



The Role of Transboundary Biodiversity Areas in Preventing and Combating Cross- Border Pollution and Transnational Wildlife Crime

Preliminary insights

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1. Introduction

This working paper forms part of the TRANSNATURE project (TRANSboundary governance models of biodiversity protection: case studies for an enhanced protection of NATURAL resources in Europe), funded under the 2021-2022 BiodivProtect call of Biodiversa+. The project examines how transboundary governance models can enhance biodiversity protection in Europe by addressing the limitations of conservation approaches that rely primarily on nationally designated protected areas. Specifically, the project analyses the extent to which transboundary conservation areas bring together different types of managing authorities and stakeholders through effective governance mechanisms aimed at enhancing biodiversity conservation.

The activities of the TRANSNATURE project are organized into a set of interrelated Work Packages (WPs). WP1 establishes the conceptual and methodological foundations of the project by conducting desk-based legal and policy research on transboundary biodiversity governance, mapping existing governance models, identifying key stakeholders, and engaging with them. Building on this groundwork, WP2 focuses on uncovering the practices of transboundary biodiversity protection in the selected case studies through empirical fieldwork, including semi-structured interviews and focus groups, drawing on a refined list of relevant stakeholders. WP3 focuses specifically on the role of transboundary conservation areas in preventing and enforcing cross-border pollution and transnational wildlife crime. WP4 evaluates the effectiveness of the transboundary governance arrangements identified across the project and translates the research findings into policy-oriented outputs, including recommendations aimed at improving biodiversity protection at multiple governance models. In addition to these substantive research work packages, the project includes two cross-cutting and supporting WPs (WP5 and WP6), which address dissemination, communications and project management, and ensures the effective coordination, implementation, and impact of the project's activities and results.

The research has been conducted through a comparative approach that combines legal analysis with empirical research across 4 European case studies:¹

- (1) the Julian Alps (Italy/Slovenia), a mountainous area characterised mainly by informal inter-park cooperation on sustainability recognised by different international certifications;
- (2) the border area from the Baltic to the Barents Sea (B2B), where context-specific cooperative schemes collectively work towards the protection of the region's ecological, cultural, and socio-economic features (Finland/Sweden/Norway);

¹ Description drawn from Federica Cittadino, Katharina Heinrich, Sanna Kopra, Emma Mitrotta, Alexandre Moreno-Urpí, Nienke van der Burgt, *Exploring Transboundary Biodiversity Protection in Europe. A Comparative Analysis of Four Cases*, Eurac Research (2025) <<https://doi.org/10.57749/pwxj-qh94>>.

- (3) the Scheldt Estuary (the Netherlands/Belgium), regulated through bilateral agreements concerning important aspects of river cooperation on accessibility, safety, and nature protection; and
- (4) the ZASNET EGTC (Spain/Portugal), a formal cooperative scheme including regional authorities charged with managing the Transboundary MAB (Man and Biosphere) Reserve “Meseta Ibérica” (MITBR).



Figure 1 Geographical location of cases.²

As embedded in the project’s design and subsequently examined and documented through fieldwork conducted under WP2, all four cases share a transboundary dimension and display significant variation across European regions and ecosystems (terrestrial, mountainous and river-based) as well as across governance models, levels

² Map created by Elisabeth Aster, Eurac Research.

of authority (international, national, and subnational), and types of actors involved (public authorities, law enforcement agencies and non-state actors, including indigenous peoples, local communities, and citizens).³

This working paper is developed under WP3 “Focusing on Cross-Border Pollution and Transnational Wildlife Crime”, which was designed to address the TRANSNATURE project’s third research question: “To what extent can transboundary conservation areas contribute to reducing ecological degradation by improving the prevention and enforcement of both cross-border pollution and transnational wildlife crime in the EU?”. In doing so, WP3 builds on earlier work carried out under WP2, where this issue was already addressed through dedicated questions (14, 15 and 16) in the interviews conducted in the case studies from April to December 2024 (see annex 1), and pursues the specific objective of further understanding whether transboundary biodiversity governance in the selected case studies provides specific mechanisms that facilitate the prevention or enforcement of legislation related to cross-border pollution and transnational wildlife crime, or both.

To this end, a specific questionnaire was designed to gather both factual and experiential information on the prevention and enforcement of transnational wildlife crime and cross-border pollution within the selected case studies. It first collects background information on respondents’ professional roles and their involvement in relevant prevention or enforcement activities. It then explores respondents’ awareness of activities resulting in illegal biodiversity loss or environmental degradation with cross-border impacts, including both wildlife crime and pollution, and examines the existence or related judicial proceedings as well as perceptions of legal and regulatory harmonisation between neighbouring countries. The questionnaire further investigates the presence of cross-border and national cooperation mechanisms to address these challenges, identifying the authorities and actors involved, the tools and mechanisms supporting cooperations, and perceived successes and obstacles. In addition, it seeks respondents’ views on governance mechanisms that could further strengthen prevention and enforcement efforts, with particular attention to the role of non-state actors and cooperation between civil society organisations and law enforcement agencies. Finally, the questionnaire allows respondents to share additional insights and experiences, including examples drawn from contexts beyond the specific case study area (see annex 2).

Given the central role of law enforcement agencies in WP3, the project applied a functional criterion to distinguish them from other public authorities. While law enforcement agencies are formally part of the public administration, they were treated as a separate analytical category when their mandate involved the enforcement of laws through coercive means, namely the direct exercise of investigative or sanctioning

³ See Federica Cittadino, Katharina Heinrich, Sanna Kopra, Emma Mitrotta, Alexandre Moreno-Urpí, Nienke van der Burgt, *Exploring Transboundary Biodiversity Protection in Europe. A Comparative Analysis of Four Cases*, Eurac Research (2025) <<https://doi.org/10.57749/pwxj-gh94>>.

powers under a legal mandate. By contrast, public authorities were understood as governmental or administrative bodies responsible for policy-making, regulation, management or coordination functions, which may support prevention and enforcement but do not primarily exercise coercive enforcement powers.

To ensure comparability across different case studies, the following agreed criteria were established:

- Geographical scope: participants should represent all countries involved.
- Number of questionnaires: a minimum of 3 questionnaires should be completed for transnational wildlife crime and 3 for cross-border pollution. A single respondent may cover both topics if it aligns with their expertise.
- Participant profile: for each topic (wildlife crime and pollution), there should be at least 1 representative from a public authority other than a law enforcement agency, 1 from a law enforcement agency, and 1 from a non-state actor -such as an NGO or another civil society organisation.
- Additional profiles: An academic/expert profile may be included when case studies require additional information on specific aspects.
- Profile symmetry across borders: It is not necessary to interview the same type of profile on both sides of the border.

