

UNIVERZA NA PRIMORSKEM

FAKULTETA ZA MATEMATIKO, NARAVOSLOVJE IN
INFORMACIJSKE TEHNOLOGIJE

MAGISTRSKO DELO

(MASTER THESIS)

POTENCIAL ZA USTANOVITEV ČEZMEJNEGA
MORSKEGA ZAVAROVANEGA OBMOČJA V
PIRANSKEM ZALIVU IN OKOLICI, SEVERNI JADRAN

(THE POTENTIAL FOR ESTABLISHING A
TRANSBOUNDARY MARINE PROTECTED AREA IN
PIRAN BAY REGION, NORTHERN ADRIATIC)

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INFORMACIJSKE TEHNOLOGIJE

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(Master thesis)

**Potencial za ustanovitev čezmejnega morskega zavarovanega območja v
Piranskem zalivu in okolici, Severni Jadran**

(The potential for establishing a transboundary marine protected area in Piran Bay region,
Northern Adriatic)

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Študijski program: Varstvo narave, 2. stopnja

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Koper, november 2015

Ključna dokumentacijska informacija

Ime in PRIIMEK:

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Naslov zaključne naloge:

Preučevanje potenciala za ustanovitev čezmejnega morskega zavarovanega območja v Piranskem zalivu in okolici, Severni Jadran

Kraj: Koper

Leto: 2015

Število listov: 68 Število slik: 2 Število preglednic: 4

Število prilog: 2 Število strani prilog: 7

Število referenc: 112

Mentor: Doc. dr. Peter Mackelworth

UDK: 502/504 (043.2)

Ključne besede:

Piranski zaliv, morsko zavarovano območje, čezmejno ohranjanje narave, NATURA 2000, *Tursiops truncatus*, *Caretta caretta*, družbene razsežnosti, čezmejno sodelovanje, načrt upravljanja

Povzetek:

V Piranskem zalivu in okoliških vodah, ki si ga delita Slovenija in Hrvaška, so prisotni kritični habitatni tipi in ogrožene vrste, ki redno prečkajo državne meje in pristojnosti. Kljub temu se učinkoviti varstveni ukrepi na tem območju ne izvajajo oziroma so pomankljivi. Preko interjujev s ključnimi eksperti sem ocenil primernost območja za varovanje upoštevajoč objavljene biološke in ekološke študije. Poudarek sem namenil tudi družbenim značilnostim regije: ključnim deležnikom, lokalnim, regijskim in državnim oblastem ter relevantnim organizacijam. Rezultat magistrskega dela je utemeljitev razlogov za ohranjanje narave in koraki potrebni, da se ustanovi mednarodno morsko zavarovano območje, ki bo združilo ohranjanje narave s trajnostnim razvojem.

Key words documentation

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Title of the final project paper:

Investigating the potential for establishing a transboundary marine protected area in Piran Bay region, Northern Adriatic

Place: Koper

Year: 2015

Number of pages: 68

Number of figures: 2

Number of tables: 4

Number of appendix: 2

Number of appendix pages: 7

Number of references: 112

Mentor: Assoc. Prof. Peter Mackelworth, PhD

UDK: 502/504 (043.2)

Keywords:

Piran Bay, marine protected area, transboundary conservation, NATURA 2000, *Tursiops truncatus*, *Caretta caretta*, human dimensions, crossborder cooperation, management plan

Abstract:

Piran Bay and adjacent waters shared by Slovenia and Croatia, host critical habitats and endangered species that regularly cross borders and national jurisdictions. However effective conservation measures are lacking or are insufficient. Through interviews with key experts this thesis reviewed the biological and ecological information of Piran Bay region. Human dimensions of the region were investigated through interviews with local, regional and state authorities as well as relevant institutions and stakeholders. As a result the thesis provides a justification for conservation as well as a “roadmap” for the development of a potential Transboundary Conservation Area which would combine nature conservation with sustainable development.

ACKNOWLEDGEMENTS

There are so many people that helped me in one way or another I would like to thank that it's probably impossible not to forget someone.

First and foremost I would like to thank my family for all kinds of support they provided throughout the years. I dedicate this thesis to my little brother, a legend in the making, for all the smiles, happiness and adventures we already had and will have together.

A special thank goes to my supervisor for his patience, guidance and advices from the first scrappy manuscripts to this final version of the thesis. He is a true source of inspiration and a role model, always seeing opportunities where everybody else sees problems and obstacles.

I would like to thank all of my friends coming from Konjice, Žalec, Preddvor, Ptuj, Koper, Ljubljana, Vodnjan, Ližnjan, Pula, Belgium and many other places. Special thanks go to my crazy best friends from Zeče, Veržej, Mali Lošinj and Venezia for being there for me always. Thank you for all the support, kind words, crazy moments and adventures. Without all of you, the road to this moment would be twice harder and I think not even one quarter as funny as it was.

I would like to thank to Blue World Institute and their staff, for accepting me in their midst and giving me the chance to work with them. The experience gained there showed me the way to go in the future. I really enjoyed every sighting, no matter how big the group of dolphins was, every counted "blow" and all miles that we crossed on the sea. Thanks also to all of English speaking volunteers visiting the Blue World Institute for their proof reading contribution.

Thanks to all of the anonymous respondents for taking time out of their busy schedules. It was a great experience to meet and have a chat with all of you. Thank you for your willingness to cooperate and for all the information provided.

Thanks to everybody that was not mentioned but somehow helped me or contributed to this work in any way.

Hopefully this work will in some way contribute to the conservation of beautiful species of bottlenose dolphins and loggerhead turtles and the environment of the Northern Adriatic.

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LIST OF ABBREVIATIONS

CBD – Convention on Biological Diversity

CEC – Commission of the European Communities

EC – European Commission

EGTC – European Grouping of Teritorial Cooperation

EU – European Union

GES – good environmental status

IUCN – International Union for Conservation of Nature

MPA – Marine Protected Area

MSFD – Marine Strategy Framework Directive

PSSA - Particularly Sensitive Sea Area

SAC – Special Area of Conservation

SCI – Site of Community Importance

SPA – Specially Protected Area

SPA/BD protocol - Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean

TBCA – Transboundary Conservation Area

TBPA – Transboundary Protected Area

UNCLOS – United Nations Convention on the Law of the Sea

“The most wonderful mystery of life may well be the means by which it created so much diversity from so little physical matter. The biosphere, all organisms combined, makes up only about one part in ten billion of the earth's mass. It is sparsely distributed through a kilometre-thick layer of soil, water and air stretched over a half billion square kilometres of surface. If the world were the size of an ordinary desktop globe and its surface were viewed edgewise an arm's length away, no trace of the biosphere could be seen with the naked eye. Yet life has divided into millions of species, the fundamental units, each playing a unique role in relation to the whole” (Edward Osborne Wilson).

“Sadly, conservation-oriented research and action plans and the call for more workshops, meetings, studies, and reports risk are adding up to nothing more than “conservation on paper.” ... Is paper, and then more paper, all that governments really want from us? When will the time for action come? Are we allowing ourselves to be lost in the illusion of doing conservation while in fact we are mostly just producing conservation tools that are rarely used? ... These are fine initiatives, but only if they lead, eventually, to concrete steps that improve the status of the animals. ... Even sanctuaries and protected areas sometimes function as an excuse, as a way of allowing officials to say, “Look, we just created a new protected area—what more do you want?” But the questions we should all be asking are: Did the cetaceans living in the protected area get any benefits from the new designation? Have conservation measures actually been implemented? Has the environment improved? or Is this just one more paper park, a high-profile gesture that will be used to justify another decade of studies, meetings, and inaction?” (Giovanni Bearzi).

1 INTRODUCTION

This thesis investigates the potential to establish a Transboundary Conservation Area in the marine environment of the Piran Bay and adjacent waters shared by the Republic of Slovenia and the Republic of Croatia. It builds upon the initiative presented by Mackelworth et al. (2013).

Piran Bay hosts critical habitat types and endangered and vulnerable species recognised by international and European Union (EU) legislative framework, but currently lacks effective conservation measures.

Habitat types, such as Sandbanks slightly covered by the sea water all the time and Estuaries listed in the Habitats Directive (description below), are present in the Piran Bay. Wide ranging endangered species of marine reptiles, loggerhead sea turtle, *Caretta caretta*, frequent the waters of Eastern North Adriatic regularly (UNEP-MAP-RAC/SPA, 2014a). A small community of common bottlenose dolphins, *Tursiops truncatus*, is present throughout the year (Genov, 2011). Other species of international and regional importance are present as well (see Mackelworth et al., 2013).

Throughout the thesis the term Marine Protected Area (MPA) will be used. The MPA is described as “*a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values*” (Dudley, 2008 in Vasiljević, 2015) although alternative definitions exist as well (i. e. Agardy et al., 2003). MPAs are recognised as effective tool for conservation of habitats and endangered species (Hoyt, 2005; Agardy et al., 2003; Gubbay, 1995). However within the Northern Adriatic only 0,4% of area is covered and the designations are weak in terms of both numbers and representativeness, most covering coastal areas and none in the high seas (Turk and Odorico, 2009). Thus MPAs within Slovenian and Croatian borders are failing to meet the target set by Convention on Biological Diversity to establish a representative network of MPAs by 2020 that cover 10 percent of their territorial sea (State Institute for Nature protection of Croatia, 2015; Vidmar and Turk, 2011).

The Marine NATURA 2000 network in Slovenia is still insufficient (Ministry of the Environment and Spatial Planning of Slovenia, 2014). To fulfil state obligations under the Habitats Directive one or more NATURA 2000 sites for the conservation of common bottlenose dolphins in Slovenian Sea must be designated (Ministry of the Environment and Spatial Planning of Slovenia, 2014). Furthermore to determine areas important for conservation of loggerhead sea turtles additional research is needed (Ministry of the Environment and Spatial Planning of Slovenia, 2014). Meanwhile the Marine NATURA 2000 network in Croatia is in the process of designation. The absence of NATURA 2000

sites for loggerhead sea turtles in the whole territorial sea of Croatia and for common bottlenose dolphins in the offshore areas still needs to be addressed (Plavac, 2015).

Thus, the first part of the thesis will provide the biological and ecological information for the area through a literature review. Furthermore emphasis will be invested in identifying threats and disturbances caused by anthropogenic activities in the region. This information will be examined through the interviews with key experts in the region with the aim to provide justification for establishment of a Transboundary Conservation Area in Piran Bay and the development of potential conservation measures and mitigation strategies.

The second part of the thesis will investigate the human dimensions of Piran Bay region that has an interesting political situation and history of conflicts, large number of stakeholders and is intensively utilised. Views of state and local authorities, institutions and stakeholders in the region will be collected. The alternative solution of how to potentially govern and manage this shared area through a combined management body that would not undermine the border resolution process will be examined. The aim is to propose the creation of shared opportunities for sustainable direct and indirect resource use in light of the ongoing border dispute.

1.1 Overview and obligations of legislative framework

1.1.1 European Union legislation

Both Croatia and Slovenia are European Union (EU) member states and are legally bound to implement the EU legislative framework in the form of policies, directives and regulations. There are three directives and one regulation that are particularly applicable to this thesis:

- The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, from now on referred to as Habitats Directive,
- The Council Directive 2009/147/EC on the Conservation of Wild Birds, from now on referred to as Birds Directive,
- The Directive 2008/56/EC of the European Parliament and of the Council Establishing a Framework for Community Action in the Field of Marine Environmental Policy, from now on referred to as Marine Strategy Framework Directive (MSFD),
- Regulation (EC) No 1082/2006 of the European Parliament and of the Council of 5 July 2006 on a European Grouping of Territorial Cooperation (hereafter EGTC).

The Habitats and Birds Directives together set the standard for nature conservation and enable EU Member States to work together within a strong legislative framework. The output of the two directives, in terms of spatial conservation, is the NATURA 2000 network. This is a coherent ecological network for conservation of species and habitat types important at EU level, consisting of Specially Protected Areas, Special Areas of Conservation (hereafter SPA and SAC respectively). Prior to the SAC designation, the member states propose potential sites to the European Commission referred to as Sites of Community Importance (SCIs).

The Habitats Directive was adopted in 1992 by EU governments in order to ensure the survival of Europe's most endangered and vulnerable species. Protected species and habitat types are listed in different Annexes of Habitats Directive:

- Habitat types in need of conservation are listed in Annex I and require designation of SCIs to maintain their favourable conservation status,
- For species listed in Annex II core areas of their habitat, identified as SCIs, must be protected under the NATURA 2000 network and the sites managed in accordance with the ecological requirements of the species (European Commission (EC), 2015a).
- Annex III of the Habitats Directive provides the Criteria for selecting sites eligible for identification as SCI and designation as SACs,

- For species and sub-species listed in Annex IV a strict protection regime must be applied across their entire natural range within EU, both within and outside NATURA 2000 sites (EC, 2015a).
- For species and subspecies listed in Annex V Member States shall take measures to ensure that their exploitation and taking in the wild is compatible with maintaining their favourable conservation status (EC, 2015a).

