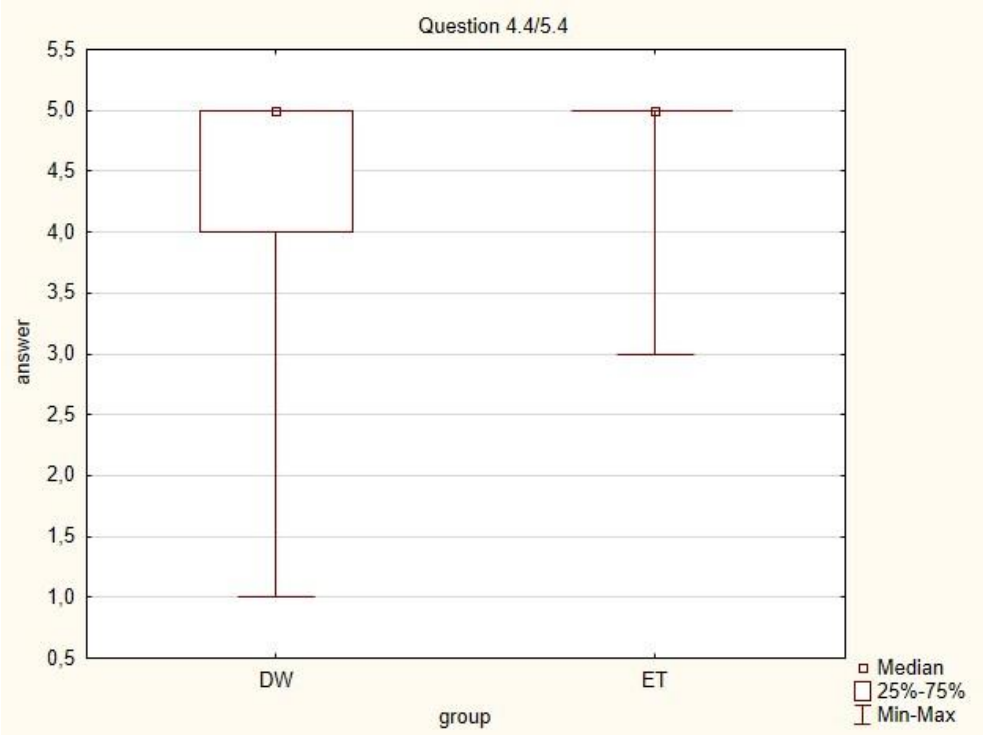


**Fig. 37.** Boxplot showing the distribution of watchers' (DW) and doers' (ET) answers to the question 4.4 in DWQ and 5.4 in ETQ, ranking the importance of a factor 'Contributing to dolphin conservation' on a 5-point likert-scale.

**Table 8.** Mann-Whitney U Test results: comparing watchers' and doers' answers to questions 4.1 5.1 'Being as close to the dolphins as possible' and 4.4 5.4 'Contributing to dolphin conservation'.

| variable | "Mann-Whitney U Test (w/ continuity correction) By variable group Marked tests are significant at p <,05000" | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| answer | Rank Sum | Rank Sum | U | Z | p-value | Z | p-value | Valid N | Valid N |
| 4.1 5.1 | 30016.50 | 8.486.500 | 5.930.500 | 2.374.179 | 0.017589 | 2.461.967 | 0.013818 | 206 | 71 |
| 4.4 5.4 | 26915.00 | 11311.00 | 5.800.000 | -254.815 | 0.010830 | -330.969 | 0.000934 | 205 | 71 |

### *4.4.2. Hypothesis 2*

'Both programmes positively affect pro-environmental attitudes and behavior intention, but doers exhibit bigger changes in pro-environmental attitudes and behavior intention than watchers, as they were deeper invested in the activity.'