The questionnaire was sent by e-mail to relevant stakeholders in the 4 case studies between April and October 2025.⁴ In accordance with the project Ethics Plan,⁵ informed consent was obtained from all participants, and the data collected were anonymized.⁶

Notwithstanding the careful design of the data collection process, the research conducted across all 4 case studies faced significant challenges that reduce the reliability and generalisability of the findings. The most recurrent difficulty was the low response rate, despite repeated follow-ups and the use of phased or snowball sampling strategies. Cold emails often went unanswered, and in several contexts potential respondents declined participation or provided only partial answers. Even when replies were obtained, logistical barriers such as difficulty with identifying the appropriate contact person, limited transparency in public administrations, and respondents' concerns about confidentiality or professional duties hindered the gathering of detailed information. Moreover, many responses were brief, descriptive, or limited to yes/no statements. Where feasible, participants were offered the possibility of completing the questionnaire as an oral interview; however, this option was not applicable in all cases. These constraints were compounded by contextual factors in the case-study regions: in

⁴ The period originally agreed for collecting questionnaires was from April to July 2025. An extension until end of October was agreed after this period expired to face difficulties in gathering responses in some case studies (Baltic to Barents, the Scheldt Estuary, and the ZASNET EGTC and the 'Meseta Ibérica Transboundary Biosphere Reserve').

⁵ Federica Cittadino, *TRANSNATURE Ethics Plan* (2024) <<https://zenodo.org/records/10992776>>.

⁶ Questionnaires (and interviews, as later explained) will be referred to with an anonymization code which contain reference to the work package (WP3), the instrument used (*Quest* for written questionnaires and *Int* for oral interviews), the number of the questionnaire or interview (e.g., 01), the case study (e.g. Julian Alps), the abbreviation of the participant profile (e.g., Law enforcement agency, LEA), and the country in which the participant operates (e.g., FI for Finland).

some areas, certain types of environmental crime are genuinely rare or not systematically recorded, making it difficult to verify their existence; in others, key actors were unwilling or unable to discuss ongoing investigations, institutional shortcomings, or politically sensitive topics. Furthermore, in several cases respondents did not work directly in the study area or lacked first-hand operational knowledge. Taken together, and despite the groundwork laid under WP2, these difficulties created gaps, biases, and asymmetries in the collected material across countries, sectors, and thematic areas. These gaps, fully acknowledged only at the end of the fieldwork period, resulted in an evidence base that is neither comprehensive nor statistically representative and could not be addressed through additional methodological strategies at that stage of the project due to time constraints.

For these reasons, the results presented cannot be interpreted as robust scientific findings. Instead, they should be understood as preliminary insights, indicative of emerging patterns and stakeholder perceptions, and useful primarily for guiding future, more systematic research and improved data-collection strategies. In the following section, each case study sets out the data-collection approach used and presents the preliminary insights that emerged from the process, preceded by a brief description of the case studies to contextualize the results (a full description of the case studies is provided in the WP2 working paper).⁷

2. Preliminary insights

2.1. The Julian Alps

2.1.1. Context

The Julian Alps case focuses on cooperation for transboundary biodiversity conservation between the Triglav National Park (TNP) in Slovenia and the Natural Park Prealpi Giulie (PNPG) in Italy. The cooperation process culminated in the establishment of the Julian Alps MAB Transboundary Biosphere Reserve (JATBR) in 2024, covering a total extent of 267,007 hectares.⁸ The JATBR embraces the two national Julian Alps MAB Biosphere Reserves (the Slovenian one recognised in 2003 and the Italian one in 2019).⁹ The National Biosphere Reserves continue to exist and have the TNP and PNPG as their respective managing authorities. This area is not only recognised as an international biodiversity hotspot, but also as a region rich for historical and socio-cultural reasons.

⁷ See Federica Cittadino, Katharina Heinrich, Sanna Kopra, Emma Mitrotta, Alexandre Moreno-Urpí, Nienke van der Burgt, *Exploring Transboundary Biodiversity Protection in Europe. A Comparative Analysis of Four Cases*, Eurac Research (2025), 7 ff. <<https://doi.org/10.57749/pwxj-gh94>>.

⁸ See <www.tnp.si/en/park/area/transboundary-biosphere-reserve-julian-alps>.

⁹ For a detailed description of the geographical features and the zonation of the Julian Alps MAB Transboundary Biosphere Reserve, see the *Candidature of the Julian Alps Transboundary Biosphere Reserve (Italia-Slovenja) - September 2023*, 27 ff. <www.tnp.si/media/5290/julianalpstbr_nomination_form_printed_version.pdf>.

The main activities in the area are linked to forestry, agricultural and pastoral economy and traditions, which are present on both sides of the cooperation area. In addition, tourism is well developed on the Slovenian side and is often perceived as a challenge to biodiversity conservation, while the Italian side suffers from depopulation trends.

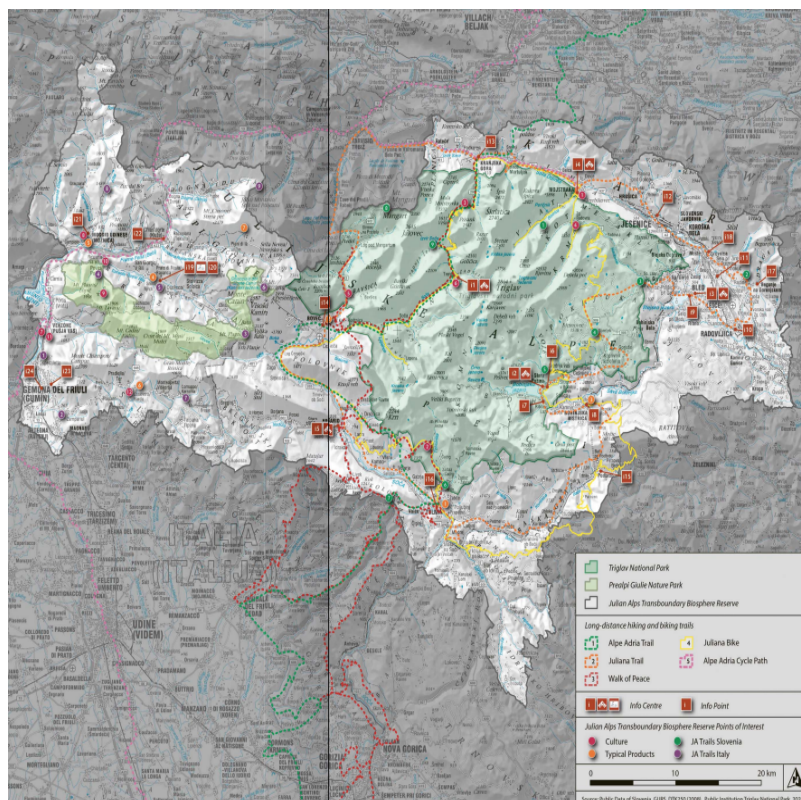


Figure 2 Map of the Julian Alps MAB Transboundary Biosphere Reserve.¹⁰

2.1.2. Insights

For the Julian Alps case, the process of identifying possible respondents was structured around 3 different phases. The first one built on the desk research carried out during the project, contacting a series of stakeholders with whom researchers had established contact during the stakeholder mapping phase carried out in WP1 and WP2. A second phase used snowballing to gather more contacts from those reached during the first phase allowing for the identification of additional respondents. Finally, additional desk research was done during the third phase to find new respondents for those categories and areas that were underrepresented in the sample. A total of 23 individuals and institutions were contacted and asked to answer a short questionnaire. These invitations were sent in waves during a period of 4 months (April-July 2025), including