The Habitats Directive defines a favourable conservation status:

- of a natural habitat as: *“The conservation status of a natural habitat will be taken as ‘favourable’ when its natural range and areas it covers within that range are stable or increasing, and the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable”* (Habitats Directive , Article 1) and
- of species as: *“The conservation status will be taken as ‘favourable’ when population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitat, and the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on long term basis”* (Habitats Directive , Article 1).

Article 6 of the Habitats Directive includes the obligation for Member States to establish the necessary conservation measures and appropriate management plans for the designated NATURA 2000 sites, if required.

The Birds Directive was first adopted in 1979. In 2009 the original Birds Directive and Annexes were updated due to enlargements of the EU. The Birds directive provides a comprehensive scheme of protection for all wild bird species occurring naturally in the EU (EC, 2015b) and places greater emphasis on the protection of the habitats:

- for both endangered and migratory bird species which are listed in Annex I of the directive, through the establishment of a coherent network of Special Protected Areas (EC, 2015b)
- For species listed in Annex II and III, activities that directly threaten birds (i.e. destruction of nests, taking of their eggs, etc.) are banned, however hunting is recognised as a legitimate activity if a comprehensive system for the management of hunting is provided (EC, 2015b).

The Marine Strategy Framework Directive (MSFD) is the environmental pillar of Integrated Maritime Policy of the EU. The MSFD aims to achieve Good Environmental

Status (GES) of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend (European Commission, 2015c). MSFD defines GES as *»the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at the level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations«* (MSFD, Article 3).

The MSFD provides 11 qualitative descriptors which guide EU Member States in developing their Marine Strategies. Several descriptors are associated to maintaining or restoring the structure and functioning of the ecosystem, shifting focus away from single species and habitat types to whole ecosystems, thus requiring an Ecosystem Based Management approach (MSFD, Article 3).

The MSFD recognizes the establishment of NATURA 2000 sites and MPAs as important contributions to achieving GES and recommends EU member states use the existing cooperation structures in order to achieve coordination, including those under Regional Sea Conventions, covering that marine region or sub-region (MSFD, Article 4). The Adriatic Sea is recognized as a sub-region of Mediterranean region by the MSFD, for which the Convention of the Protection of Marine Environment and the Coastal Region of Mediterranean is applicable (see below).

The European Grouping of Territorial Cooperation (hereafter EGTC) was defined by the Regulation (EC) No 1082/2006 of the European Parliament and of the Council of 5 July 2006. In 2013 the clarification, simplification and improvement of the establishment and functioning of such grouping was amended by Regulation (EC) No 1302/2013 of the European Parliament and of the Council. The EGTC can serve as a tool for any aspect of territorial cooperation. Articles 8 and 9 of the Regulation (EC) No 1082/2006 give the EGTC *“a legal personality and the capacity to act on behalf of its members and the regional and local authorities of which it is composed”*. Examples of successfully upgrading informal cross-border cooperation to formal EGTCs in terrestrial and marine conservation already exist. Such examples are the Maritime Alps-Mercantour TBPA and the International Marine Park of Bonifacio (Vasiljević et al., 2015; International Marine Park of Bonifacio EGTC, 2012). In the case of the Maritime Alps-Mercantour TBPA the establishment of the EGTC resulted in additional conservation, economic and institutional benefits (Vasiljević et al., 2015)

1.1.2 International Conventions

Slovenia and Croatia are signatories to all of the major international environmental conventions, of which the Convention of the Protection of Marine Environment and the Coastal Region of Mediterranean (hereafter Barcelona Convention) is especially

applicable. The Convention on Biological Diversity and the United Nations Convention on the Law of the Sea are also important.

The United Nations Convention on the Law of the Sea (hereafter UNCLOS) is an international, legally-binding agreement that codifies the principal rules of customary international law governing the uses of the sea (Gubbay, 1995). UNCLOS recognizes different maritime zones that are subject to varying degrees of countries jurisdiction. The dispute between Slovenia and Croatia regarding the border in Piran Bay and Slovenian access to the high seas was addressed by the Permanent Court of Arbitration until recently. Associated with the dispute between the two bordering States is the Article 15¹ of UNCLOS, on which both countries are laying their claims (Figure 1).

Under the UNCLOS, the Adriatic Sea has also been proposed for designation as a Particularly Sensitive Sea Area (PSSA) (Vidas, 2006). PSSAs are marine areas that need special protection thorough action by the International Maritime Organisation because of its significance for recognised ecological or socio-economic importance, or scientific reasons (International Maritime Organisation, 2015).

Each participatory country of the Convention on Biological Diversity (hereafter CBD) is required to establish the means of conservation to protect biodiversity, which should be implemented throughout all sectors that can impact biodiversity (World Public Library, 2015). This should be achieved while ensuring sustainable use of resources, which are to be fair and equitably distributed (World Public Library, 2015). The CBD highlighted for the first time that biodiversity should be seen as a common concern of humankind (Rio Conventions Project, 2015). The CBD sets the target for contracting parties to establish a representative network of MPAs covering 10% of coastal and marine areas and no less than 17% of inland waters by 2020 (Convention on Biological Diversity, 2015). The Northern Adriatic has been recognised as an Ecologically and Biologically Significant Area under the CBD (UNEP-MAP-RAC/SPA, 2010).

Adopted originally in 1976 and amended in 1995, the Convention of the Protection of Marine Environment and the Coastal Region of Mediterranean (hereafter Barcelona Convention) consists of 7 protocols of which the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (hereafter SPA/BD protocol)(UNEP-

¹ *“Neither of the two States is entitled, failing agreement between them to contrary, to extend its territorial sea beyond the median line every point of which is equidistant from the nearest points on the baselines from which the breadth of the territorial seas of each of the two States is measured. The above provision does not apply, however, where it is necessary by reason of historic title or other special circumstance to delimit the territorial seas of the two States in a way which is at variance therewith”*(UNCLOS , Article 15).

MAP, 2015) is particularly applicable for the thesis. As a part of the SPA/BD protocol the contracting parties are:

- Required to protect, preserve and manage in a sustainable way areas of particular natural or cultural value, by the establishment of Specially Protected Areas
- Protect, preserve and manage threatened or endangered species of flora and fauna, that are listed in Annexes II and III of the Convention,
- And shall adopt strategies, plans and programmes for the conservation of biological diversity and the sustainable use of marine resources (SPA/BD protocol, Article 3).

For the species listed in Annex II of the Barcelona Convention the contracting parties are required to ensure their maximum possible protection and recovery.

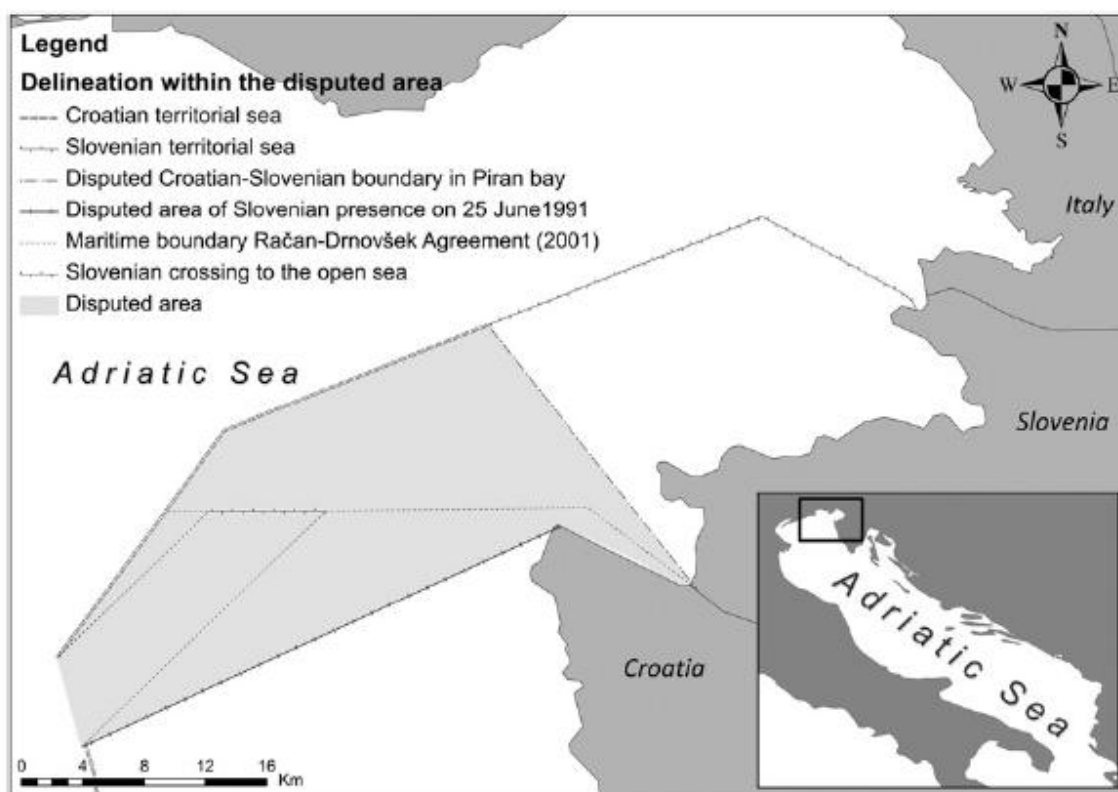


Figure 1: Map of the wider Northern Adriatic region with the disputed area of Piran Bay (Source: Mackelworth et. al, 2013)

1.1.3 National legislation

Slovenia and Croatia transposed EU directives and international conventions associated with nature protection into their Nature Conservation Acts: *Zakon o ohranjanju narave* (Official gazette of Republic of Slovenia, number 96/04) and *Zakon o zaštitu prirode* (Official gazette of Republic of Croatia 80/2013) respectively. These two acts provide the regulation for nationally designated protected areas.

Slovenian Nature Conservation Act recognises 6 categories of protected areas:

- National Park
- Regional Park
- Landscape Park
- Natural Monument,
- Strict Natural Reserve and
- Natural Reserve.

Croatian Nature Conservation Act recognises 9 categories of protected areas:

- Strict reserve,
- National park,
- Special reserve,
- Nature Park,
- Regional Park,
- Natural monument,
- Significant Landscape
- Forest Park
- Monument of Park Architecture.

The categories of protected areas in both countries differ in the strictness of conservation regimes. Not all categories of Protected Areas in Slovenia are required to have a management plan (Official gazette of Republic of Slovenia, number 96/04, article 53), while protected areas in Croatia can form cross-border connections with protected areas of neighbouring countries (Official gazette of Republic of Croatia, number 80/2013, Article 122).

The NATURA 2000 network in Slovenia is regulated by the Decree on special protection areas (NATURA 2000 areas) (Official gazette of Republic of Slovenia, number 49/04, 110/04, 59/07, 8/12, 33/13, 35/13, 39/13 and 3/14) and in Croatia by the Decree on ecological network (Official gazette of Republic of Croatia, number 124/2013).

1.1.4 Transboundary conservation

Along with increasing numbers of MPAs in the world, the number of Transboundary Conservation Areas (hereafter TBCA) has also increased in the last three decades (Vasiljević et al., 2015). Most marine ecosystems have transboundary properties as the waters and species move across political borders and national jurisdictions (IUCN WCPA, 2015). Therefore, the most effective marine conservation includes some transboundary cooperation, between neighbouring countries or across marine regions (IUCN WCPA, 2015).

Vasiljević et al. (2015) reviewed and defined three existing categories of TBCAs:

- Transboundary Protected Area is a clearly defined geographical space that consists of protected areas that are ecologically connected across one or more international boundaries and involves some form of cooperation.
- Transboundary Conservation Landscape and/or Seascape is an ecologically connected area that sustains ecological processes and crosses one or more international boundaries, and which includes both protected areas and involves some form of cooperation.
- Transboundary Migration Conservation Areas are wildlife habitats in two or more countries that are necessary to sustain populations of migratory species and involve some form of cooperation.

Additionally, a Park for Peace is a special designation that may be applied to any of the three types of TBCA and is dedicated to the promotion, celebration and/or commemoration of peace and cooperation (Vasiljević et al., 2015).

1.2 Biological and ecological information of the Piran Bay region

This thesis examines and updates the species list of conservation importance provided Mackelworth et al. (2013) through a literature review. It focused primarily on species listed in Annexes of Habitats and Birds Directive, habitat types listed in Annex I of Habitats Directive and secondarily on species listed in Annexes of Barcelona Convention. It includes the species and habitat types that are present and not currently protected by the law but that are an essential part of the biodiversity and ecological complexity in the region.