Results show that doers related more to the attitude 'Following this experience, I feel a personal obligation to support dolphin conservation', with a median of doers' answers (5,0) being higher than of watchers' (4,0). 50% of the watchers agreed with the statement on a scale from 3,0-5,0, while 50% of doers agreed on a scale from 4,0-5,0 (see Fig. 38). The watchers' minimum (1,0) is lower than the doers' (2,0) (Fig. 38). However, Mann-Whitney U Test has shown that these differences are not significant, as p-value is higher than 0,05 (see Table 9). This means that both programmes positively affected environmental attitudes, but doers did not exhibit bigger changes in attitudes than watchers. The difference in the effect on pro-environmental behavior between doers and watchers is found. Effect on behavior is divided into 0= 'no effect' and 1= 'effect' (positive or neutral). Among watchers, 78% exhibited positive/neutral effect, while 22% have exhibited no effect (see Table 10 (a)). Among doers, 74% exhibited positive/neutral effect and 26% have exhibited no effect (Table 10 (a)). Chi-square test (Pearson Chi-square, M-L Chi-square and Spearman Rank R, with df=1) has shown that the difference between doers and watchers is not significant (see Table 10 (b)) and it suggests that both ecotourism programmes have a similar effect on the pro-environmental behavior intention.

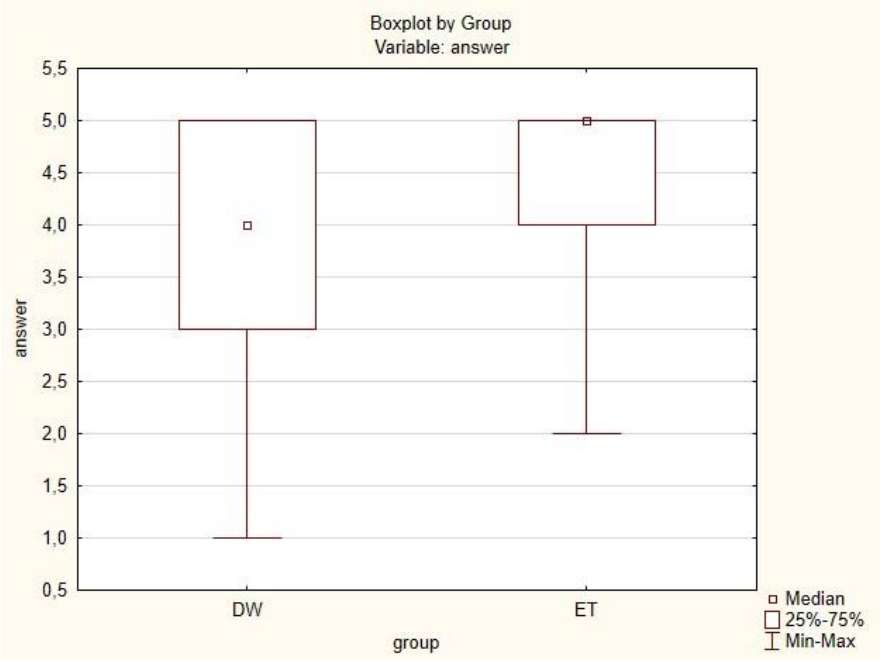


**Fig. 38.** Boxplot showing distribution of watchers' (DW) and doers' (ET) answers to the question 6.7 in DWQ and 7.7 in ETQ, ranking the attitude 'Following this experience, I feel personal obligation to support dolphin conservation' on a 5-point likert-scale.

**Table 9.** Test of significance: Mann-Whitney U Test results: comparing watchers' and doers' answers to question 6.7 7.7 'I feel personal obligation to support dolphin conservation'.

**Mann-Whitney U Test (w/ continuity correction) By variable group Marked tests are significant at p <,05000**

| variable | Rank Sum | Rank Sum | U | Z | p-value |
|---|---|---|---|---|---|
| answer | 24368 | 9823 | 5840 | -1,45681 | 0,145169 |

| variable | Z | p-value | Valid N | Valid N |
|---|---|---|---|---|
| answer | -1,55858 | 0,119098 | 192 | 69 |

**Table 10.** Pro-environmental behavior intention of the two independent groups: doers and watchers, (a) frequencies, (b) chi-square test of significance.