¹⁰ This map is extrapolated from the Visitor Guide of the Julian Alps Transboundary Biosphere Reserve <www.tnp.si/media/5822/jatbr_visitor_guide_2024.pdf>.

reminders to those that did not answer. 13 responses were received, 7 from Slovenia and 6 from Italy. One of the Slovenian respondents opted for an interview as they did not feel comfortable with the questionnaire format. Regarding the profiles of the respondents, these were law enforcement agencies (3), public authorities (5), non-state actors (4) and experts and researchers (1). Some respondents were contacted for a follow-up to clarify certain aspects or identify potential new respondents.

The challenges faced are inherent to the methodology. These include difficulty obtaining responses to cold emails, requiring multiple reminders and leading to a 40% non-response rate; challenges identifying the person responsible for a specific area, particularly in public agencies and law enforcement agencies, which may lack transparency in public information; and the brevity of some responses. Combined with the inability to ask follow-up questions, this brevity risks losing information. Several respondents provided simple yes-or-no answers without explaining their reasoning.

Pollution and wildlife crime, though they exist, have a reduced impact on the Julian Alps in comparison to other latitudes. These are of small scale in the park area, although more significant in the wider area of the UNESCO MAB Transboundary Biosphere Reserve of the Julian Alps. Regarding pollution, the most significant episodes concern surface water and groundwater pollution caused by wastewater discharge from mountain huts in the Slovenian side in combination with inappropriate or under-dimensioned sewage systems (a growing problem due to tourism).¹¹ Pollution and misuse of water sources, mostly related to agriculture uses and waste disposal, in the Isonzo-Soča basin were also identified as a cause of habitat degradation with a transboundary impact, with cross-border cooperation through water management bodies such as the Eastern Alps Basin Authority as the main tool for solving these issues.¹² Minor cases of illegal waste disposal that led to pollution cases in the karst and forest habitats of Slovenia have also been reported.¹³ Episodes involving the killing, destruction, or taking of specimens of protected wild fauna or flora species are also relevant in the Julian Alps area. In particular, cases of illegal activities involving the collection of subterranean animals (insects) within cave ecosystems in Slovenia has been reported as a growing problem.¹⁴ Moreover, there have been various incidents regarding large, medium, and small carnivores (including collared bears), birds of prey (but also other bird species), and ungulates.¹⁵ For instance, several cases of poisoning or illegal killing of jackals and wolves with firearms have been reported.¹⁶ Other minor transgressions such as illegal fishing in rivers were also pointed out as factors leading to loss of biodiversity.¹⁷ Additionally, it is known that for some years there has been trafficking of wild bird species from Eastern European countries, which feeds the illegal

¹¹ WP3_Int01_JulianAlps_NSA_SI.

¹² WP3_Quest07_JulianAlps_NSA_ITA; WP3_Quest08_JulianAlps_PA_ITA; WP3_Quest12_JulianAlps_PA_ITA.

¹³ WP3_Quest07_JulianAlps_NSA_ITA.

¹⁴ WP3_Int01_JulianAlps_NSA_SI; WP3_Quest11_JulianAlps_NSA_E_SI.

¹⁵ WP3_Int01_JulianAlps_NSA_SI.

¹⁶ WP3_Quest13_JulianAlps_E_ITA.

¹⁷ WP3_Quest09_JulianAlps_PA_SI; WP3_Quest10_JulianAlps_NSA_SI.

market in decoys for hunting purposes with the Julian Alps area being a transit zone.¹⁸ Although being present, the minor entity of these offenses results in the absence of relevant known court cases in the matter.

Efforts towards harmonization between the laws of Italy and Slovenia has been small, mainly under EU guidance. Some cooperation indeed exists at operative level between law enforcement agencies but with a lack of a systematic system of exchange of information. Although very few mechanisms for cross-border/transnational cooperation to address these issues exist, there has been some progress, especially regarding the cooperation between the Friuli-Venezia-Giulia Region and the Slovenian authorities in what can be considered as a first step towards further cooperation. In particular, cooperation between the environmental agencies of Friuli Venezia Giulia (ARPA) and Slovenia (ARSO) has been strengthened following an agreement signed in 2025, that provides for the exchange of data, the sharing of environmental archives, and activities for sharing and disseminating information, as well as the establishment of joint monitoring programs, including in the context of projects funded by the European Union.¹⁹

Collaboration with environmental associations, NGOs and cross-border stakeholders was reported as a success strategy in the Julian Alps area by several respondents, highlighting the importance of involving local actors in supporting the actions of institutions, with still some margin for improvement regarding key stakeholders such as farmers and hunters.²⁰

2.2 Baltic to Barents (B2B)

2.2.1. Context

The B2B case focuses on the transboundary governance of the Northern border area between Finland, Sweden, and Norway. Geographically, it covers a large area from the Baltic Sea towards the Barents Sea, along the Western border of Lapland between Sweden and Finland (Torne valley), following the northern border between Finland and Norway. This area features various crucial habitats, ecosystems, and species of transboundary and interconnected nature, which require cooperation for their holistic conservation and monitoring. At the same time, the area is part of a wider area known as Sápmi, the homeland of the Sámi Indigenous Peoples. Sápmi is not defined by national boundaries but stretches over four countries: Finland, Norway, Sweden and Russia. These connections have allowed for the establishment of very different forms of

¹⁸ WP3_Quest05_JulianAlps_LEA_ITA.

¹⁹ See Digno Montalván Zambrano, *Best practices on prevention and enforcement mechanisms against cross-border pollution and wildlife crime*, TRANSNATURE (2025), 8. <<https://zenodo.org/communities/transnature/records?q=&list&p=1&s=10>>.