In Piran Bay, three biocenosis are associated with the habitat type Sandbanks that are slightly covered by seawater all the time (European Union Habitat type code 1110, hereafter Sandbanks) which is listed in Annex I of the Habitats Directive. In the Mediterranean the Sandbanks can be covered by *Cymodocea nodosa* together with photophilic species of algae living on the leaves of the plants or the macrophytes can be absent and the invertebrate communities of sandy sublittoral are present instead (European Commission, 2007). Sandbanks are often highly important as feeding, resting or nursery grounds for seabirds, fish or marine mammals (European Commission, 2007).

These three biocenosis' are:

- biocenosis of coastal detritic bottom,
- biocenosis of muddy detritic bottom and
- biocenosis of superficial muddy sands in sheltered waters associated with *Cymodocea nodosa* (Lipej et al., 2006).

Soft bottom invertebrate communities in the coastal area of Gulf of Trieste, including the area of Piran Bay, boast high taxa richness (Mavrič et al., 2010). At different sampling stations inside the Piran Bay the average number of identified species was 62, (ranging from 35 – 78 per sampling station)(Mavrič et al., 2010).

The biocenosis' of the rocky bottom in mediolittoral belt and biocenosis of photophilic algae in infralittoral belt were also recorded in Piran Bay (Lipej et al., 2006). These two biocenosis' are associated with *Cystoseira* species, which are listed in Annex II of Barcelona convention and are one of the most important habitat forming species in the marine environment (Gianni et al., 2013).

Four rivers and streams enter the bay as well as numerous undersea freshwater springs (Orožen Adamič, 2002) influence the saltwater properties of Piran Bay (Orlando Bonaca et al., 2012). Hence the area also potentially falls under the habitat type of an Estuary (EU habitat code 1130). At some locations in the bay biogenic structures consisting of

Cladocora caespitosa colonies resembling reef complexes (Habitat type 1170) are also present (Pitacco et al., 2014).

Common bottlenose dolphins (hereafter bottlenose dolphins), *Tursiops truncatus* (Montagu, 1821), are one of the most studied cetacean species in the world and in the Adriatic region as well (Genov, 2011, Bearzi, 2008). The conservation status of bottlenose dolphins in the Mediterranean region is considered to be vulnerable according to the IUCN criteria (Bearzi, 2012) while some local populations in the Northern Adriatic are considered to be endangered (Fortuna, 2006). Bottlenose dolphins are listed in Annex II and Annex IV of the Habitats Directive as well as Annex II of Barcelona Convention.

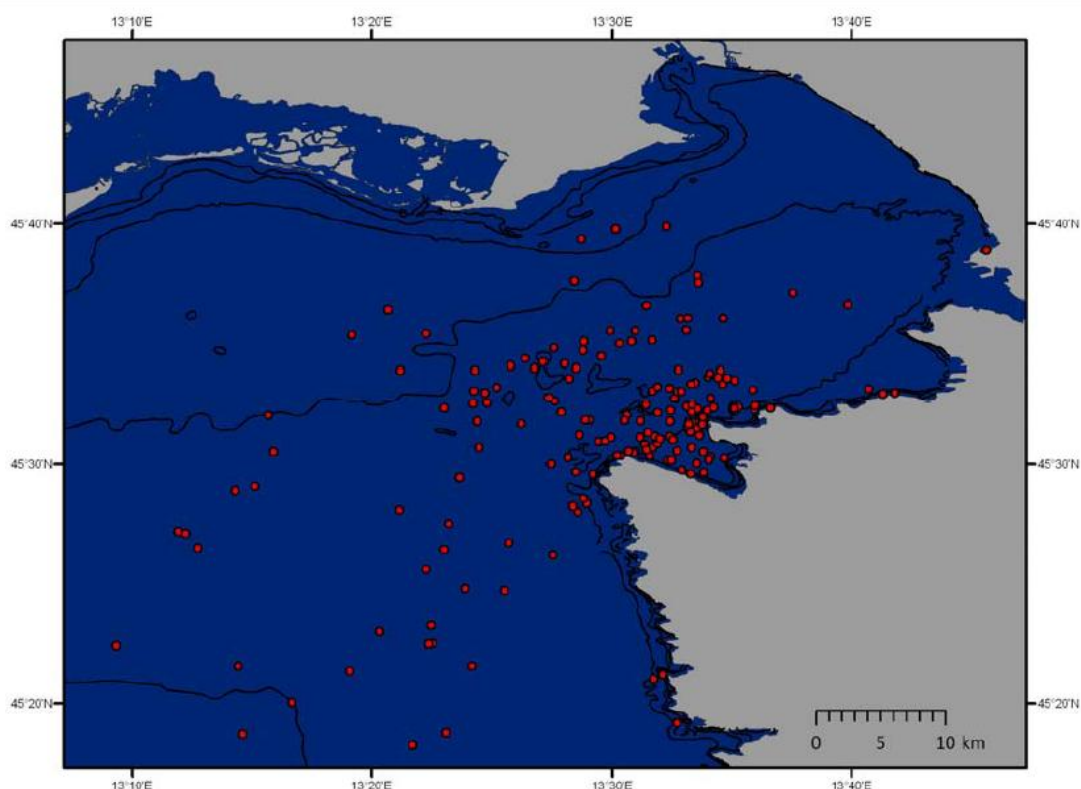


Figure 2: Sightings of the bottlenose dolphins in Piran Bay and adjacent waters (source Genov, 2011)

Genov (2011) investigated several ecological aspects of the resident community in the Gulf of Trieste and the adjacent area. The research area, including Piran Bay, spanned over approximately 1600 km² and included territorial waters of Slovenia, Italy (between Trieste and Lignano) and Croatia, (between Savudrija and Poreč) (Figure 2). Part of the research was conducted in north-east part of the international waters in Adriatic (Genov, 2011). The animals were sighted over the entire research area covered (Figure 2) (Genov, 2011).

The estimated population size was 74 animals, with 95% confidence interval 57-90 animals (Genov, 2011). A total of 150 different animals have been encountered in 2013 in the Slovenian sea (Morigenos, 2014) and juveniles are present in 54% of the encountered groups (Genov et al., 2008).

The only regularly occurring species of marine reptiles in the North Adriatic is the loggerhead sea turtle (hereafter loggerhead turtle), *Caretta caretta* (Linnaeus, 1758) (Lazar et al., 2004). Loggerhead turtles are considered to be endangered according to the IUCN criteria (IUCN, 2015). They are present in the Gulf of Trieste in the warm part of the year between May and October (Lazar et al. 2003), and while most animals migrate south due to the low winter sea temperatures, some remain present in the area during the winter (Casale et al., 2012). This area is an important feeding habitat for all developmental stages of the loggerhead turtle but it is especially important for feeding and development of juveniles that belong to Greek nesting population (Lazar et al., 2011, Lazar and Žiža, 2010). Loggerhead turtles are sighted relatively often in the area, with more sightings in the open waters rather than in the coastal areas (Morigenos, 2014). A population abundance estimate for the Northern Adriatic places their number at more than 50,000 (UNEP-MAP-RAC/SPA, 2014a). Loggerhead turtles are listed in Annexes II and IV of Habitats Directive and in Annex II of Barcelona Convention.

The Common European shag, *Phalacrocorax aristotelis desmarestii* (Linnaeus, 1761) is an endemic subspecies of *P. aristotelis* (Nelson, 2005, in Bird Watching and Bird Study Association of Slovenia, 2015) and is present throughout the Mediterranean and Black seas. The area of Gulf of Trieste represents an important feeding ground for the colonies that breed on Croatian islands and subsequently migrate to non-breeding areas in the region (Sponza et al., 2013). Piran Bay itself is not considered to be important for feeding (Bird Watching and Bird Study Association of Slovenia, 2015), but the fish farm inside the bay offers an important roost site in the Northern Adriatic region (Bordjan et al., 2013). Although the species is not included in the IUCN red list, it is listed in Annex I of Birds Directive and in Annex II of Barcelona Convention, due to their limited distribution range and decline in population abundance (Bird Watching and Bird Study Association of Slovenia, 2015).

Species from the *Cystoseira* genus are some of the most important marine ecosystem-engineers (Gianni et al., 2013). Their forests increase three-dimensional complexity and spatial heterogeneity of rocky bottoms, providing refuge and food for many invertebrates and fishes at different life stages (Gianni et al., 2013; Orlando Bonaca et al., 2008).

Another important habitat forming species present is the date mussel, *Lithophaga lithophaga* (Lipej et al., 2006). It's harvesting, despite strictly regulated or banned, is ongoing and causes significant habitat degradation, changes in fish assemblages (Guidetti

et al., 2004) and indirectly promotes the increase in abundance of sea urchins. This results in hampered recovery of the rocky reefs due to unselective grazing (Guidetti, 2011).

The fan shell, *Pinna nobilis*, the largest bivalve found in Mediterranean, is present as well. It can attain lengths of up to 120cm and the shell provides a hard substrate utilised by variety of epibionts in an otherwise sedimentary soft bottom environment (Šiletić and Peharda, 2003).

Contributing to the spatial heterogeneity of rocky and sandy bottoms in the region is the Mediterranean stony coral, *Cladocora caespitosa*. Dead corallites and coralline algae create a secondary hard bottom, where *C. caespitosa* can grow with its associated fauna creating unique communities (Pitacco et al., 2014).

There is little data available on population structure and dynamics for the whole distributional range of *Hippocampus hippocampus* and *H. guttulatus* (Gristina et al., 2015). However, the Northern Adriatic is considered to have the greatest abundance of these two seahorse species compared to the other Adriatic regions (Goffredo et al., 2004).

Piran Bay is seasonally occupied by commercially important fish species, such as European seabass (*Dicentrarchus labrax*), European anchovy (*Engraulis encrasicolus*), common pandora (*Pagellus erythrinus*), gilt-head bream (*Sparus aurata*), golden grey mullet (*Liza aurata*) and common sole (*Solea solea*) among others (Pengal, 2013). Due to geomorphologic and oceanographic properties this area represents one a spawning ground in the Northern Adriatic for the above mentioned species. For that reason the Portorose Fisheries Reserve has been established in 1978 in the inner part of the bay (Decree of Marine Fisheries, 1978 in Pengal, 2013). Leisure and commercial fishing are banned, with the exception of winter harvest of the golden grey mullet, which is allowed by the special permit from the responsible ministry (Marine Fisheries Act of Slovenia, Official gazette of Republic Slovenia, number 115/06).

1.3 Threats, disturbances and stressors

Norse and Crowder (2005) identified 5 general threats to the marine environment: overexploitation, physical alteration, pollution, alien species and climate change. These are driven by overpopulation, excessive resource use, insufficient understanding, undervaluing and inadequate institutions.

Threats in the Adriatic can be considered at a broad or regional scale or at a small or local scale. Broad scale threats include pollution from rivers and cities, commercial shipping and associated ballast water discharges, oil and gas exploration and drilling, etc. Small scale threats include fishing, disturbance by leisure boats, coastal development, etc.

The main sources of pollution in the North Adriatic region are discharges from rivers Po and Isonzo. Other sources of pollution are discharges from coastal cities and ships (Giani et al., 2012). Plastic debris and microplastics are increasing threats especially for large marine vertebrates (Lazar and Gračan, 2011) due to possible entanglement or ingestion. Another major source of pollution are heavy metals, mostly mercury, derived from the mercury mine in Idrija and discharged from the Isonzo. Heavy metals are stored in the sediments and are released from it by the processes of sediment resuspension, caused by different natural processes and anthropogenic activities (Hace, 2011). In the past, the levels of heavy metals in local seafood were so high that it was considered to be dangerous for human health (Ramšak, 2012). Discharges from rivers contained high levels of nutrients (phosphorus, nitrates), causing increased primary production and algal blooms (Giani et al., 2012). In turn, when the algae died they caused hypoxic and even anoxic environments (Giani et al., 2012).

Commercial shipping is another anthropogenic activity that has a negative effect on the environment. Ballast water discharges are a source of transference of alien species, such as *Codium fragile subsp. fragile*, *Mnemiopsis leydyi* and *Crassostrea gigas* (Lipej and Mavrič; in Jogan, 2012) among many others. Some of them are considered to be invasive species. Shipping causes sediment re-suspension and increased sedimentation resulting in lower transparency of the water and limited spatial distribution of algae and seaweeds (Orlando Bonaca et al. 2012). Due to the fact that the Adriatic Sea is semi enclosed and the water exchange with Mediterranean Sea is low, potential shipping accidents can be considered as a major threat to the environment (Vidas, 2006). Adding to the problem are the planned oil and gas exploration and drilling activities in the Croatian territorial waters.