(a)

**All Groups**

**2-Way Summary Table: Observed Frequencies Marked cells have counts > 10**

| group | answer=0 | answer=1 | Row |
|---|---|---|---|
| DW | 448 | 1612 | 2060 |
| Row % | 0,22 | 0,78 | |
| Total % | 0,16 | 0,58 | 0,74 |
| ET | 183 | 527 | 710 |
| Row % | 0,26 | 0,74 | |
| Total % | 0,07 | 0,19 | 0,26 |
| Totals | 631 | 2139 | 2770 |
| Total % | 0,23 | 0,77 | 1 |

(b)

**All Groups**

**Statistics: group(2) x answer binary(2)**

| | Chi-square | df | p |
|---|---|---|---|
| Pearson Chi-square | 4,867934 | df=1 | p=,02736 |
| M-L Chi-square | 4,7774 | df=1 | p=,02884 |
| Phi for 2 x 2 tables | -0,041921 | | |
| Tetrachoric correlation | -0,077452 | | |
| Contingency coefficient | 0,0418843 | | |
| Kendall's tau b & c | b=-,041921 | c=-,030705 | |
| Gamma | -0,110904 | | |
| Spearman Rank R | -0,041921 | t=-2,207 | p=,02736 |

### *4.4.3. Hypothesis 3*

'Emotional response to wildlife positively affects pro-environmental behavior intention.'

Spearman rank order correlation test did not show a significant correlation of emotional response to wildlife with the general pro-environmental behavior intention (see Table 11). The correlation was not found either for an emotional response to wildlife and the two separate categories of behavior 'Reduce the amount of single-use plastics in your daily life' and 'Promote dolphin conservation among my friends and family by reducing our use of plastics'. It was not possible to get statistically significant results.

**Table 11.** Spearman's correlation between the doers' answers to 6.3 'I felt an emotional connection to the animals that I saw' and 5.0 general pro-environmental behavior intention

| | **Spearman Rank Order Correlations MD pairwise deleted Marked correlations are significant at p <,05000** | |
|---|---|---|
| **variable** | **emotional connection** | **reduce plastic** |
| emotional connection | 1 | 0,12861 |
| reduce plastic | 0,12861 | 1 |

# 5. Discussion

The overall aim of this study was to investigate the potential of the two different ecotourism programmes involving dolphin observation to increase pro-environmental attitudes and behavior of participants. We compared two forms of ecotourists, watchers and doers, which differed in the level of investment in the ecotourism activity. This was the first study to analyze the differences between watchers and doers active within the same organization.

Our findings revealed that doers were more motivated than watchers to contribute to dolphin conservation when joining the programme. For both groups, the main motivation factor was seeing the dolphins in their natural habitat. Both groups did not find it very important to be as close to the dolphins as possible, although it was slightly more important for watchers than for doers. This was likely a result of enhanced awareness of the threat that boats are causing to the dolphins, which was emphasized through both programmes. The study by Ballantyne et al. (2011) showed that on wildlife watching sites, being physically close to the animals was something that was novel or remarkable for many visitors.

Both programmes positively affected pro-environmental attitudes and pro-environmental behavior intention of the participants. This was in line with the study by Apps et al. (2018) where after a white shark cage-dive experience, the participants showed positively affected awareness, understanding, attitudes, and concern, as well as increased participation in pro-conservation behaviors. In a study made by Cheng et al. (2018), the participants' knowledge and pro-environmental behavior intention were shown to be enhanced after the interpretative dolphin watching the tour.

The most watchers (more than 70%) have shown that they were inspired by the experience to adopt the following pro-environmental behaviors: encourage the use of the boat code of conduct among their friends and family and support development of obligatory measures within the Natura 2000 site that would improve dolphin conservation. This suggests the importance of environmental interpretation in a dolphin watching tour, through which the code of conduct and Natura 2000 were introduced to the watchers. It could be that this information was novel to a certain number of watchers because a high percentage of watchers (67%) had never participated in a dolphin/whale watching tour before and 30% of watchers did not know dolphins existed in the area before coming to Lošinj. This could indicate that many of them did not have prior knowledge of dolphin conservation as well. Cheng et al. (2018) showed in their study that an interpretative dolphin watching tour can provide an alternative learning experience through which the participants can acquire knowledge related to the dolphin ecology, the threats to the dolphin population and conservation measures that have been adopted by the government. In our study, these conservation measures were promoting the code of conduct and establishing Natura 2000 sites where the measures for dolphin conservation are applied.