²⁰ WP3_Int01_JulianAlps_NSA_SI; WP3_Quest05_JulianAlps_LEA_ITA; WP3_Quest13_JulianAlps_E_ITA.

cross-border cooperation for the protection of the natural environment that is crucial for the local communities in the region. These include border-river management institutions and grassroots efforts involving local communities and indigenous peoples. Three examples of transboundary biodiversity cooperation were selected to illustrate different governance models across the B2B area: the Finnish-Swedish Transboundary River Commission, the Håldi Transboundary Area (TBA) between Finland and Norway, and Pasvik-Inari Transboundary Area (formerly known as Pasvik-Inari Trilateral Park), between Finland and Norway.

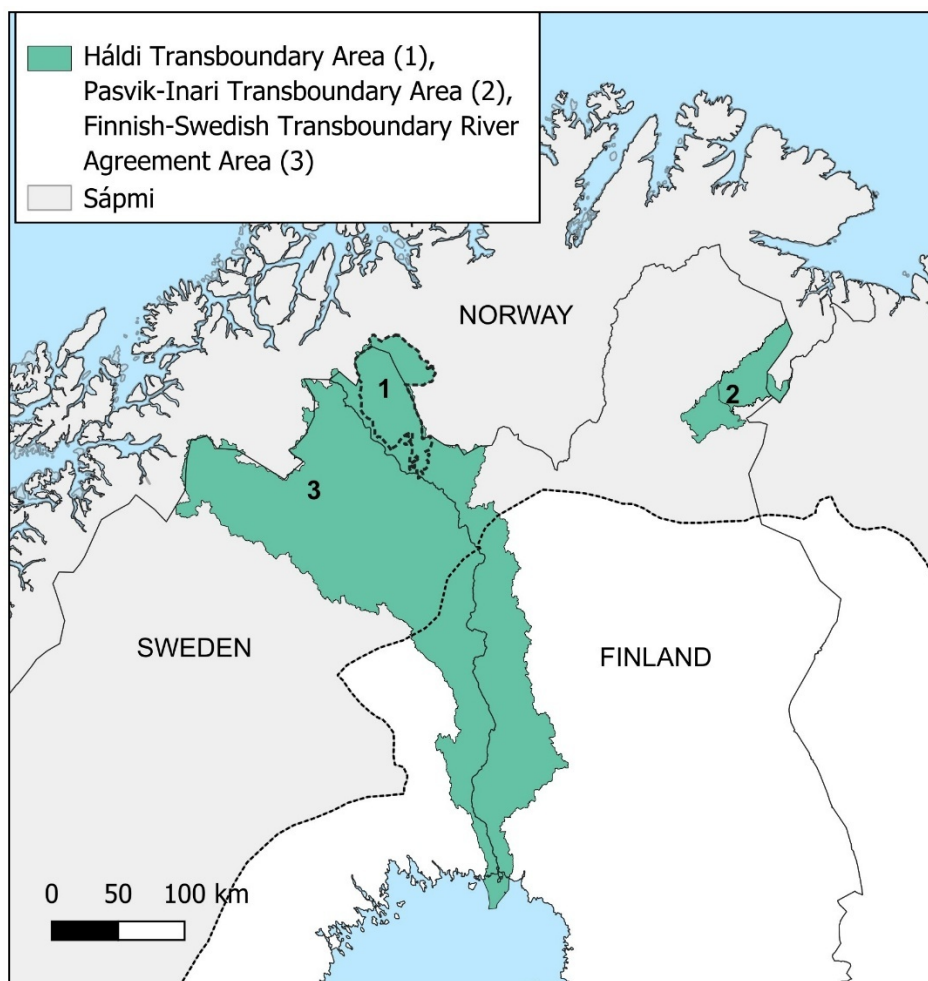


Figure 3 Geographical location of the three examples of transboundary cooperation mechanisms for the B2B case study.²¹

²¹ Map created by Arto Vitikka, Arctic Centre, University of Lapland; Border data: Runfola, D. et al. (2020) geoBoundaries: A global database of political administrative boundaries. PLoS ONE 15(4): e0231866. <https://doi.org/10.1371/journal.pone.0231866>; Arctic Indigenous languages and revitalization: an online educational resource (2024). *Language speaker areas map and dataset*. (version 1.1) <https://arctic-indigenous-languages-uito.hub.arcgis.com> [data set].

2.2.2. Insights

The Baltic to Barents (B2B) team identified the respondents through desk research among the participants to the interviews identified in the WP1 and WP2 phases. The selection of the interviewees was guided by the criteria of being as representative as possible of the law enforcement and environmental protection authorities involved in the chosen transboundary biodiversity conservation areas of each country, namely Finland, Sweden and Norway. The questionnaire was distributed by e-mail among the chosen respondents and among new names that had resulted from further desk research. The survey was conducted between June and October 2025. A total of 18 stakeholders, individuals and institutions, were contacted for the survey and at the end of the process 5 responses were returned, 4 from Finland and 1 from Sweden. As for their profiles, 2 come from law enforcement authorities and 3 come from other government authorities. We also got 2 short replies by mail from 2 members of other government authorities.

Several challenges were encountered during the process of searching for respondents. First, some potential participants declined after seeing the questionnaire sent to them as they found the questions problematic despite the availability of the anonymity option. Particularly, those in the environmental protection sector, felt uncomfortable to answer as they felt that they could break the oath of secrecy by disclosing confidential information.²² Hence, most of those who answered or those who declined found difficulties in answering the questions due to the sensitive nature of the topic, which in turn may have discouraged the completion of the survey's forms.

Some of those who answered the survey reported that there is some criminality at national level but are not aware that it would have any cross-border impact.²³ However, sometimes information has been needed from the other side of the border in cases related to killing of large carnivores, like bears, lynxes and wolves.²⁴ Otherwise, there are only sporadic cases of wildlife crime mostly with minor law offences punishable with fines. The respondents placed this range of offences between those in the field of fishing, hunting, natural livelihoods and potentially increased mining activities. For example, 1 respondent pointed to illegal waste transport across the Finnish-Swedish border that can cause serious environmental pollution. Over the years, inspections have revealed several cases where goods posing a serious environmental risk were transported across borders completely without appropriate transport equipment or without taking any measures to protect the environment.²⁵ Another example mentioned is the illegal trade of wild birds' eggs for which a successful practice is in place, where the different law enforcement authorities of both countries organise every

²² WP3_Int01_B2B_PA_FI; WP3_Int02_B2B_PA_FI.

²³ WP3_Quest02_B2B_LEA_FI.

²⁴ WP3_Quest01_B2B_PA_FI; WP3_Quest02_B2B_LEA_FI; WP3_Quest04_B2B_LEA_FI; WP3_Quest05_B2B_LEA_SWE.