Fishing in the North Adriatic has a long history. The use of different fishing techniques, such as bottom trawling, static nets and purse seiners by large scale commercial fisheries has increased the negative impacts to marine environment (UNEP-MAP-RAC/SPA, 2014b). The total landings of commercial capture fisheries, excluding bivalve molluscs and aquaculture, peaked in 1981 (220000 tonnes) and declined in the next decades, falling to 110000 tonnes in 2000 according to Mannini et al. (2005). UNEP-MAP-RAC/SPA (2014b) reports a peak in catches of all marine species in the beginning of the 1980s around 250000 tonnes per year and then a drop to around 150000 tonnes per year in the 1990s. Total catch of marine species in Adriatic from the beginning of 1990s to 2010 remained around 150000 tonnes per year (UNEP-MAP-RAC/SPA, 2014b).

According to UNEP-MAP-RAC/SPA (2014b) report:

- The commercial fishing fleet of Slovenia is composed of 20 bottom trawlers and 9 purse seiners targeting mainly small pelagic species, the only pelagic pair trawler ceased to operate in 2012.

- The commercial fishing fleet of Croatia is composed of 800 bottom trawlers and 400 purse seiners targeting mainly small pelagic species, there are no pelagic pair trawlers registered.

There are 58 different fishing tools recorded to be used in Croatian part of Adriatic, mostly in the coastal areas (less than one mile from the nearest coast) (Cetinić et al., 1999 in Dulčić et al., 2003). Artisanal fisheries in Croatia consist of small scale commercial fishers and subsistence fishers, the fleet is composed mostly of multipurpose vessels smaller than 10 metres (Matić-Skoko et al., 2011). The main fishing tool used in west Istria in the winter period are trammel nets of smaller height (Matić-Skoko et al., 2011).

The direct effect of fishing on large marine vertebrates is increased mortality, for not targeted species known as bycatch (Norse and Crowder, 2005). Lazar et al. (2006) estimated that minimum of 468 loggerhead turtles are caught by gillnet fisheries in North Adriatic with 74% mortality rate. When multipurpose vessels in the area are considered as well, the number of caught turtles is estimated at 4035 captures per year suggesting a significant conservation concern for loggerhead turtles in the region (Lazar et al., 2006). Fortuna et al. (2010) reported:

- 80 loggerhead turtles (1 dead, 79 released), by-catch rate 0.0276,
- 3 bottlenose dolphins (2 dead, 1 released), by-catch rate 0.0007,
- 504 rays, by-catch rate 0.1739 and
- 502 sharks, by-catch rate 0.1732,

caught in the pair trawlers in the Northern Adriatic in the period between 2006 and 2008.

Indirect effects of fishing are a reduction in biomass or abundance of prey species, leading to decreased amounts of food in the environment and potential trophic cascades that have an ecosystem wide impact (Norse and Crowder, 2005). In the Northern and Central Adriatic fishing is an important driving factor of the ecosystem changes and in the last three decades one of the factors causing a decrease of commercially fished species (Coll et al., 2009).

The Coastal belt of the region is subject to increased urbanization and development (Turk and Odorico, 2009) with only around 20% of the Slovenian coast still considered to be in natural state (Turk, 1999 in Orlando Bonaca et al., 2012). More than 400,000 people live in the coastal cities of the Gulf of Trieste (Hace, 2011) and this is expected to grow in the coming decades (Peterlin et al, 2013). The degree of alteration and degradation of the coastal zone in the Southern part of the bay is lower compared to the Northern part, due to less and smaller coastal cities.

With over 50,000 moorings yearly in the local marinas, leisure boat traffic represents one of the main localised disturbances in the region (Turk and Odorico, 2009). Oil and gas spills, underwater noise and increased chances of collisions with cetacean and sea turtles are to be mentioned (Turk and Odorico, 2009). Underwater noise is particularly problematic for bottlenose dolphins. It increases stress and can cause behavioural changes, difficulties in finding food, difficulties in communication, temporary or permanent hear loss and avoidances of areas with higher noise pollution levels (Morigenos, 2014; Rako, 2013).

1.4 Aims and objectives

Based on the information provided above this study aims to address the following questions:

1. Is the region of Piran Bay and the adjacent waters an important habitat for species of conservation concern, such as *Caretta caretta* (loggerhead sea turtle), *Tursiops truncatus* (common bottlenose dolphin) and *Phalacrocorax aristotelis desmarestii* (European shag) and other species of importance through analysis of existing biological information?
2. Is the area representative of the Northern Adriatic Sea and does it meet the ecological criteria for the designation of NATURA 2000 under the Habitats Directive (92/43/EEC) or Birds Directive (79/409/EEC) in Slovenia and Croatia?
3. What are the conservation measures and protection regimes required for maintaining the conservation status of the region taking into account the threats, pressures and disturbances present?
4. How do the authorities, institutions and stakeholders perceive a new initiative for the establishment of a NATURA 2000 sites and/or Transboundary Conservation Area in the region? What are the potential problems expected to arise in the process?
5. Can a newly designated NATURA 2000 provide a basis for the establishment of a TBCA – International Marine Peace Park (IMPP)? Is there institutional interest and political will to support the designation?

1.5 Hypothesis

Taking into account the information collected through the literature review and consultation with the supervisor Dr. Peter Mackelworth the following hypothesis were developed and will be examined throughout the thesis:

- HYPOTHESIS 1

I expect that there is enough scientific data to provide justification for the designation of a Transboundary Marine Conservation Area in the region of Piran Bay and adjacent waters on both sides of the national border.

- HYPOTHESIS 2

I expect that there is institutional interest and political will to further develop the TBCA project.

- HYPOTHESIS 3

I expect that authorities, institutions and local stakeholders will support the TBCA project providing there is an opportunity for their input into the project.

2 MATERIALS AND METHODS

2.1 Literature review

A review of the primary literature about the region provided background information on the presence and distribution of species and habitat types. Focused sampling was then used to identify the institutions and stakeholders to be included in the study, and involved in the possible process of designation of any potential NATURA 2000 sites and/or the TBCA. The following literature provided the basis for the review:

- Mackelworth et al., 2013;
- Genov, 2011;
- Vidmar and Turk, 2011;
- Turk and Odorico, 2009;
- Lipej et al., 2006;
- Berginc, 2006;
- Ministry for Environment, Spatial Planning and Energy of Slovenia, 2003.

Respondents were identified and chosen to ensure that all interest groups were represented and included based on the literature review. The appropriateness of initial respondents was confirmed in cooperation with supervisor Dr. Peter Mackelworth and Dr. Bojan Lazar.

2.2 Survey method

In order to fulfil the aims of the research, an understanding of the respondents views and experiences was required. Therefore, qualitative methods of data collection were chosen (Strauss and Corbin, 1998). Data was collected through conducting a series of semi-structured interviews as described in Berg (2001) with representatives of the previously identified institutions and stakeholder groups. Semi-structured interviews are described as ‘conversations with a purpose’ enabling the researcher to address a number of issues or topics of interest (Marshall and Rosman, 1999). The interviewees are allowed to frame and structure their responses, free to develop ideas and speak widely on the issues raised (Denscombe, 2003).

Each respondent was contacted via formal e-mail or telephone call. Whenever possible, the interviews were conducted in person. In one case the interview was conducted via Skype and in one instance the respondent returned a written response via e-mail. Interviews were

conducted in Slovenian and Croatian language. Based on agreement with respondents, their identities will not be revealed.

2.3 Survey design

Prior to the interview a copy of the original concept paper (Mackelworth, et al., 2013) was provided. At the beginning of an individual interview the aims and objectives of the study were shortly presented so that a context between the study and the interviewees work or area of expertise could be established. Efforts were made to be polite, receptive and neutral in order to encourage the right climate for the respondents to feel comfortable and provide honest answers (Denscombe, 2003). Discussion about the research topics followed. The interviews were recorded to ease the process of data collection and transcription.

The interview involved a number of predetermined questions divided into broader topics (Appendix A):

- The first topic addressed the biological and ecological information about Piran bay and the adjacent waters. It addressed the threats, stressors and pressures on the environment and potential conservation measures needed to address these. The viability for conservation and representativeness of the area was also discussed.
- Through the second topic the interviewees were asked to identify all the relevant stakeholders and their potential role in the development of the initiative.
- Next topic addressed the process of designation of potential transboundary NATURA 2000 site and TBCA.
- The fourth topic covered the existing transboundary cooperation as well as potential problems that could arise as part of the process.
- The last topic addressed the potential benefits of a TBCA for the region.

The final questions allowed the interviewees to suggest other relevant interviewees, a method known as of snowball sampling for identification of other potential interviewees if the sample is small (Schoon, 2008), and other literature of interest for the study. Interviewees were given the opportunity to comment the interview topics, suggest topics that were not covered and express their opinion about the initiative.

The same questions were asked of each interviewee in a systematic and consistent order, with the freedom to digress (Berg, 2001), which provided qualitative data for content analysis.

2.4 Data coding and analysis

The interviews were transcribed and were analysed manually. Due to the small number of the interviews there was no requirement to use any specialist software. Through the process of open coding, transcripts were analyzed and the main themes for categories and concepts in the data were developed (Strauss and Corbin, 1998). The process was iterative, the examinations of transcripts were repeated to re-evaluate the themes and categories (Denscombe, 2003). Examples and descriptive quotes were chosen to serve as illustrations and supporting evidence for the ideas developed and to answer main research questions (Denscombe, 2003). The themes and quotes were translated into English. Due to the fact that neither English nor Croatian is my mother tongue it is possible that there are some small variations in the translation of the texts, however the general meanings of the quotes however have not been influenced.

Sample size was determined in consultation with supervisor Dr. Peter Mackelworth and is comparable to similar studies conducted in the Adriatic region (Chase, 2014; Tonino, 2014).

3 RESULTS

During the research 44 persons were contacted with affiliations to 25 different organisations. From these, 30 responded and 20 were willing to be interviewed. After the last interview, there were 7 more respondents recommended, that were not contacted due to the time limitations of the study.

As described in materials and methods first respondents were identified based on the literature review. Other respondents were recommended by earlier interviewees. After conducting initial interviews there was a repetition in the recommendations for new contacts in institutions, stakeholders and names of recommended respondents.

Table 1: Primary affiliation of the respondents

Primary affiliation	Number of respondents	Respondents from Croatia	Respondents from Slovenia
Research organisations	9	3	6
Public sector	4	2	2
Private organisations	3	1	2
Nongovernmental organisations	2	1	1
Government representative	1		1
International organisation	1		1
Total	20	7	13

Table 2: Secondary affiliation of the respondents

Secondary affiliation	Number of respondents	Respondents from Croatia	Respondents from Slovenia
International organisation	2	1	1
Nongovernmental organisations	1		1
Local government	1	1	
Total	4	2	2

As in every study the chosen methodology has its positives and negatives. The sample size of 20 respondents may be considered as relatively small: nevertheless the majority of relevant authorities, institutions and stakeholders were included in the sample (Table 1). For the purposes of this thesis the inclusion of an equal number of representatives from both countries and from a wide range of institutional backgrounds was intended. The aim was to get a balanced perspective on the research questions. Unfortunately the ratio

between the respondents from Slovenia and from Croatia was tilted towards the Slovenian side. These results might therefore be more representative of the Slovenian perspective on the research topic, which is considered as very political in Croatia. One of the issues encountered was the reluctance of some organisations and user groups, namely representatives from fisheries and tourist boards, to cooperate in the research. The representativeness of the sample would be better if these stakeholders had consented to be included in the study. Affiliations of respondents are shown in Tables 1 and 2, some of the respondents have a secondary affiliation.

Table 3: Results for the question: Do you support the development of the TBCA?

	Total	Respondents from Croatia	Respondents from Slovenia
Yes	17	6	11
No	3	1	2

Table 4: Results for the question: Do you think the TBCA initiative has the potential to be realised?

	Total	Respondents from Croatia	Respondents from Slovenia
Yes	15	6	9
No	5	1	4

The majority of the respondents support the idea of development of a TBCA in Piran Bay (Table 3). They are of the opinion that it could bring many benefits to the region. It would also follow the vision of the EU to increase cross border regional cooperation (Regulation EC No 1082/62) and contribute to sustainable development.

Consistent with the high level of support is also the question of whether the initiative has the potential to be realised (Table 4). Different arguments, reasoning and objections have been suggested, for and against the designation. They are presented, broken down in detail and discussed below.

The analysis of the interviews has identified 6 major themes. Even though the importance of different themes was perceived differently by respondents, they are ordered in accordance with the actual process of designation of a TBCA:

- Biological evidence based framework,
- Identification and inclusion of relevant authorities institutions and stakeholders,

- Understanding regional context,
- Building on existing cross-border cooperation,
- Funding,
- Development of a management plan.