The pro-environmental behaviors that many watchers had already been practicing prior to experience were mostly connected to the responsible use of plastics (60-70% watchers were already recycling, reducing single-use plastics and using cotton bags and re-usable water bottles). Therefore, our results did not exhibit the major effect of the tour on those behaviors, as a relatively small share of all respondents (between 29-37%) stated they were specifically encouraged by the tour to adopt those behaviors. This was in line with the study by Ballantyne et al. (2011), where they found that only 7% of respondents reported adopting a specific new pro-environmental behavior as a result of the tourism experience and 11% reported a heightened awareness of the need for such pro-environmental action. Our results confirm the ceiling effect because watchers were already pro-environment in some fields and the tour did not have a major effect on those behaviors. However, we should not overlook that 5-9% watchers also gave double answers to responsible plastic use-related behaviors, stating both 'Yes' and 'I already do that'. This could indicate that they were already practicing those pro-environmental behaviors, but the tour itself encouraged them to practice them even more. Additionally, a high percentage of watchers (61%) stated that the tour encouraged them to promote reduced use of plastics among their friends and family. This was a step further from the basic responsible use of plastics, such as recycling, reducing and reusing, as it comprises the will and effort to involve other people in pro-environmental behavior and responsible use of plastic. Therefore, we can assume that regardless of the ceiling effect, the tourists that were practicing pro-environmental behavior were encouraged by the experience to practice it even more. This is in line with Beaumont's (2001) statement that 'reinforcing the conservation ethic (in the ecotourism programme) only helps those who may be affected by the ceiling effect'. Apps et al. (2018) also found that the experience of a white shark cage-dive may act to reinforce and enhance the already favourable attitudes of the visitors. Even though the dolphin watching tour is a short programme, and its participants (watchers) were passive observers, the effect of the environmental interpretation of the programme on pro-conservation behavior intention is evident.

As well as watchers, the most doers (59%) were inspired by the programme to encourage the use of the boat code of conduct among their friends and family, as this was something they were not practicing prior to the eco-tourism course. Doers were already slightly more active than watchers in behaviors such as recycling, encouraging their friends and family for less plastic use, supporting nature conservation by petitions, following dolphin conservation organizations on social media and volunteering on beach clean-ups. This indicates that the strong ceiling effect was present for many pro-environmental behaviors among doers. Regardless of small deviations in pro-environmental behaviors between the groups, they have both shown the overall positive effect of the ecotourism programme on pro-environmental attitudes and behavior intention.

The emotional response to viewing dolphins quite differed among the participants and it was one of the categories that had the highest diversity of answers, with some visitors strongly agreeing with feeling the emotional connection with the animals and some remaining neutral. This factor is highly individual and to explain why it differed so much among the visitors is beyond the

extent of this study. The study by Ballantyne et al. (2011) has shown that whale watching inspired the most emotional affinity among a wide range of wildlife watching programmes. Ballantyne et al. (2011) explain that the idea that the animals in their wild habitat had chosen to approach the visitors led to a heightened sense of privilege and emotional affinity.

We did not find a significant correlation between emotional response to wildlife and pro-environmental behavior intention. In the study of the white shark cage-dive, Apps et al. (2018) found a weak correlation between pro-environmental behavior and emotional engagement. However, correlation with emotional engagement was stronger than with other factors such as learning outcomes and knowledge gain (Apps et al., 2018). Ballantyne et al. (2011) found that in the context of wildlife tourism, the emotional experience provoked deeper thought, leading to concern and respect not only for the specific individuals of encountered during the tour but to the species as a whole. This was particularly the case when visitors could 'witness the animals' struggles to survive', or when environmental interpretation emphasized the threats posed by human actions. Hughes (2013) found similar results when studying the marine turtle tourism site, where the visitors were more likely to express an intention to adopt pro-conservation behaviors if they were emotionally engaged in the experience. Jacobs and Harms (2014) found that after the whale watching tour with interpretation focused on emotion, the visitors were more likely to foster conservation intentions than after the tour with interpretation focused on knowledge or responsibility. Possibly we should have formulated our questions differently, as it was not possible to get a correlation of emotional response to wildlife and pro-environmental behavior intention. The problem was that they were studied through different types of questions (emotional response through a 5-point likert-scale – ordinal data, and pro-environmental behavior through multiple choice question with answers – categorical data). In future studies, in order to compare the effect of emotional response to wildlife on pro-environmental behavior, both categories should be expressed as the same question-type (e.g. 5-point likert-scale). In the future studies it would be effective to get the overall index of pro-environmental behavior intention out of questions about different behaviors. In order to do that, we should formulate the question differently, asking all questions on a 5-point likert-scale, which is easier to compare than the categorical data of behavior in our study.