²⁵ WP3_Quest04_B2B_LEA_FI.

year a special monitoring of the borders crossing with targeted checks aimed at uncovering and discouraging such illegal trade.^{26 27}

The key element regarding the transboundary pollution or wildlife crimes in the B2B case is that there are very few offences and these are not statistically relevant. In Finland there is a comprehensive system of compensation from the losses induced by any of the protected wild predators, Game Animal Damages Act (105/2009), which may contribute to keep to a minimum the cases of wildlife crimes. In both Sweden and Norway there are also similar predators' compensation legislations in place. Finland and Norway use an *ex-post* system that compensate on actual damages, whereas Sweden uses an *ex-ante* system based on the evaluated quotas of predators in the region.

Other interesting themes emerged. All respondents emphasized the importance of transboundary biodiversity conservation areas and expressed the importance of and an interest in collaborative initiatives, such as shared data management and flowing exchange of information across borders connected to law enforcement databases.²⁸ An example would be developing electronic hunting and fishing permit database systems, from which information could be quickly accessed 24/7.²⁹

Another significant idea mentioned by most participants was the emphasis on the training of the people who operate on the ground to do joint surveillance and crime detection cooperation and thus to guarantee efficient transboundary biodiversity protection.³⁰ Sometimes the need for joint operations is complicated by the lack of resources in the respective organisations and by misaligned laws and regulations that do not fully harmonize with law enforcement work across borders. Hence, it was emphasised by all that the different laws and regulations of the participant countries should be more harmonized as failing to do so may hinder cross-border cooperation.³¹

Another recurring theme was the emphasis on local communities: hunting and fishing associations and NGOs' participation was indicated as the way forward to securing the full implementation of cross-border biodiversity conservation policies.³² Another respondent emphasised how failing to secure biodiversity conservation would bring consequences that could be quite devastating for the currently relatively clean nature of Upper Lapland and especially its waterways.³³

²⁶ WP3_Quest01_B2B_PA_FI; WP3_Quest02_B2B_LEA_FI.

²⁷ See Digno Montalván Zambrano, *Best practices on prevention and enforcement mechanisms against cross-border pollution and wildlife crime*, TRANSNATURE (2025), 30. <<https://zenodo.org/communities/transnature/records?q=&l=list&p=1&s=10>>.

²⁸ WP3_Quest01_B2B_PA_FI; WP3_Quest02_B2B_LEA_FI; WP3_Quest03_B2B_PA_FI; WP3_Quest04_B2B_LEA_FI; WP3_Quest05_B2B_LEA_SWE.

²⁹ WP3_Quest04_B2B_LEA_FI.

³⁰ WP3_Quest01_B2B_PA_FI; WP3_Quest02_B2B_LEA_FI; WP3_Quest04_B2B_LEA_FI; WP3_Quest05_B2B_LEA_SWE.

³¹ WP3_Quest04_B2B_LEA_FI; WP3_Quest05_B2B_LEA_SWE.

³² WP3_Quest04_B2B_LEA_FI; WP3_Quest05_B2B_LEA_SWE.

³³ WP3_Quest01_B2B_PA_FI.

Overall, these insights provide valuable directions for future protection activities and point toward the need for stronger joint themed surveillance on both Swedish and Norwegian sides of the border, training cooperation and information exchange for an effective transboundary biodiversity conservation in the field of wildlife and pollution prevention. Further prevention must be improved through environmental education projects involving various actors (such as authorities, including law enforcement authorities, researchers and NGOs), focus groups or multi-stakeholder meetings, with the purpose of exchanging ideas and experiences and the result of which would be reports, which should inform authorities and the public and ultimately influence positively biodiversity conservation policy.

2.3. The Scheldt Estuary

2.3.1. Context

The Scheldt Estuary is situated between the southwest of the Netherlands and the northwest of Flanders, Belgium.³⁴ The case study looks at the part between Ghent and Antwerp, which is known as the 'Seascheldt' (Flanders), and the part beyond Antwerp, which is called the 'Western Scheldt' (Netherlands). Together with the Western Scheldt, the Seascheldt forms the Scheldt Estuary, which is about 160 kilometres long. The total basin area is widely recognized as important for water birds, migrating fish species, porpoises, and diverse rare habitats. Large parts of this estuary are designated as Natura 2000 Site (Special Protection Areas or Special Areas of Conservation under the EU Habitats and Birds Directives), Ramsar Site, UNESCO geopark, transboundary park (*Groot Saefthinge*), and national park (*Schelde Valei*). Intensive agricultural activities also take place in the Scheldt catchment area. The entire Scheldt River falls under the International Scheldt Commission (ISC). The scope of the Scheldt Treaty is the international river basin district of the Scheldt Area.³⁵ In recent years, new harbor expansion plans have raised concerns for increased nitrogen deposits, further deepening, and climate mitigation. In addition, the disclosure of the discharge of persistent chemicals in the port of Antwerp sparks new governance questions in relation to transboundary pollution.

³⁴ See 'The Scheldt Estuary' <<https://northsearegion.eu/immerse/project-estuaries/the-scheldt-estuary/>>.

³⁵ The Scheldt Treaty (signed 3 December 2002, Ghent) <www.isc-cie.org/wp-content/uploads/ACC-GENT_Accord-Escaut.pdf>.

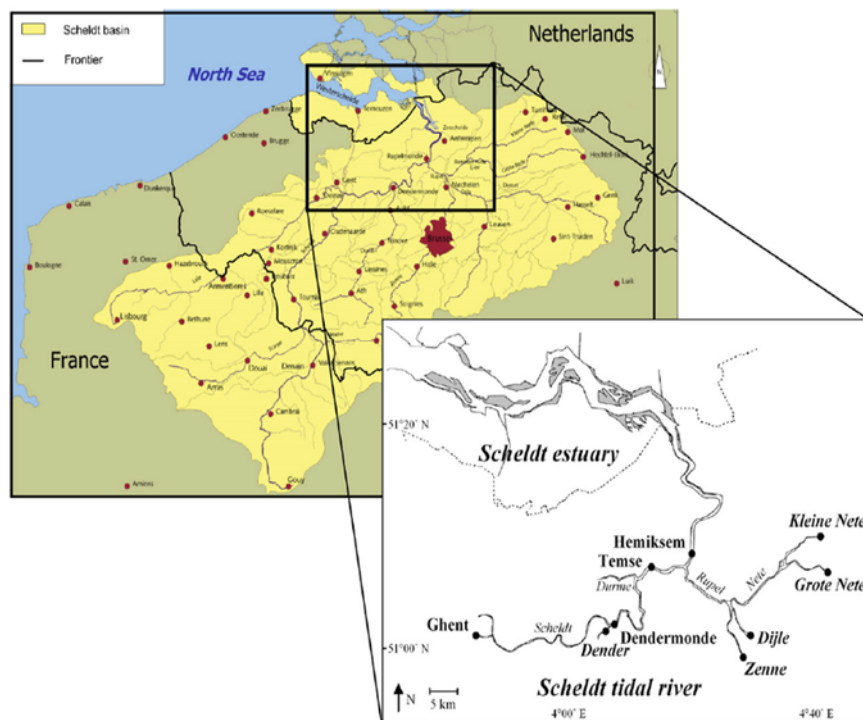


Figure 4 Map of the Scheldt Estuary.³⁶

2.3.2. Insights

In the case of the Scheldt Estuary, the process of identifying respondents was based on the desk research carried out (stakeholder mapping) as well as interviews conducted under WP1 and WP2. The interviews, part of WP2 included questions identifying activities linked to pollution or wildlife crime. Moreover, as this was anticipated to be relevant in the context of the Scheldt Estuary, stakeholders were asked about their concerns regarding water quality, PFAS, microplastics and/or nitrogen pollution. Based on these (23) interviews, there was already an indication that PFAS pollution was often confirmed to be a concern, whereas there were no indications of wildlife crime.