These themes are interconnected and some information will therefore be mentioned within more than one theme.

4 DISCUSSION

4.1 Evidence based framework

The overarching and the most commonly mentioned theme was the need for an evidence based framework through the presentation of consistent biological and ecological data for the area. The biological and ecological information about the area as well as a clear understanding of the natural processes should be as thorough as possible. Knowing what is there and what is happening with it is a basic prerequisite to effectively designate and manage a MPA (Alexander, 2010). Good scientific foundation is needed, because the uncertainty associated with conservation is often used as an excuse for inaction despite the adoption of the precautionary principle by most international and regional environmental agreements.

The need for an evidence based framework is widely supported by the literature. Agardy et al. (2003) argues that *“in promoting MPAs it is important that there is a good understanding of the conservation science underlying marine protection in terms of the factual foundation and long-term implications. Ignoring this may lead resource managers and policymakers to make ill-informed decisions regarding MPAs, resulting in poor MPA design and performance”*.

4.1.1 Review of biological and ecological information

While reviewing information about habitat types in Piran Bay following quotes from one Slovenian and two Croatian respondents respectively were singled out:

“Piran Bay doesn’t have any special level of biodiversity compared to other areas [of Slovenian Sea]. The Sandbanks present don’t have a spatial heterogeneity needed to support high biodiversity levels. The only exception is a patch of rocky bottom located at Piranska Punta [area near the end of the Northern peninsula defining Piran Bay, already designated as natural monument]. On the other hand we know that this area is an important spawning and nursing ground for several fish and shark species. From that perspective it is important. Another thing that I have to mention is the research effort invested into Piran Bay. It was lower compared to any other area of the Slovenian sea.”

“There has been absolutely no research effort put into mapping of the habitat types and almost no effort in any other kind of biological or ecological research in this particular area since 1970s. We proposed marine NATURA 2000 sites in Istria [Croatia] based on data we had [published prior to 2008] and we conducted several additional projects to map habitats types on East side of Istria all around the tip [of Istria] and up to Rovinj on the West side. Data for the southern part of

Piran Bay does not exist. But we plan to conduct additional research and cover this area as well in the future.”

“I would like to compare Piran Bay to Limski channel [MPA in coastal part of western Istria] or to Miramare [MPA in Gulf of Trieste, Italy]. I will point out some similarities you should consider. As Piran Bay Limski channel is utilised by mariculture and the ecotourism has been developed in recent years. The biodiversity in Limski channel is incomparably high, but that is due to the specific environmental conditions. Sedimentary muddy bottom communities have naturally lower levels of biodiversity. On the other hand Miramare encompass very similar habitat types and species as Piran Bay. It is located near Trieste [Italy] and the area surrounding it is subject to high levels of anthropogenic activities. Therefore MPA in Piran Bay in my opinion can be established, regardless relatively low biodiversity present. It can serve different purposes, i.e. to restock fish population, to have a symbolic meaning, to develop new ecotourism offers.”

From these quotes it is clear that there is an imbalance between the knowledge about the presence and status of habitat types in the southern and northern part of Piran Bay. In general the Slovenian northern part of Piran Bay has been subject to more research effort as it is a smaller overall area with a shorter coastline. In contrast the southern part of the bay has been subject to less research effort because the Croatian sea is much larger and the shoreline much longer and this region is rather peripheral compared to the important economic regions of Primorsko-Goranska and Dalmatia. Even within the Istrian county the Ruđer Bošković Institute Center for Marine Research based in Rovinj and Department of Spatial planning of Istrian County based in Pula are relatively far away from Piran Bay. The only existing source of information for the Southern part of the bay, provided by one of the Croatian respondents, is a Map of Habitats published in 2006 (States Institute for Nature Protection of Croatia, 2006). Present habitat types are classified as Circalitoral muds and Circalitoral sands, which is consistent with information available for northern part of the bay (Orlando Bonaca et al., 2012).

The habitat types present in Piran Bay are not perceived as particularly important from a biodiversity point of view by some respondents. This represents an argument against designation of a TBCA, however others believe that the TBCA could be established nevertheless as the area is representative of the broader unprotected Northern Adriatic.

From a species perspective the most important features of Piran Bay are the two species of large marine vertebrates, the bottlenose dolphins and loggerhead turtles. Both of these species are perceived as charismatic and are considered to be vulnerable and endangered respectively, thus providing the impetus for conservation action.

One of the respondents pointed out why the resident community of bottlenose dolphins in the Gulf of Trieste should be protected:

“There are several lines of evidence suggesting that this is unique community. This is the northern most community of bottlenose dolphins in the Mediterranean Sea and it appears to show strong site-fidelity to the semi-enclosed Gulf of Trieste. Recent studies [Gaspari et al., 2013] confirmed that it is genetically differentiated from other subpopulations in Adriatic Sea. Based on the comparisons of two photo ID catalogues [Morigenos, Blue World Institute that are spatially adjacent projects in Northern Adriatic] it seems that the animals do not mix between the two areas [Gulf of Trieste and Cres-Lošinj archipelago]”.

In the past a proposal to designate a marine NATURA 2000 site in Slovenian Sea for the bottlenose dolphins was submitted in 2012. Two of the respondents were involved in the process and provided data. The proposal included the whole Slovenian sea, 180km², taking into account the precautionary principle. It was rejected by the government officials based on the argument that the animals regularly cross the national borders. The two respondents were of the opinion that the main reason against the designation was that the bottlenose dolphins have a large home range and are constantly crossing the borders. One of them stated that:

“In my opinion the Slovenian Authorities did not want to act because they cannot guarantee that the species [bottlenose dolphin] will be maintained in good conservation status. The animals are crossing the [national] borders and we can do everything in our power, but if the same measures are not implemented in neighbouring countries, the status of the species can decline regardless. And the [Slovenian] Authorities will have to pay the fine for not respecting their obligations.”

Uncertainty associated with habitat use, regarding bottlenose dolphins and loggerhead turtles, was highlighted as one of the main factors, why the Slovenian authorities are reluctant to designate a marine NATURA 2000 site for these two transboundary species.

The respondents are of the opinion that if a TBCA will share the obligations between the two countries, this could partially alleviate Slovenian concerns. A TBCA could consist of two newly designated adjoining NATURA 2000 sites one in each country or a newly designated Natura 2000 site in the Slovenian sea and connecting to extension of waters of West Istria (HR5000032) NATURA 2000 site. The NATURA 2000 network can be the basis for the establishment of nationally designated protected areas if stricter protection is required (Berginc et al., 2006). One of the respondents further suggested:

“Given the specific situation of the area [Northern Adriatic] a joint trilateral effort at the scale of Gulf of Trieste or even Northern part of North Adriatic Sea would be the best way to make an effective management plan and conservation strategy for loggerhead sea turtles and common bottlenose dolphin”.

The Northern Adriatic region can be regarded as ecologically coherent unit that needs to be managed as such. Environmental protection and nature conservation are topics that need to be tackled holistically, integrating with other sectors in a cross-border context.

4.1.2 Threats, stressors and disturbances

The region of the Northern Adriatic is subject to high anthropogenic influence (Micheli et al., 2013). Threats and stressors specific to the area of Piran Bay have been identified and presented in the introduction. Several respondents point out, that high anthropogenic influence, resulting in relatively low “naturalness” of the area can be an argument against the establishment of the MPA. However, Frascchetti et al. (2009) demonstrated that MPAs can be designated in such areas as well, what is essential is the identification, protection and conservation of core areas of high priority habitats.

Regarding threats one of the respondents said:

“At first glance fishing seems to be the most obvious threat to biodiversity in the region, but looking at the number and capacity of the Slovenian fishing fleet, one can see, that other threats are more important to consider. The number of critical or fatal interactions between fisheries and [loggerhead] turtles or [bottlenose] dolphins is still relatively small.”

And another commented:

“The biggest threat to the environment in my opinion is [freight] shipping. There are two Ports [Koper, Trieste] in the Gulf of Trieste and the number of ships navigating in the area is enormous. Any accident in this area will have an impact on the whole Northern Adriatic. But it might be interesting to conduct research in the areas that are under main shipping routes and monitor changes caused by it.”

Respondents are of the opinion that broad scale threats in the region are unlikely to be mitigated by a locally based TBCA. But the TBCA may help to address some threats at a local scale. It is possible to develop codes for conduct when encountering marine mammals, to limit the maximum speed of recreational vessels or control fishing methods in critical areas. Just the reduction of small scale threats may lead to higher resilience and capacity to adapt to broader threats to the system (Hughes et al., 2003). These rules, however, have to be equitably developed, implemented and enforced to ensure that this is not just another paper park (Guidetti et al., 2008).

A quote from a respondent from one of the research institution regarding threats in the region summarises:

“We are always trying to assess the levels of threats and disturbances and to propose mitigation strategies, but we are facing many problems and limitations. For example the lack of quantitative and baseline data, problems with acquiring quantitative data, lack of methodology to assess the effects of different stressors and disturbances and synergistic effects of multiple stressors. Nevertheless we managed to develop different indices that can give us the idea in what status the marine environment around us is.”

4.2 Identification and inclusion of relevant authorities, institutions and stakeholders in the region

Another key step in designating a TBCA highlighted by respondents is the need to identify and include relevant authorities, institutions and stakeholders in the region in the process. There is a wide range and number of stakeholders from the two different countries in the region which would require the development of a clear governance structure, appropriate management body which could divide the obligations between the two states.

Several institutions in Slovenia and Croatia have done biological and ecological research in the Northern Adriatic Sea. Morigenos, the Slovenian Society for Marine Mammals, has been doing research and monitoring of bottlenose dolphins and loggerhead turtles since 2002 in Italian, Slovenian and Croatian waters in cooperation with the Blue World Institute for Marine Research and Conservation from Croatia. Other such institutions include the University of Primorska, the Institute for Biodiversity Studies and Science and Research Center, the Marine Biological Station in Piran, the National Institute for Biology, and the Center for Marine Research in Rovinj, Institute Ruđer Bošković. All conduct biological and ecological research on species diversity, coastal and marine habitats, changes and threats to marine environment in the region.

Both Slovenia and Croatia have a public institution responsible for providing the technical basis for decision making process regarding nature conservation at the local, regional and national levels. Both states also have Institutes for Fisheries, based in Ljubljana, Slovenija, and Split, Croatia respectively.

In the Region of Istria, Croatia, there is the Department for Sustainable Development and Department for Spatial Planning at the county level and the Public Institution 'Natura Histrica', responsible for management of the protected areas and other protected natural values in the Istrian County. In Slovenia there is a Regional Development Agency of Koper which coordinates and integrates different sectors at a local and regional level, including sustainable development and environmental protection in the region.

Tourism is represented by the Tourism Board Istria in Croatia and the Tourism Board Portorož in Slovenia. In Portorož and in Crveni Vrh there are luxury hotel chains owned by Kempinski. Another major tourism company in Istrian County is Valamar Hotels and Resorts.

Another very important user of the area is Fonda Fish and Shell farm, which is located in the inner part of the bay, inside the Fishing reserve. Fisheries in the region are represented by Fisheries community Poreč and individual fishermen in Slovenia, who are cooperating with the Office for Fisheries at Agricultural and Forestry Institute of Nova Gorica.

There are local and regional authorities, the municipality of Piran and Istrian County respectively, that need to be considered and involved in the initiative. Due to the cross-border nature of the discussed TBCA the State Ministries for the Environment and potentially Ministries for Foreign Affairs need to be included as well.

Civil societies and local communities are important as they represent the critical mass that can provide the momentum to develop the initiative or stop the process.

“It is necessary to include all relevant authorities: state, county and local. Otherwise initiatives like this do not stand a chance. Coastal municipalities have to see and recognise this initiative as a way to go. There is a problem in our country that Ljubljana, I believe it is the same with Zagreb, is the centre where decisions are made. Very often these kind of initiatives are in turn seen as the impositions from the government. It is important to work with all levels of authorities and with stakeholders and public as well throughout the process to build a broad consensus.”

Organizations that have a potential role in the development of the initiative are representatives of regional conventions, i.e. Barcelona Convention, such as Priority Action Plan – Regional Activity Center (PAP-RAC) and Regional Activity Center for Specially Protected Areas (RAC-SPA), or at least their national focal points.

From a stakeholder perspective, respondents highlighted both the positive and a negative side. The presence of several research institutions and universities in the region, working in biological and ecological research as well as in different social science departments is seen as big advantage of the Northern Adriatic. Some of these institutions, such as Center for Marine research Rovinj and Marine Biological Station Piran, have a long history of research work, are respected by local communities and recognised in the wider region. For these organisations cooperating in the development of the initiative has been considered as beneficial, potentially providing opportunities for continuation of their research activities or engaging in other fields of research. Respondents perceive the institutional capacity in the region as very good but suggested that cooperation, coordination and communication between institutions and stakeholders from different sectors involved must be effective.