When testing how likely we could convert watchers into doers, we assumed that price and duration would be limiting factors for joining the eco-tourism course. However, our results show that time was more limiting than money. Interestingly, time was a limiting factor for all the offered programmes, regardless of their duration (hands-on activity - 2 hours, workshop - half a day or eco-tourism programme - 10 days). We suspect that this was due to the fact that many respondents were on the end of their holiday and did not have any time left to join any more programmes while on Lošinj. We wanted to investigate whether 10 days of the eco-tourism programme was too much time for watchers to set aside for contributing to dolphin conservation. As defined before, watchers are visitors who, whilst on holiday, may partake in an eco-tourism programme for a period of up to several hours, but the eco-tour itself is not the primary goal of the holiday. Doers, on the other

hand, are ecotourists whose primary goal is to contribute towards the environment and nature conservation while on their holiday. We suspect that many respondents misunderstood the question about price and duration. If the question was formulated differently: 'I would return to Lošinj to take part in the programme…', we would avoid this misunderstanding. Money was a limiting factor for joining the ecotourism course only for 31% of respondents This was opposite to our expectations that the more participants would state that eco-tourism course would 'take too much money', than 'too much time'. Potentially there was a protest vote for time because some participants did not want to recognize money as an issue, so they voted time instead.

# 6. Conclusion

The general conclusion is that both dolphin observation programmes have a positive effect on inducing pro-environmental attitudes and behavior which contribute to the conservation of the bottlenose dolphin population in the Adriatic.

Specific conclusions connected to our hypotheses are:

1. Doers are more motivated by contributing to dolphin conservation when joining the programme than watchers. Both doers and watchers are highly motivated by the fact that they will see the dolphins in their natural environment.

2. Both programmes had a positive effect on pro-environmental attitudes and pro-environmental behavior intention. However, doers did not exhibit bigger changes in pro-environmental attitudes and behavior intention as expected. The overall effect of both programmes on pro-environmental attitudes and behavior intention of doers and watchers was similar. Even though watchers programme required less engagement through much shorter period, positive effect on pro-conservation behavior intention was evident.

3. The correlation between emotional response and pro-environmental behavior intention was not found.

4. After the programme, watchers were interested to get further involved in dolphin conservation, being interested in joining hands-on activities and workshops (both 36%) and the eco-tourism course (41%) organized by the Blue World Institute.

5. Both price and duration of the programmes are the limiting factors preventing watchers from joining further in dolphin observation programmes, particularly the eco-tourism course (doers programme). Among the watchers that were interested in further engaging (converting to doers), 46% stated they would not have enough time to join (we assume that they did not consider coming back to Lošinj to participate in the course) and 31% stated that the price of the course would be the limiting factor.

6. The dolphin observation programme inspired a certain amount of doers to engage further in dolphin conservation, through undertaking a similar programme with another organization (65% agreed), but less through repeating the ecotourism course again with the Blue World Institute (46% agreed). 9 respondents stated that the programme inspired them to consider a career change towards biology or environmental sciences.

# 7. Literature

## 7.1. List of publications


Ajzen, I., 1991. The theory of planned behaviour, Organizational Behavior and Human Decision Processes 50 (2), 179–211.

Apps, K., Dimmock, K., Huveneers, C., 2018. Turning wildlife experiences into conservation action: Can white shark cage-dive tourism influence conservation behaviour? Marine Policy 88, 108–115.

Ballantyne, R., Packer, J., Sutherland, L.A., 2011. Visitors' memories of wildlife tourism: Implications for the design of powerful interpretive experiences. Tourism Management 32, 770–779.

Barnett, L., Carter, E., 2017. The discerning traveller and sustainable tourism in ASEAN - a critique Phranakhon Rajabhat Research Journal (Humanities and Social Sciences) 12 (2), 261-273.