For the questionnaire, a total of 15 stakeholders, individuals and institutions were approached, 9 from Flanders and 6 from the Netherlands. Out of these, 5 responded positively (4 from Flanders and 1 from the Netherlands), agreeing either to complete a questionnaire (4) or to provide information via an interview (1). Regarding their profiles, responses were received exclusively from non-state actors and experts.

The process followed a differentiated strategy for the topics of pollution and wildlife crime. As mentioned above, the earlier desk research and stakeholder mapping (WP1

³⁶ Claire Delvaux and others, 'Controls on Riverine $\delta^{30}\text{Si}$ Signatures in a Temperate Watershed under High Anthropogenic Pressure (Scheldt — Belgium)' (2013) 128 *Journal of Marine Systems*.

and WP2) pointed to PFAS-related pollution concerns and an apparent absence of notable wildlife crime in the area. Consequently, the research design was adapted to the specific context, with 2 distinct methodological approaches: 1 focusing on deepening the understanding of pollution-related issues through targeted expert consultation, and another aimed at verifying and exploring the lack of evidence regarding wildlife crime through additional stakeholder engagement and snowball sampling.

For pollution, given the amount of information already emerging from the previous interviews, rather than seeking a large sample of general respondents, the team concentrated on deepening and validating the existing information by reaching out to selected experts with specialised knowledge on pollution in the estuary. In addition to the agreed target groups, additional profiles included experts, such as lawyers active on the topic. For wildlife crime, to verify absence of direct evidence of wildlife crime in the Scheldt Estuary area, a snowballing strategy was adopted to identify and engage organisations and authorities potentially involved in or aware of wildlife crime issues. The objective was not only to confirm the lack of evidence but also to gain contacts of other organisations or enforcement agencies involved. It started at the level of nature organisations and conservation groups active on both sides of the border. Input confirmed that wildlife crime is not an issue in the Scheldt estuary. No replies were received from the contacts (law enforcement) gained through NGO contacts. Despite several follow-ups -both by email and phone- responses were limited.

Cross-border pollution emerged as a major and complex issue in the Scheldt Estuary, particularly in relation to PFAS contamination and other industrial discharges.³⁷ The estuary is a densely populated and industrialised zone, hosting numerous chemical industries, refineries, and ports along both sides of the border. Respondents consistently identified chemical pollution -particularly related to PFAS- as one of the most pressing environmental problems affecting both ecosystems and public health. PFAS contamination gained increasing public and media attention in recent years. It is seen not only as an ecological threat but also as a major governance challenge, highlighting the difficulties of coordinating pollution control measures across national boundaries.

Respondents underlined the key role of civil society organisations in bringing pollution issues to the forefront of public debate.³⁸ Also, health-related concerns have become a powerful mobilising factor, prompting environmental groups and residents to demand stronger action and transparency from public authorities. These actors have increasingly resorted to litigation and legal advocacy, using the courts to compel governments to act. Litigation was described as compensating for perceived delays or gaps in political and administrative responses.³⁹

³⁷ WP3_Int01_SE_NSA_BE. This issue had already been identified in WP2.

³⁸ WP3_Int01_SE_NSA_BE; WP3_Quest02_SE_E_BE; WP3_Quest05_SE_NSA_BE.

³⁹ WP3_Int01_SE_NSA_BE; WP3_Quest02_SE_E_BE.

Input from the respondents revealed that cross-border coordination on pollution remains limited and largely reactive.⁴⁰ The PFAS problem is also increasingly placing a heavy constraint on the permissibility and affordability of any nature development and restoration project that requires excavation and/or soil movement.⁴¹ The role of the courts was frequently highlighted as a decisive factor shaping the pollution agenda. Ongoing PFAS-related cases were mentioned as examples of how judicial processes can influence environmental governance. These cases raised awareness and also triggered political responses, compelling governments to strengthen environmental standards and monitoring procedures.⁴² However, respondents stressed that litigation is a time-consuming and resource-intensive process. Smaller community groups and NGOs face significant obstacles due to limited access to funding and subsidies, which hampers their capacity to engage in long-term advocacy or legal action.⁴³

In contrast to pollution, wildlife crime appears to be largely absent or negligible in the Scheldt Estuary. Respondents from conservation NGOs confirmed that there are no known cases of illegal killing, trafficking, or exploitation of protected species in the area. Wildlife crime in the Scheldt Estuary appears limited compared to other European regions.⁴⁴

2.4. The ZASNET EGTC and the ‘Meseta Ibérica’ Transboundary Biosphere Reserve

2.4.1. Context

ZASNET is a European Grouping of Territorial Cooperation (EGTC) created in 2009 at the North-Eastern border of Portugal and Spain between municipalities and subnational governments of these 2 countries to cooperate inter alia in the environmental sector.⁴⁵ Its most successful result is the recognition of the ‘Meseta Ibérica’ as the first Transboundary Biosphere Reserve (MITBR) in the framework of the MAB Programme in 2015.⁴⁶ It is one of the largest transboundary biosphere reserves in Europe covering a total of 1,132,607 hectares. The MITBR embraces natural parks and Natura 2000 sites and is characterised by very diverse biodiversity being one of the most important areas

⁴⁰ WP3_Int01_SE_NSA_BE; WP3_Quest02_SE_E_BE.

⁴¹ WP3_Quest05_SE_NSA_BE.

⁴² WP3_Quest02_SE_E_BE; WP3_Int01_SE_NSA_BE.

⁴³ WP3_Quest02_SE_E_BE; WP3_Int01_SE_NSA_BE.

⁴⁴ WP3_Quest03_SE_NSA_BE; WP3_Quest04_SE_NSA_NL.

⁴⁵ See ‘La ZASNET’ <www.zasnet-aect.eu/es/la-zasnet>.