On the other hand a large number and wide range of local stakeholders, such as fisheries, tourism, local communities, shipping industry and ports, that are dependent on the income they generate by utilizing the region. It has been emphasized that in designing an MPA, the early inclusion of stakeholders is of the utmost importance. In cooperation a broad consensus must be reached for further development of the initiative. It is also important that good communication is maintained, and that the stakeholders are a part of consultation and negotiation process prior to designating the MPA. In doing so the risk of new conflicts arising can be reduced, support of conservation measures can be increased, and the quality

of conservation measures and their implementation can be improved (Ministry for Agriculture and Environment of Slovenia, 2014).

Regarding the transboundary nature of the initiative one of the respondents stated:

“From scientific perspective I don’t think it will be a problem. There are institutions capable of providing technical basis for the process, even though I’m aware that there are still gaps in knowledge and research of marine ecosystems. The most important thing in this process in my opinion is the organisational or governance structure. By this I mean: who will provide the initiative at the national or regional level, how will the two countries or their respective governments organise and coordinate themselves regarding the matter, how the proposal and the paperwork will be prepared, etc. This is the key to the success of designating an area like this as a TBCA.”

Hence to foster communication and coordination between these large number of sectors, authorities, stakeholders and institutions will require the definition of a coordinating body with a clearly defined organisational structure.

A possible solution could be the use of the European Grouping of Territorial Cooperation (EGTS) mechanism. While many respondents were familiar with this mechanism, only one knew about it in detail. Due to the dearth of information collected regarding the EGTC, its role and applicability remains to be further investigated. One of the possibilities is to investigate adding the nature conservation content to the existing EGTC in the Northern Adriatic, consisting of Istrian County, Region of Veneto and Friuli Venezia Giulia (Italy) as well as Land Carinthia (Austria) or to establish a new one based around the coastal part of the region.

According to Charles and Wilson (2009) in planning, implementing and managing MPAs the human dimensions (social, economical and institutional considerations) are equally important as the oceanographic and biological properties of the area. In Piran Bay case it seems like the human dimension of conservation have even more important role than actual biophysical properties of the region.

4.3 Understanding the regional context for effective development of the initiative

One of the respondents stated:

“From the socio-economic perspective this region [Gulf of Trieste] is one of the most complex spaces in an already complex Mediterranean space. Several important functions are present and are interconnected. If we take the short Slovenian coast for example, one can find an important transport and trading route, internationally important Port of Koper, residential and agricultural areas, areas of conservation importance as well (i.e. wetlands), etc. Integrating all of those functions at a regional and national level is a challenge, and it becomes even bigger one when you have to integrate them all together with the plans of the three neighbour countries [Slovenia, Croatia and Italy].”

The ongoing border dispute between Slovenia and Croatia is one of the factors that add to the complexity of the area. It is a politically and diplomatically sensitive topic. The arbitration process was expected to be completed by the time of writing of this thesis. In the mean time the process was delayed due to an incident regarding the Slovenian representatives (Dnevnik, 2015). Lack of clarity regarding the national boarder was perceived by the respondents to this thesis as a factor that influences or reduces the dialogue between the states, especially regarding the cooperation in the disputed area which can also be noticed in the Article 10² of the Arbitration agreement ... (2009) as well.

From biological and ecological standpoint the border has only a secondary meaning. Especially now that both countries [Croatia and Slovenia] are EU member states and are bound to implement EU legislation. Both of them have to maintain or restore good environmental status of their marine waters by 2020 [under MSFD]. And GES cannot be achieved only behind the national borders: species are migrating, currents are mixing and displacing water masses, nutrients, pollutants etc.”

The respondents are in unanimous agreement that resolving the border dispute will facilitate cooperation and there will be a better chance to further develop the initiative, this is consistent with Klemenčič and Topalović (2009).

In Piran Bay there is a history of conflict between Slovenian and Croatian fisherman and Slovenian and Croatian Marine Police (Delo, 2008; Primorske novice, 2014). However the fishermen appear to have enough of the border dispute and are eagerly expecting the

²“Article 10: Stand-still

(1) Both Parties refrain from any action or statement which might intensify the dispute or jeopardize the work of the Arbitral Tribunal” (Arbitration agreement ...,2009)

results of arbitration so they can continue their work without new conflicts (Aljazeera, 2014). One of the problems is that Slovenian fisheries have been in severe decline during the past 25 years (Statistical Office of Republic of Slovenia, 2015). One of the respondents, whose work includes cooperation with fisheries stated:

“This [the fisherman] is a group of people with their own, unique worldview, values and calculations. You have to take into account that this activity provides for their livelihoods or can be an additional source of income for their families. I expect that they will not recognise the proposal for conservation of the area as beneficial to them and might oppose the idea.”

According to another respondent some fisherman in the region are already combining fishing activities in the winter with tourism in the summer, by using their vessels as tour boats. She expects the fishermen to be sceptical about the initiative and expects opposition, but stated:

“... they [fisherman] are aware that there is less and less fish in the sea and that the reserve [Portorož Fisheries Reserve] has a positive effect on fish stocks. In my opinion there is a good possibility to expand the reserve and close a wider area for the whole year, which I believe can be negotiated with them [fisherman] as well. Afterwards we can investigate the effects of this bigger reserve on fish stocks and on the catches of local fishermen [spill over effect]. There are many examples where actions like this were successful.”

Some of the fishermen are cooperating with Institutes for Fisheries in both countries. They are cooperating in conducting monitoring of wild fish communities.

Within Piran Bay there is a small fish farm which has a local effect on benthic meiofauna communities and on the composition and feeding habits of wild fish stocks (Pengal, 2013; Demuynck, 2012; Grego, 2009). Their representative stated:

*“Our company is trying to as environmentally friendly as possible. We have all the permits needed to operate and we are utilising ecologically friendly means, such as manual cleaning of the nets and the production of *Mytilus galloprovincialis*, thus decreasing the potential eutrophication and additional chemical burden of the Bay. The area around the farm is the very diverse and fish species are very abundant around it. In theory I support both NATURA 2000 and MPAs but in practice it has been too often the case that protection of a site brought restriction to those who utilised the area. So at the moment I’m against it, because for us it would most likely mean that we would have to stop operating. The problem is with the market as well. Nobody will pay more for the fish from a protected area. And*

the state will not compensate for the losses we will have if some restriction are set upon us as a part of protection.”

As evident in above quotes one of the respondents expressed and others expect a negative perception and lack of support for designation of NATURA 2000 site or TBCA. That is especially the case for the stakeholders that are utilising the marine environment in the region. Some of the respondents even expect that these user groups could oppose the designation of TBCA. The worst case scenario expected was lobbying against the designation and potentially new conflicts arising.

Other economically important activities that can potentially be impacted by the TBCA are tourism and the shipping industry. Gulf of Trieste is one of the main routes for cargo transportation in the Adriatic. The Ports of Koper and Trieste are fast developing logistics and transportation centres in the region, benefiting the regional and national economies (Peterlin et al., 2013). The amount of shipping is expected to increase in the next years, due to the development of the Northern Adriatic Port Association (Kocjan, 2014). Tourism is one of the major economic drivers in the region as well. Only Slovenian coast sees more than half a million visitors every year (Peterlin, 2013).

Drawing from their experience, many of the respondents described the public perception of NATURA 2000 and Protected Areas as negative, seen as an obstacle for the development, as new forms of restrictions that are set upon them from the authorities and additional bureaucracy.

One of the respondents who at the time of the interview worked on a proposal for the designation of a NATURA 2000 site, stated:

“We are just finishing a project that lasted for 5 years. Within the project we collected data on species distribution and abundance within the research area. We analysed the data, prepared everything that was required and even had a public consultation. However on proposing the NATURA 2000 site to the authorities, we were told that the opinion of stakeholders and the public need to be taken into account and further research is needed. In my opinion, if you have solid scientific information you have to act accordingly. The public and stakeholders cannot just invent counter-arguments.”

Another one stated:

“Scientific component has to be included, but it is not enough. It is only one part of the requirements. Besides that support from local communities, local and county authorities, competent organisations and businesses is needed. Communication between them is crucial.”

It is clear that a potential TBCA needs to offer some incentive to stakeholders that utilise the area. That is if the TBCA is to be accepted and effective. One respondent suggested that he expects support from some local communities and some stakeholders because:

“Istria as a region has been historically very well connected and the cross-border cooperation between Italians, Croatians and Slovenians has been always present. Since there were several initiatives to revive this region in the past, I see the potential for support of the TBCA here.”

Regarding fisheries another respondent suggested that there is a potential to develop local brand:

“Working with local fishermen and the Istrian Chamber of Commerce I noticed that there is an interest to develop a regional brand to promote locally harvested fish as a regional specialty and to serve it in locally based restaurants.”

Another respondent suggested:

*“In my opinion Protected Areas in general are attractive for tourists and can provide new opportunities, which is why the tourism workers are likely to support the initiative. In this case I see potential for promoting scuba diving due to the presence of interesting species [*Hippocampus hippocampus*, *H. gutulatus*, *Cladocora caespitosa*, several fish species] and interesting spots [rocky areas with higher biodiversity levels]. Presence of bottlenose dolphins offers the potential for the development of dolphin watching. But we have to be careful, that these activities do not become excessive and in turn increase the pressure on the environment.”*

The TBCA fits well with the regional context and majority of the respondents believe the initiative has the potential to be realised (Table 2). However they recommended investing a lot of effort in the communication with and education of the public, so they are informed and aware of the initiative and that in cooperation with them the MPA is designed to be beneficial for nature conservation and for them.

The potential TBCA in Piran Bay would also complement existing adjacent coastal protected area, Landscape Park Sečovlje Saltpans, and a planned terrestrial protected area, Landscape Park in the Dragonja Valley.

4.4 Building on existing cross-border cooperation

Respondents provided information about different forms of cooperation both at the formal and operational level as well as at the informal level. In the Adriatic context several bilateral, trilateral or multilateral agreements already exist. They recommend building on these existing agreements to develop this initiative.

Slovenia and Croatia are partners in the INTERREG Cooperation Program 2014 - 2020, which includes the border Counties in Croatia and regions in Slovenia (in our case Istria and Obalno-Kraška respectively). The Second Priority Axis of the Cooperation Program is Preservation and sustainable use of natural and cultural resources, with a Specific Objective of Protecting and restoring biodiversity and promoting ecosystem services (Cooperation Program Slovenia Croatia 2014 - 2020, 2015). The program justifies the inclusion of these objectives to maintain and restore biodiversity as well as many species and habitats listed in Birds and Habitats Directives depends significantly on a cross-border approach (Cooperation Program Slovenia Croatia 2014 - 2020, 2015).

Slovenia and Croatia are successors of a treaty between the former Yugoslavia and Italy. In 1992 a Trilateral Commission to protect the Adriatic Sea and coastal areas against pollution, consisting of Slovenia, Croatia and Italy, was formed. The Commission meets on a regular basis and is currently addressing topics such as the problem of ballast water discharges, combating the pollution caused by solid and hazardous waste, establishment of the system of separate navigation in Adriatic, aiding in development of a Particularly Sensitive Sea Area (PSSA) proposal for the Adriatic (David & Gollasch, 2008), etc.

Both states are a part of the EU Strategy for Adriatic and Ionian Region, launched in 2014 by the European Commission in the form of a Communications and Action Plan, which consists of four pillars (Commission of the European Communities (CEC), 2014). The Environmental quality pillar includes specific actions to enhance the network of Marine Protected Areas in the Adriatic and Ionian seas, by possible designation of new protected areas and completing the marine NATURA 2000 network under Birds and Habitats Directives (CEC, 2014).

The trilateral Commission and EU strategy for Adriatic and Ionian region were mentioned as key platforms that can enable or facilitate the development of the initiative:

”Regarding the Adriatic region the formal platform for communication and cooperation between Slovenia and Croatia is the Trilateral Commission. Topics such as nature conservation, establishment and management of marine NATURA 2000 and MPAs network and marine spatial planning are regularly on the agenda. At the moment this is even more important in the light of newly launched strategy for Adriatic and Ionian region. Slovenia is actually the coordinator of the

environmental pillar. The strategy emphasizes the crossborder cooperation to maintain and restore GES of marine and coastal environment in the region by enhancing connections and cooperation between protected areas on land, coast and in the sea.”

Representatives from the environmental ministries of the 8 Countries in the Adriatic region, including Slovenia and Croatia signed a treaty in 2008 called a Big Win to protect Dinaric Arc. This is a regional transboundary initiative, whose goals include the development of NATURA 2000 networks in marine environment (Big Win for Dinaric Arc Report, 2009).