Bearzi, G., Politi, E., Notarbartolo di Sciara, G., 1999. Diurnal behaviour of free-ranging bottlenose dolphins in the Kvarnerić. Marine Mammal Science, 15 (4), 1065–1097.

Beaumont, N., 2001. Ecotourism and the conservation ethic: recruiting the uninitiated or preaching to the converted? Journal of Sustainable Tourism 9, 317–341.

Cheng, I.N.Y., Cheung, L.T.O., Chow, A.S.Y., Fok, L., Cheang, C.C., 2018. The roles interpretative programmes in supporting the sustainable operation of the nature-based activities. Journal of Cleaner Production 200, 380–389.

Ducarme, F., Luque, G.M., Courchamp, F., 2013. What are "charismatic species" for conservation biologists? Master thesis, CNRS, Université Paris XI, Paris.

Fletcher, S., Potts, J., 2007. Ocean Citizenship: An emergent geographical concept. Coastal Management 35, 511–524.

Fortuna, C.M., 2007. Ecology and conservation of bottlenose dolphins (*Tursiops truncatus*) in the North-Eastern Adriatic Sea. PhD thesis, University of St Andrews, St Andrews.

Fortuna, C.M., Cañadas, A., Holcer, D., Brecciaroli, B., Donovan, G.P., Lazar, B., Mo, G., Tunesi, L., Mackelworth, P.C., 2018. The coherence of the European Union marine Natura 2000 network for wide-ranging charismatic species: A Mediterranean case study. Frontiers in Marine Science 5, 356.

García-Cegarra, A.M., Pacheco, A.S., 2017. Whale-watching trips in Peru lead to increases in tourist knowledge, pro-conservation intentions and tourist concern for the impacts of whale-watching on humpback whales. Aquatic Conservation: Marine and Freshwater Ecosystems 27 (5), 1011-1020.

Higginbottom, K., 2004. Wildlife tourism: An introduction. In: Higginbottom K (ed) Wildlife tourism: impacts, management and planning. Common Ground Publishing Pty Ltd, Altona.

Hill, J., Woodland, W.,Gough, G., 2007. Can visitor satisfaction and knowledge about tropical rainforests be enhanced through biodiversity interpretation, and does this promote a positive attitude towards ecosystem conservation. Journal of Ecotourism 6, 75–85.

Hughes, K., 2013. Measuring the impact of viewing wildlife: do positive intentions equate to long-term changes in conservation behaviour? Journal of Sustainable Tourism 21 (1), 42–59.

Jacobs, M. H., Harms, M., 2014. Influence of interpretation on conservation intentions of whale tourists. Tourism Management, 42, 123-131.

Littlefair, C.,Buckley, R., 2008. Interpretation reduces ecological impacts of visitors to world heritage site. AMBIO: A Journal of the Human Environment, 37 (5), 338-341.

Marsili, L., Focardi, S., 1997. Chlorinated hydrocarbons (HCB, DDTs and PCBs) levels in cetaceans stranded along the Italian coast: An overview. Environmental Monitoring and Assessment 45 (2), 129–180.

Nimak-Wood, M., Pleslić, G., Rako, N., Mackelworth, P., Holcer, D., Fortuna, C.M., 2011. Presence of a solitary striped dolphin (*Stenella coeruleoalba*) in Mali Lošinj harbor, Northern Adriatic Sea, Croatia. Vie Milieu – Life and Environment 61 (2), 87-93.

Plesić, G., Rako, N., Mackelworth, P.C., Wiemann, A., Holcer, D., Fortuna, C.M., 2015. The abundance of common bottlenose dolphins (*Tursiops truncatus*) in the former special marine reserve of the Cres-Lošinj Archipelago, Croatia. Aquatic Conservation Marine and Freshwater Ecosystems 25.

Pough, F.H., Janis, C.M., Heiser, J.B., 2009. Vertebrate Life, 8th Edition. Pearson Education Inc., San Francisco.