⁴⁶ Resolución de 16 de julio de 2015, de Parques Nacionales, por la que se publica la aprobación por la UNESCO de dos reservas de la biosfera españolas: Reserva de la Biosfera del Macizo de Anaga, Tenerife, y Reserva de la Biosfera Transfronteriza Meseta Ibérica (España y Portugal) [Resolution of 16 July 2015 of National Parks, publishing the approval by UNESCO of two Spanish biosphere reserves: Macizo de Anaga Biosphere Reserve, Tenerife, and Iberian Plateau Transboundary Biosphere Reserve (Spain and Portugal)], BOE 205, 27 August 2015.

for wild species in Spain, Portugal and Europe. ZASNET is its managing authority. Among the MITBR organs, there is a participatory body to ensure the involvement of civil society and local communities in the governance of this transboundary natural space.

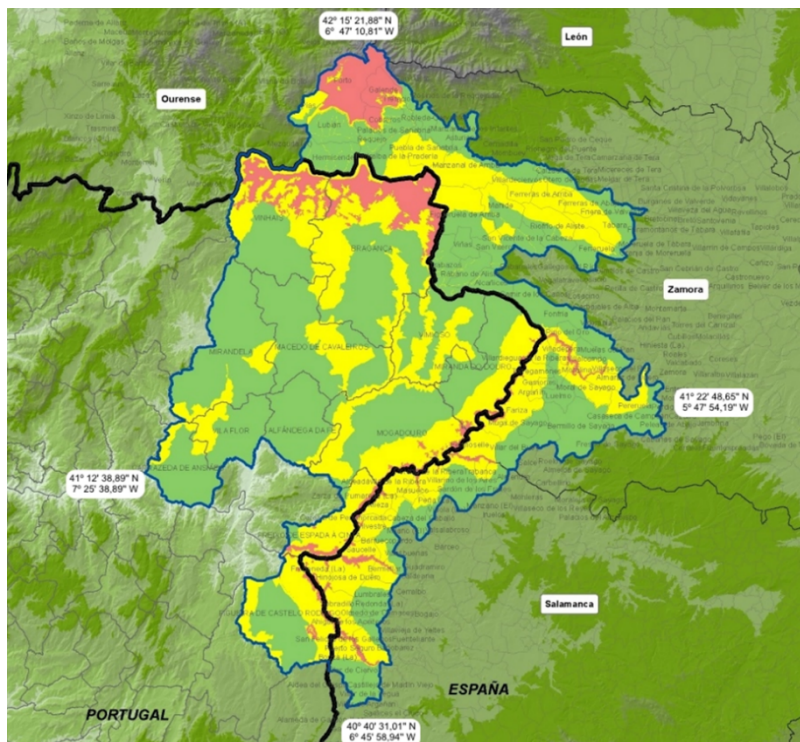


Figure 5 Map of the 'Meseta Ibérica' Transboundary Biosphere Reserve.⁴⁷

2.4.2. Insights

For the ZASNET EGTC and the Meseta Ibérica TBR case, respondents were identified and contacted in 3 different phases. In the first one, a number of stakeholders previously identified or engaged during the work carried out in WP1 and WP2 were approached. The second phase focused on consolidating participation by following up with non-respondents and strengthening communication through ZASNET, that acted as a gatekeeper for this case study. When ZASNET had provided the relevant contacts, it was copied in the correspondence to reinforce the request. Despite these efforts, the response rate remained very low. In light of this, a third phase was launched using the snowball technique. An expert with an extensive network of contacts was approached, who provided a key contact that subsequently enabled access to a larger number of law enforcement-profile participants. In total, 18 individuals and institutions were contacted and invited to complete the questionnaire, to ensure that the minimum target of 6

⁴⁷ See Annex to Resolution of 16 July 2015 of National Parks, publishing the approval by UNESCO of two Spanish biosphere reserves: Macizo de Anaga Biosphere Reserve (Tenerife) and Iberian Plateau Transboundary Biosphere Reserve (Spain and Portugal), BOE 205, 27 August 2015.

responses was met. These invitations were sent during a period of 4 months (May-August 2025). At the end of the third phase, 10 responses were received, 1 from Portugal and 9 from Spain. Regarding the profiles of the respondents, these were law enforcement agencies (6), non-state actors (2), public authorities (1) and experts and researchers (1). However, the process revealed three significant limitations. First, the number of responses obtained is unbalanced, both between the 2 countries and among the different participant profiles. Second, many respondents do not work directly in the study area, which means that, although their contributions are valuable, they do not stem from first-hand knowledge of the field. Finally, most responses provide only limited information, lacking the detail needed for a deeper analysis.

Regarding transnational wildlife crime, various incidents have been reported affecting protected species and their habitats. The Iberian wolf continues to face tensions with livestock farming, illegal hunting, poisoning, traps, and habitat fragmentation, despite current legal protections.⁴⁸ Other issues raised included the destruction of raptor nests, deliberate burning of scrubland for agricultural use, and poor enforcement of hunting regulations, with quota violations and the killing of protected species.⁴⁹ There is a lower awareness and understanding of cross-border pollution, though forest fires are highlighted as a potential pollution source.⁵⁰ Perceptions on the harmonisation of environmental laws and regulations between Spain and Portugal vary. Most respondents believe that effective harmonisation is lacking, particularly regarding pollution matters.⁵¹

As for cross-border cooperation mechanisms, a SEPRONA member noted that the existing protocols between the specialised environmental units of the Portuguese National Republican Guard (SEPNA) and the Spanish Civil Guard (SEPRONA) allow for direct and swift collaboration.⁵² However, most respondents believed that cooperation is either insufficient or non-existent, calling for stronger coordination between environmental inspection services.⁵³ The Spain-Portugal Cross-Border Cooperation Programme (POCTEP) 2021-2027 is identified as a key framework to support such collaboration,⁵⁴ and the LIVEX-LOBO 2024 Programme stands out as a successful example of best practice.⁵⁵ Under this initiative, SEPNA and SEPRONA officers took part in a cross-border simulation exercise on wildlife and environmental crime.⁵⁶

⁴⁸ WP3_Quest02_ZASNET_NSA_SPA; WP3_Quest03_ZASNET_NSA_SPA; WP3_Quest04_ZASNET_NSA_SPA.

⁴⁹ WP3_Quest05_ZASNET_LEA_SPA; WP3_Quest08_ZASNET_PA_SPA.

⁵⁰ WP3_Quest05_ZASNET_LEA_SPA.

⁵¹ WP3_Quest02_ZASNET_NSA_SPA; WP3_Quest04_ZASNET_NSA_SPA; WP3_Quest05_ZASNET_LEA_SPA; WP3_Quest09_ZASNET_LEA_SPA; WP3_Quest10_ZASNET_LEA_SPA.