Since 2001 the Alto Adriatico project has been trying to develop a model of governance for the entire North Adriatic fisheries sector. The partners involved are Italian regions Emilia-Romagna, Veneto and Friuli-Venezia-Gulia, the Slovenian municipality of Izola and Croatian Counties Istria and Primorsko Goranska. The main aim was to benefit consumers by certifying and thus guaranteeing the safety of fisheries food products (Alto Adriatico, 2010).

Many of the identified and interviewed institutions and stakeholders are already a part of these existing forms of cross border cooperation. Some of these programmes include topics such as Nature conservation and the development of NATURA 2000 and MPAs network, which are recognised as important and are promoted.

Experiences of the respondents regarding formal and informal cross-border cooperation, range from very positive to negative. Some of them have been cooperating very successfully and have carried out several cross-border projects. One of the respondents stated:

“I have had both a positive and negative experience with cross-border cooperation. Our organization is in the process of preparing a joint project with several partner organisations from neighbouring state. On the other hand in many years that I have been working in this region, there has been no interest from local communities on the other side of the border to cooperate. All we get from them are accusations that we [our organization] are trying to own and utilize the other countries territory.”

Another respondent said:

“When it comes to cross-border cooperation on a scientific and professional level, we never had any problems. But when we had to the public and politicians were involved in our projects, we faced several problems: endless bureaucracy, lack of support, opposition and disinterest to name just a few. “

4.5 Funding

One of the main requirements for developing the initiative highlighted by some respondents was funding:

“It is important to think about the funding in the phase of planning. It doesn't matter if you have the best idea or project and you designate a MPA if you don't have the necessary funds. It will not function without money.”

The funding issue needs to be addressed from two perspectives. Starting funds are needed to realize the initiative through one or several projects. Meanwhile a lot of attention needs to be invested in the development of a strategy for long term financial sustainability.

One of the respondents suggested:

“Regarding funding there are many opportunities in my opinion. The European Union is usually supporting projects like this. There are different mechanisms available: Life and Horizon 2020 for example.”

Some other respondents were of the same opinion, suggesting that the third party funding is the most realistic option. Along with Life and Horizon 2020 other suggested mechanisms were: INTERREG Cooperation Program Slovenia-Croatia 2014 – 2020, European Regional Development Fund and Adriatic-Ionian Programme 2014-2020.

One of the respondents was also sceptical about the state funding:

“In recent years the budget for environmental and nature conservation issues is shrinking. Our country and politicians probably don't want to see new proposals for Protected Areas. They are aware that the government has to contribute some part of the funding if Protected Area is designated.”

Another consideration was singled out by one of the respondents:

“One of the factors that have to be taken into account is that the relatively small Municipality of Piran [Slovenia] already has four protected areas inside its jurisdiction. The local authorities might therefore be reluctant to designate one more. Meanwhile in Istria the number of protected areas is even bigger, with the National Park of Brijuni and the Limski channel coming under marine category and several others in the terrestrial.”

The funds provided by both countries and local communities for nature conservation are limited and are already divided to support a large number of protected areas.

One respondent suggested another way of accessing funds:

“Another option to consider is to find interested sponsors. I.e. I know that the Port of Koper is very keen to invest a part of their budget in activities that are associated with reduction of their impacts on the environment. They are included in the EU eco-management and audit scheme – an instrument for companies and organisations to evaluate, report and improve their environmental performance. In that case it is important not to get into conflict of interest. Being financed by sponsors, in my opinion, can lead to decreased objectivity.”

Another more unconventional way of getting funds is possible as well. In recent years, several online platforms, such as Kickstarter and Indiegogo, are enabling projects from different topics to apply for crowdfunding. Even though there are not many successful examples up to date, some initiatives managed to crowdfund some parts of their projects (Borrell, 2015), suggesting this could be an interesting idea to try.

4.6 Management plan and definition of spatial extent of the MPA

Preparation of a management plan was mentioned as a key step in the development of the initiative. One of the respondents pointed out:

“While finishing our 5 year lasting project and submitting the proposal for designation of a NATURA 2000 site I realised something interesting. We don't have a long term vision. We are basically moving from one project to another. I believe that with long term management plan we can achieve much more. We should manage this area [Gulf of Trieste], which is shared by three countries, in a more holistic way. The animals they don't know where the national borders are. And another benefit of the [management] plan would be that different research and other organisations would be brought together behind the same table. And then it would be easier to develop and reach some kind of consensus.”

Many MPAs are designated even without clearly defined management plan and in turn are not effective, known also as paper parks (Bearzi, 2007). The management plan should also be adaptive, meaning that it should be reviewed periodically and changed when new or better information is available (Alexander, 2010). Management plan should include:

- legislation and policies that will govern both the process and outcomes of management,
- the biological and ecological information,
- threats and disturbances,
- stakeholder information,
- specific objectives for wildlife features,
- specific objectives for cultural features,
- mitigation strategies if needed,
- identified and justified resource requirements, both human and financial,
- monitoring and surveillance programmes to ensure that we are aware of the status of all the important features (Alexander, 2010).

Tools available to for management are restrictions and different kinds of limitations (Gubbay, 1995). The area included in the MPA can consist of different zones in which activities are regulated according to the management objectives for each zone (Gubbay, 1995).

The thesis identified legislation and policies that are present in the region. Comprehensive biological and ecological information including threats and disturbances were presented as well as stakeholder information. Some knowledge gaps have been identified and can be appropriately addressed in the future with additional targeted research.

Developing site specific objectives for wildlife and cultural features, identification and justification of resource requirements, both human and financial, and monitoring and surveillance programmes to ensure that we are aware of the status of all the important features are out of the scope of this thesis and should be considered in the future.

5 CONCLUSIONS

Currently over 1800 species have been recorded in the Gulf of Trieste, implying that in general this area is rich in biodiversity, considering its small overall size. Piran Bay with a combination of different habitat types, species and soft bottom taxa diversity can be considered as a representative site for the wider northern Adriatic region.

In the waters adjacent to Piran Bay a proposal for designation of a SPA under Birds Directive for conservation of common European shag has been recently submitted (Bird Watching and Bird Study Association of Slovenia, 2015). According to two respondents the proposal to designate a SAC for conservation of bottlenose dolphins was submitted and rejected in the past. Based on the existing biological information and data from interviews combined with these two initiatives I can conclude that area of Piran Bay and adjacent waters is an important habitat for several species of conservation concern.

The area of Piran Bay and adjacent waters fulfil several social (recreation, accessibility, research and education, public awareness), economic (fishery, tourism, transportation) and ecological criteria (representativeness, integrity, productivity) for MPA site identification (see Gubbay, 1995 for detailed descriptions). Thus it could be considered as a potential site for multiple use MPA. A potential TBCA in Piran Bay could contribute to:

- Maintaining favourable conservation status of habitats and species of regional importance (i.e. Sandbanks, bottlenose dolphins, loggerhead turtles, common shag)
- potentially restoring ecological and biological features (i.e. *Cystoseira* forest),
- potentially restocking fish populations in the region
- development of sustainable fisheries.

This can be achieved by managing existing human activities in a sustainable way and potentially providing new socio-economic opportunities (ecotourism, cross-border cooperation, research, education, etc.) which is consistent with Turk and Odorico (2009).

A newly established TBCA has the potential to link and combine existing Protected Areas (Portorož Fishing Reserve, Natural Monument Piranska Punta) and potential SAC and SPA through a long term management plan that can provide continuity and consistency. Some uncertainty and knowledge gaps still need to be addressed through consistent and continuous biological and ecological research and monitoring..

Summarizing all of the above the Hypothesis 1 is confirmed.

The development of a TBCA initiative is a long-term process. Therefore Hypothesis 2 tried to establish if there is institutional interest and political will to support the process. Through the interviews institutional interest was clearly recognised. There are several benefits and opportunities that the interviewed institutions see within the initiative.

Regarding political will, the situation seems to be different. While some political support at the state level is expected, many respondents are of the opinion that it will not be enough. To overcome shortcoming of state support the leadership and motivation should be instigated through the development of a regional cooperation structure (i.e. EGTC) consisting of local and regional authorities. Who have more to gain from cooperation than from conflict.

This thesis identified wide range of authorities, institutions and stakeholders in the region. Support for the development of the initiative was assessed directly, through a question included in the interview, and indirectly by opinions provided by the respondents. As seen in Table 3 the majority of the interviewees support the initiative. However they are sceptical whether other stakeholders will see the proposal positively and support the initiative.

Regarding Hypothesis 3 the conclusion can be made that there is broad support expressed by the respondents, but a lower level of support is expected from other stakeholders and local communities.

Klein et al. (2008) demonstrated that in some cases *“a stakeholder driven process can use systematic conservation-planning methods to successfully produce options that satisfy multiple conservation and socio-economic objectives”*. Future efforts should invest in additional socio-economic research. Using quantitative conservation planning tools, i.e. MARXAN, cost-benefit analysis can be made to assess financial viability of conservation. Additional research can be invested in investigating the objectives and attitudes of stakeholders, their attachment to place and to develop meaningful participation.

Human dimensions of conservation play a major role in Piran Bay region and it seems essential that the potential TBCA planning process include and develop socio-economic research in support of the initiative. A TBCA that will incorporate multiple stakeholder interests without compromising biodiversity goals will be more likely to protect the marine environment of the Piran Bay.

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APPENDIX A: Topics and questions for interview

TOPICS FOR THE INTERVIEW

My name is Matic Jančič and I am a student at University of Primorska, Faculty of Mathematics Natural Sciences and Information Technologies, on master programme Nature Conservation. I am undertaking a study looking at the potential for the development of a transboundary Marine Protected Area in the Piran Bay region. This document contains topics and questions that I would like to discuss with you. Given your knowledge and field of expertise we can deviate from original questions or get into more details of particular topic.

BIOLOGICAL AND ECOLOGICAL INFORMATION OF THE PIRAN BAY AND ADJACENT WATERS

- Which are the biological features (species, habitats) that are of regional/national/international importance in the area?
 - Are there any priority species?
 - What is the status of its populations?
- Which are the ecological features (spawning grounds, migration routes) of regional/national/international importance in the region?
- What is the status of present ecological features in the region?
- Is in your opinion this area viable for development of transboundary cooperative research, education and conservation?
- Which are the threats to biodiversity in the region?
 - How can they be mitigated?
 - Are there any potential threats that can be expected in the future?

STAKEHOLDER INFORMATION

- Which are the stakeholders and key organisations should be involved in the development of governance of a potential Marine Protected Area?
- Would you and your organization be interested in cooperating in the development of the initiative?

PROCESS OF DESIGNING OF POTENTIAL NATURA 2000 SITE OR TBPA

- What form of Protected Area would be suitable for the area?
- Could a potential transboundary SAC be the basis for the establishment of a regional TBPA?
 - Do you believe that this is a viable option?
- Do you believe that there is political will for cooperation in the process of MPA establishment?

TRANSBOUNDARY COOPERATION

- Do you know of any ongoing or future transboundary programmes?
 - If yes, can you give me more details of the objectives and partners involved?
- Are you aware of the European Grouping of Territorial Cooperation (EGTC) programme of the Committee of the regions?
 - If yes, do you believe this could be a vehicle for the development of governance of a TBPA?
- Are you aware of the ongoing arbitration process?
 - If yes, what is the current situation?
 - Do you believe that the arbitration process can influence the development of the initiative?
 - If yes, how?
- Do you believe that a new proposal for development of the TBPA in the region would be welcomed?
- Do you expect any other difficulties or problems arising in the process?

POTENTIAL BENEFITS OF A MPA TO THE REGION

- Do you believe that a locally managed TBPA could be beneficial for the region?
 - If yes, what benefits could that be?
- Do you believe that there is a possibility for EU financing for this kind of proposal?
 - If so, which funding mechanisms?

CLOSING QUESTIONS

- Do you have any documentation that might be of interest to my study – regarding laws and policies, biological data, plans for the future, etc?
- Is there anyone else that you would recommend that I should contact regarding this project?

Thank you for your time!

APPENDIX B: POVZETEK

UVOD

V Piranskem zalivu in okoliških vodah so prisotni habitatni tipi in ogrožene vrste vključeni v različne mednarodne konvencije in tudi v pravni red Evropske Unije (EU). Na tem območju se trenutno ne izvajajo učinkoviti varstveni režimi potrebni za njihovo ohranjenje.