Rako, N., Fortuna, C.M., Holcer, D., Mackelworth, P., Nimak-Wood, M., Pleslić, G., Sebastianutto, L., Vilibić, I., Wiemann, A., Picciulin, M., 2013. Leisure boating noise as a trigger for the displacement of the bottlenose dolphins of the Cres–Lošinj archipelago (northern Adriatic Sea, Croatia). Marine Pollution Bulletin 68, 77–84.

Rako-Gospić, N., Radulović, M., Vučur, T., Pleslić, G., Holcer, D., Mackelworth, P., 2017. Factor associated variations in the home range of a resident Adriatic common bottlenose dolphin population. Marine Pollution Bulletin 124, 234–244.

Sander, B., 2012. The importance of education in ecotourism ventures: lessons from Rara Avis ecolodge, Costa Rica. International Journal of Sustainable Society 4, 389.

Simberloff, D., 1998. Flagships, umbrellas, and keystones: is single-species management passe in the landscape era? Biol Conserv 83 (3), 247–257

Skibins, J.C., Powell, R.B., Hallo, J.C., 2013. Charisma and conservation: charismatic megafauna's influence on safari and zoo tourists' pro-conservation behaviors. Biodiversity and Conservation 22, 959–982.

Weaver, D.B., 2001. Ecotourism as mass tourism: contradiction or reality? The Cornell Hotel and Restaurant Administration Quarterly 42, 104–112.

Wells, R., Scott, M., 2002. Bottlenose dolphins, in: Encyclopedia of marine mammals. Academic Press, San Diego, 122–128.

## 7.2. Internet sources

Animal Diversity Web Contributors, 2014. Delphinidae. Animal Diversity Web. Accessed 16 May 2019, <https://animaldiversity.org/accounts/Delphinidae/>

Blue World Institute, 2019. Common Bottlenose Dolphin. Blue World Institute of Marine Research and Conservation. Accessed 16 May 2019,

< https://www.blue-world.org/conservation/species/cetaceans/bottlenose-dolphin/>

Blue World Institute, 2019. Blue World Limited. Blue World Institute of Marine Research and Conservation. Accessed 16 May 2019, <https://www.blue-world.org/about-us/blue-world-limited/>.

Blue World Institute, 2019. Code of conduct, Blue World Institute of Marine Research and Conservation. Accessed 15 May 2019, <https://www.blue-world.org/conservation/dolphin-conservation/code-of-conduct/>.

Blue World Institute, 2019. Diet. Blue World Institute of Marine Research and Conservation. Accessed 30 May 2019, <https://www.blue-world.org/research/research-methods/diet/>.

Blue World Institute, 2019. Eco-Volunteer. Blue World Institute of Marine Research and Conservation. Accessed 16 May 2019, <https://www.blue-world.org/get-involved/eco-volunteer/>.

Blue World Institute, 2019. Species. Blue World Institute of Marine Research and Conservation. Accessed 21 May 2019, <https://www.blue-world.org/conservation/species/>.

Ellis, E.J., Poor, A., 2014. Cetacea. ADW Animal Diversity Web. Accessed 16 May 2019, <https://animaldiversity.org/accounts/Cetacea/>.

Newsome, D., Dowling, R.K., Moore, S.A., 2005. Wildlife Tourism. Aspects of tourism 24. Accessed 10 May 2019, <https://books.google.hr/books?id=ral_pGRWutsC&printsec=copyright#v=onepage&q&f=false >

Wikipedia Contributors, 2019a. Baleen whale. Wikipedia. Accessed 16 May 2019, <https://en.wikipedia.org/wiki/Baleen_whale>.

Wikipedia Contributors, 2019b. Toothed whale. Wikipedia. Accessed 16 May 2019, <https://en.wikipedia.org/w/index.php?title=Toothed_whale&oldid=884486247>.

World Travel & Tourism Council (WTTC), 2012. The Comparative Economic Impact of Travel & Tourism. Accessed 17 May 2019. <https://www.wttc.org/economic-impact/benchmark-reports/the-comparative-economic-impact-of-travel-tourism/>.

## 7.3. Image sources

Blue World Ltd., 2018. Gallery. Blue World Ltd., Lošinj, Croatia, accessed 23 May 2019,< https://www.dolphin-watching.com/gallery/>.

Blue World Institute of Marine Research and Conservation, 2019. Eco-volunteer. Blue World Institute, Lošinj, Croatia, accessed 23 May 2019, <https://www.blue-world.org/get-involved/eco-volunteer/>.

Blue World Institute of Marine Research and Conservation, 2019. Common Bottlenose Dolphin. Blue World Institute, Lošinj, Croatia, accessed 20 May 2019, <https://www.blue-world.org/conservation/species/cetaceans/bottlenose-dolphin/ >.

López Marulanda, J., 2018. Schematic Illustration of a dolphin's head anatomy. Acoustic Communication and Social Behavior in Bottlenose Dolphins (*Tursiops truncatus*). PhD thesis, University Paris-Saclay at the Paris-Sud University, Paris.

# 8. Curriculum vitae

Kora Dvorski

Address: Tina Ujevića 10, 10 000 Zagreb
E-mail: koradvor@gmail.com
Date of birth: 9 April 1994

**Education:**

1. Department of Biology, Faculty of Science, University of Zagreb
   **Master of Science in Ecology and Nature Protection, marine module**
   Date: September 2016 – July 2019

2. University of Primorska, Faculty of Mathematics, Natural Sciences and Information Technologies
   **CEEPUS exchange at the Master of Nature Protection**
   Completing The Human Dimension in Conservation Sciences course
   Date: March 2018

3. University of Algarve, Portugal
   **Erasmus+ student exchange at the Master of Marine Biodiversity and Conservation (EMBC+)**
   Date: February 2017 – July 2017

4. Department of Biology, Faculty of Science, University of Zagreb
   **Bachelor of Science in Biology, *cum laude***
   Thesis 'The Role of Symbiosis in Evolution'
   Date: September 2013 – September 2016

5. XV Gymnasium – MIOC, Zagreb
   Date: September 2009 – July 2013

6. Music school Elly Bašić, Zagreb
   Completed higher musical education, graduation in guitar
   Date: September 2002 – July 2013

**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: July – September 2018

2. Group for marine biology, Biology students association BIUS, Zagreb
   **Group leader**
   Organizing and conducting projects 'Underwater biodiversity of Silba Reefs', 'Mariculture 2018' and 'Eco-action Puntamika'
   Organizing project financing, workshops, lectures and cooperation with expert associations such as Sunce Split, WWF Adria and Marine Explorers Society '20000 Leagues' and companies such as Cromaris and Lush Croatia
   Date: September 2017 – February 2019
   **Active member**
   Date: October 2013 -
3. Marine Explorers Society '20000 Leagues', Zadar
   **Active member**
   Date: May 2015 –

Research projects:

University of Lausanne, Switzerland
**Summer Undergraduate Research Programme**
Research in the field of phylogenetics, ecology and evolution, mentor: prof. Nicolas Salamin
Date: July 2015 – August 2015

Laboratory professional training:

1. University of Algarve, Portugal
   **Fish ecophysiology,** mentor: prof. Peter Hubbard
   Investigating olfaction of tilapia and its response to heavy metals in water (*Oreochromis mossambicus*) using electro-olfactogram (EOG)
   Date: June 2017 – July 2017

2. 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

Scientific meetings:

1. AdriBioPro2019, Kotor, Montenegro
   Presentation: 'Underwater biodiversity of Silba reefs'– first author
   Date: 7 – 10 April 2019

2. Summer Undergraduate Research Programme, University of Lausanne, Switzerland
   Poster: 'Changes in opsin genes as a result of different light conditions. Connecting vision with the radiation of reef and freshwater fish' – first author
   Date: 28 August 2015

**Personal skills:**

Foreign languages:

| | understanding | | speaking | | writing |
|---|---|---|---|---|---|
| | listening | reading | interaction | production | |
| English | C1 | C1 | C1 | C1 | C1 |
| Portuguese | A1 | A1 | A1 | A1 | A1 |

(A1 – basic user; C1 –proficient user)

Computer literacy:

- MS Office (Word, Excell, Access, Power Point) – proficient user
- qGIS – basic user

Diving skills: active diver

- Diving certificate GUE Fundamentals-Rec and 32% Nitrox (GUE - Global Underwater Explorers)
  Date: June 2017
- SCUBA diver CMAS R*, Date: July 2014