Kot članici EU sta Republika Hrvaška in Republika Slovenija dolžni izpolniti obveznosti, ki jih nalaga pravni red EU. Smernice za varstvo in ohranjanje narave so podane v sledečih direktivah:

- Direktiva Sveta 92/43/EGS z dne 21. maja 1992 o ohranjanju naravnih habitatov ter prostoživečih živalskih in rastlinskih vrst (Habitatna direktiva), ki zahteva, da države članice EU identificirajo jedrna območja pomembna za ohranjanje vrst in habitatnih tipov navedenih v aneksih I, II in IV. Države članice so dolžne na teh območjih ustanoviti posebna ohranitvena območja (Special areas of conservation, SAC) in zagotoviti, da se znotraj njih vrste in habitatni tipi ohranjajo v ugodnem stanju. Če je potrebno, morajo države članice sprejeti ustrezne načrte upravljanje (6. Člen Habitatne direktive).
- Direktiva Sveta 79/409/EGS z dne 2. aprila 1979 o ohranjanju prostoživečih ptic (Ptičja direktiva), ki zahteva, da države članice identificirajo jedrna območja pomembna za ohranjanje ogroženih in migratornih vrst ptic, ki so navedene v Aneksu I te direktive. Države članice so dolžne na teh območjih ustanoviti posebna varstvena območja (Special protection areas, SPA). Aneksa II in III vključujeta vrste ptic za katere veljajo različne prepovedi ali omejitve lova.
- Direktiva 2008/56/ES Evropskega Parlamenta in Sveta z dne 17. junija 2008 o določitvi okvira za ukrepe Skupnosti na področju politike morske okolja (Okvirna direktiva o morski strategiji), katere glavni cilj je doseči dobro okoljsko stanje obalnih območij in morij ter oceanov, ki so znotraj jurisdikcije držav članic EU. Eden od poudarkov direktive je ne le ohranjanje vrst in habitatov temveč tudi strukture in funkcionalnosti morskih ekosistemov. Direktiva prepoznava dopolnitev omrežja NATURA 2000 kot eno od orodij za doseg tega cilja. Državam članicam priporoča, da uporabijo obstoječe regionalne dogovore z namenom, da lažje dosežejo zastavljene cilje (Člen 4 Okvirne direktive o morski strategiji), v tem primeru Barcelonske konvencije (opis spodaj).

Posebna ohranitvena območja (SAC) in posebna varstvena območja (SPA) tvorijo celovito omrežje ohranjanja narave v EU, poznano kot NATURA 2000 omrežje.

Poleg teh direktiv je za namene naloge pomembna tudi Uredba Evropskega parlamenta in Sveta 1082/2006/ES z dne 5. julija 2006 o ustanovitvi evropskega združenja za teritorialno sodelovanje.

Mednarodne konvencije zadevne za to nalogo in katerih podpisnici sta Slovenija in Hrvaška so sledeče:

- Konvencija Združenih narodov o pomorskem mednarodnem pravu določa pasove v morju nad katerimi imajo obalne države različne stopnje jurisdikcije. Slovenija in Hrvaške se sklicujeta na 15 člen te konvencije v arbitražnem procesu, postopku razrešitve spora glede meje na morju v Piranskem zalivu.
- Konvencija o Varstvu Sredozemskega morja pred onesnaženjem, še posebej Protokol o ustanovitvi posebnih varstvenih območij in ohranju biodiverzitete nalaga podpisnicam, da ohranjanjo in trajnostno upravljajo z vrstami navedenimi v Aneksih II in III.
- Konvencija o biološki diverziteti je zadala cilj podpisnicam, da se do leta 2020 ustanovi reprezentativno omrežje morskih zavarovanih območij, ki bo obsegalo vsaj 17% notranjih morskih voda in 10% teritorialnega morja.

Mnogo avtorjev prepoznava morska zavarovana območja (MPA) kot učinkovito orodje za ohranjanje habitatnih tipov in vrst v morskem okolju (Hoyt, 2005; Agardy et al., 2003; Gubbay, 1995). Kljub temu MPA-ji v Severnem Jadranu pokrivajo le 0,4% njegove površine (Turk in Odorico, 2009). Njihova številčnost je premajhna prav tako pa ne zajemajo vseh biološko in ekološko pomembnih sestavin reprezentativno (Turk in Odorico, 2009). Čezmejno varstvo oz ohranjanje je v morskem okolju skorajda nujno, saj se vodne mase in mnoge vrste premikajo preko političnih mej in nacionalnih jurisdikcij (IUCN WCPA, 2015; Vasiljević in sodelavci, 2015)

Od pomembnejših habitatnih tipov sta prisotni biocenoza muljastega detritnega dna in biocenoza obrežnega detritnega dna (Lipej in sodelavci, 2006), ki ju uvrščamo v habitatni tip Sandbanks slightly covered by sea water all the time (Commission of European Communities, 2007). Zaradi večjega števila pritokov in podvodnih izvirov sladke vode (Orožen Adamič, 2002) okolje v piranskem zalivu ustreza tudi habitatnemu tipu Estuarij (Commission of European Communities, 2007).

V Piranskem zalivu in okolici je stalno prisotna subpopulacije velike pliskavke, *Tursiops truncatus* (Montagu, 1821)(Genov, 2011). Velika pliskavka v Sredozemskem morju je po IUCN-ovih kriterijih uvrščena na Rdeči seznam ogroženih vrst kot ranljiva (vulnerable) (Bearzi in sodelavci, 2012). Genov (2011) je ocenil, da je v Tržaškem zalivu in okolici stalno prisotnih med 57 in 90 osebkov.

Glavata kareta, *Caretta caretta* (Linnaeus, 1758) je edini stalno prisoten predstavnik morskih plazilcev v Severnem Jadranu (Lazar et al., 2004). Po IUCN-ovih kriterijih je uvrščena na Rdeči seznam ogroženih vrst kot ogrožena (endangered) (IUCN, 2015). V poletnih mesecih se v vzhodnem delu Severnega Jadrana pojavljajo v velikih gostotah (UNEP-MAP-RAC/SPA, 2014a).

Prisotne so še mnoge druge vrste, na primer Sredozemski vranjek (*Phalacrocorax aristotelis desmarestii*), morski datelj (*Lithophaga lithophaga*), leščur (*Pinna nobilis*),

morska konjička (*Hippocampus hippocampus* in *H. guttulatus*) in mnoge druge (Mackelworth in sodelavci, 2013; Lipej in sodelavci, 2006).

Opredelil in testiral sem sledeče hipoteze:

- Pričakujem, da obstaja znanstvena oziroma strokovna podlaga, da se Piranski zaliv in okolica predlaga za zavarovanje in ustanovitev čezmejnega zavarovanega območja.
- Pričakujem, da obstaja dovolj institucionalnega interesa in politične volje za razvoj te iniciative.
- Pričakujem, da organizacije in oblasti ter deležniki podpirajo to iniciativo pod pogojem, da so ustrezno vključeni v njeno načrtovanje.

MATERIALI IN METODE

Pregled objav sem uporabil z dvema namenoma. Najprej je služil kot vir informacij glede habitatnih tipov in vrst, ki so prisotne na preučevanem območju ter o njihovem stanju. Služil pa je tudi, da identificiram osebe za intervjuje. To so bili predstavniki organizacij in oblasti (lokalnih, regionalnih in državnih) ter ključni deležniki. Identificirane osebe sta potrdila mentor Dr. Peter Mackelworth in Dr. Bojan Lazar.

Kot metodo raziskovanja sem uporabil pol-strukturirane intervjuje, ki so bili razdeljeni na (Berg, 2001). Za preučevanje primernosti območja za ustanovitev morskega zavarovanega območja s stališča bioloških in ekoloških lastnosti sem identificiral ključne eksperte iz raziskovalnih organizacij in nevladnih organizacij. S predstavniki oblasti, raziskovalnih organizacij (družbene znanosti) in nekaterimi deležniki pa sem poskušal preučiti smiselnost ustanovitve morskega zavarovanega območja z vidika trenutnega koriščenja tega prostora in z upoštevanjem dejstva, da je meja na morju še vedno nedorečena.

Zaradi majhnega vzorca identificiranih oseb sem tekom intervjujev uporabil tudi metodo »snowball samplinga«, ki omogoča, da intervjuvanci predlagajo druge potencialne osebe za naslednje intervjuje (Schoon, 2013).

Besedila intervjujev sem zapisal in zaradi relativno majhnega števila analiziral brez uporabe računalniških programov. Iz teh besedil sem izločil glavne teme in koncepte (Strauss in Corbin, 1998), ki so utemeljeni in predstavljeni s citati interjuvanih oseb.

REZULTATI IN DISKUSIJA

K sodelovanju v raziskavi sem povabil 44 oseb, od katerih sem z dvajsetimi opravil intervju. Da bi bila raziskava nepristranska, sem poskušal vključiti enako število predstavnikov iz obeh držav. Razmerje je kljub temu nagnjeno na slovensko stran, kar lahko pomeni, da rezultati te študije prikazujejo bolj slovensko perspektivo.

Iz intervjujev sem izločil 6 glavnih tem, ki so medsebojno povezane. Sogovorniki so izpostavili potrebo po znanstvenem pristopu oziroma pristopu, ki temelji na znanstvenih dokazih (evidence based framework), saj je učinkovito varstvo morskih ekosistemov

odvisno od temeljitega poznavanja in razumevanja njihov oceanografskih, bioloških ekoloških lastnosti.

Sledila je tema o identifikaciji vseh ključnih deležnikov, organizacij in oblasti ter nujnosti njihove vključite v razvoj iniciative. Naslednja pa je bila, da je ob razvoju take iniciative potrebno upoštevati regionalne značilnosti. Obema temama je skupno, da je nujno upoštevati družbene dimenzije (human dimensions) v načrtovanju in ustanavljanju morskih zavarovanih območij ter učinkovita komunikacija med vsemi sodelujočimi členi. Pogosto se to izkaže kot enako pomembno kot poznavanje ekoloških značilnost območja in je ključno za uspešen razvoj in dolgoročen obstoj morskih zavarovanih območij. Veliko število deležnikov in institucij v regiji lahko predstavlja težave, hkrati pa priložnost, da se ustanovi mehanizem za komunikacijo in koordinacijo, npr. evropsko združenje za teritorialno sodelovanje. Prednosti potencialnega čezmejnega morskega zavarovanega območja so predvsem razvoj trajnostnih dejavnosti, npr. ribištvo in ekološki turizem. Te dejavnosti bi nudile možnost zaposlitve ali prekvalifikacije in finančen doprinos v regiji ter hkrati ne bi slabšale okolijskega stanja.

Sledeča izpostavljena tema je bila uporaba obstoječih sporazumov za razvoj iniciative. Obe državi in pristojna ministrstva namreč že sodelujejo in so vključeni v več regionalnih sporazumov, npr.:

- Trilateralna komisija za varstvo Jadranske morja pred onesnaženjem,
- Strategija EU za trajnosti razvoj Jadranske in Jonske regije in
- Program čezmejnega sodelovanja (INTERREG) Slovenija-Hrvaška za obdobje 2014-2020 in mnogi drugi.

V vseh te sporazumih in programih so zajete in promovirane tudi naravovarstvene vsebine, ki naj bi jih države izvajale v čezmejnem kontekstu.

Ključna komponenta za razvoj iniciative, ki so jo izpostavili sogovorniki, je tudi ustrezno financiranje: kratkoročno in tudi razvoj dolgoročnega finančnega načrta. Za začetne projekte največji potencial predstavljajo sredstva EU, ki so na voljo preko različnih mehanizmov (Life, Jadransko-Jonski program, Horizon 2020, idr.). Sogovorniki zaradi trenutnih ekonomskih razmer pričakujejo pomanjkanje finančne podpore s strani obeh držav.

Zgoraj navedene teme in informacije se v končni fazi načrtovanja vključijo in oblikujejo v dolgoročen načrt upravljanja. Le-ta mora razdeliti naloge enakomerno med predstavnike obeh držav, zagoviti mora implementacijo potrebnih ukrepov in ustrezno nadziranje. Načrt upravljanja mora biti prilagodljiv in ga je potrebno sproti ocenjevati, dopolnjevati in spreminjati, če so na voljo nove ali kakovostnejše (znanstvene/strokovne) informacije.

SKLEPI

Območje Piranskega zaliva izpolnjuje številne ekološke, družbene in ekonomske kriterije za ustanovitev čezmejnega morskega zavarovanega območja namenjenega različnim

dejavnostim (multiple-use MPA). Dolgoročen načrt upravljanja lahko združi obstoječa zavarovana območja in potencialna NATURA 2000 območja v enotno vizijo upravljanja tega prostora.

Interes s strani relevantnih institucij je vsekakor prisoten, kljub temu pa se zdi, da ne obstaja dovolj politične volje za realizacijo iniciative in da ne gre pričakovati prevelike podpore s strani obeh držav.

Iniciativa ima podporo s strani intervjuvancev, ki pa pričakujejo nižjo stopnjo podpore s strani ključnih deležnikov in lokalnih skupnosti.