⁵² WP3_Quest01_ZASNET_LEA_SPA.

⁵³ WP3_Quest03_ZASNET_E_SPA; WP3_Quest05_ZASNET_LEA_SPA; WP3_Quest06_ZASNET_LEA_SPA; WP3_Quest09_ZASNET_LEA_SPA; WP3_Quest10_ZASNET_LEA_SPA.

⁵⁴ WP3_Quest06_ZASNET_LEA_SPA.

⁵⁵ WP3_Quest01_ZASNET_LEA_SPA.

⁵⁶ See Digno Montalván Zambrano, *Best practices on prevention and enforcement mechanisms against cross-border pollution and wildlife crime*, TRANSNATURE (2025), 27. <<https://zenodo.org/communities/transnature/records?q=&l=list&p=1&s=10>>.

The main barriers to greater cooperation identified are the lack of operational authority across borders, bureaucratic hurdles, and limited human and material resources.⁵⁷ At the national level, LIFE programme projects and local environmental education and participation initiatives are valued, although these are seen as having limited influence on political and legal decision-making.⁵⁸ Overall, participants emphasised the need for stronger collaboration and coordination at all levels, with the active involvement of stakeholders and, crucially, of the authorities responsible for biodiversity and nature conservation.

3. Conclusions

As stressed above, given the substantial methodological constraints, the results presented in this working paper do not aim to offer conclusive or statistically validated findings but rather to share learning, ensure transparency regarding the limitations encountered, and provide initial insights into governance mechanisms that can further improve the prevention and/or enforcement of transnational wildlife crime and cross-border pollution.

Despite the limitations encountered, several cautious cross-case observations can be advanced.

- First, in all case studies participants perceive that the incidence of wildlife crime is generally low, under-detected, or limited to very specific situations, often linked to broader socio-environmental conflicts. Examples include illegal killing or poisoning of large and small carnivores in the Julian Alps and in the border between Portugal and Spain, sporadic offences in the Baltic to Barents region, and an apparent absence of wildlife crime in the Scheldt Estuary.
- Second, pollution emerges as a more visible and institutionally salient issue than wildlife crime, especially where industrial activities or hydrological systems produce clear cross-border effects. PFAS contamination in the Scheldt Estuary and wastewater problems in the Julian Alps illustrate how transboundary ecosystems can simultaneously experience shared pressures and fragmented governance responses. In the other study areas, participants perceived cross-border pollution incidents as occasional or non-existent.
- Third, cross-border cooperation exists in all areas but remains uneven, informal, and highly dependent on personal networks, project-driven initiatives, or ad hoc practices, rather than on systematic institutional frameworks. Respondents

⁵⁷ WP3_Quest05_ZASNET_LEA_SPA WP3_Quest06_ZASNET_LEA_SPA; WP3_Quest07_ZASNET_LEA_PT.

⁵⁸ WP3_Quest02_ZASNET_NSA_SPA; WP3_Quest03_ZASNET_E_SPA.

rarely referred to joint conservation areas as direct enforcers but did highlight their role as platforms for dialogue, shared monitoring, and information exchange, even if these mechanisms are not yet robust or consistent.

- Fourth, across all regions, local actors (NGOs, environmental organisations, hunting and fishing associations, community groups, and civil society) play a central role in monitoring, early detection, and placing environmental issues on the political agenda. Their influence is particularly visible in pollution-related cases, where litigation and civic mobilisation have compensated for gaps in administrative enforcement. However, organisations more directly involved in addressing wildlife crime do not always have the same perception.
- Fifth, environmental education projects and participatory initiatives involving a wide range of actors are valued as tools to improve the prevention of cross-border pollution and transnational wildlife crime, but the Baltic to Barents and the ZASNET cases point to the need both to scale up such initiatives and to strengthen their capacity to meaningfully influence public policy and decision-making in transboundary biodiversity protection.

Future work should prioritise more systematic data collection. Given the sensitivity of enforcement-related matters and the reluctance of some authorities to engage openly on these issues, progress in this field is likely to depend on longer-term engagement, trust-building strategies, and, where appropriate, the involvement of intermediary organisations capable of facilitating access to information. Adopting such methodological approach is essential to deepen the analysis of the role played by transboundary conservation areas as intermediaries in the prevention and enforcement of transnational wildlife crime and cross-border pollution.

4. Annex 1: WP2 Interview

Omissis

Wildlife crime and pollution

Having already touched upon the challenges for cross-border biodiversity conservation and cooperation, we would like to delve deeper into two specific issues - wildlife crime and pollution.

14. Are you aware of activities that result in direct quantitative loss of biodiversity (e.g. deforestation or draining of wetlands) or activities involving the killing, destruction, or taking of specimens of protected wild fauna or flora species with a cross-border impact within your region/case study?
15. Are you aware of any air, soil or water pollution that may result in habitat loss or degradation with a cross-border impact within your region/case study?
16. Is there any cross-border cooperation to address these activities? If yes, what tools or mechanisms are employed?

Omissis

5. Annex 2: WP3 Questionnaire

Question 1. What is your professional role, and how do you contribute to the prevention/enforcement of wildlife crime or pollution?

Question 2. Are you aware of activities that result in illegal and direct quantitative loss of biodiversity (e.g. deforestation or draining of wetlands) or activities involving the killing, destruction, or taking of specimens of protected wild fauna or flora species with a cross-border impact within your region/case study?

If yes:

- What are the most affected species or habitats?
- Are you aware of relevant court cases?
- To your knowledge or perception, is there harmonization between the relevant laws and regulations in the two countries?

Question 3. Are you aware of any air, soil, or water pollution that may result in habitat loss or degradation with a cross-border impact within your region/case study?

If yes:

- Can you give specific examples?
- Are you aware of relevant court cases?
- To your knowledge or perception, is there harmonization between the relevant laws and regulations (e.g. permits, environmental standards) in the two countries?

Question 4. Is there any cross-border or transnational cooperation to address these activities?

If yes:

- Which are the relevant authorities or actors involved?
- How is this cooperation undertaken? Are you aware of any tools or mechanisms to support the cooperation?
- Could you provide examples of successful practices and also share the main challenges you face?

Question 5. Are there any national cooperation mechanisms in place to address the prevention and/or enforcement of transnational wildlife crime and cross-border pollution?

If yes:

- Which are the relevant authorities or actors involved?
- How is this cooperation undertaken? Are you aware of any tools or mechanisms to support the cooperation?
- Could you provide examples of successful practices and also share the main challenges you face?

Such mechanisms can include, for example, environmental education initiatives involving a variety of actors (such as public authorities, including law enforcement agencies, academics, and civil society organisations), focus groups, or multi-stakeholder sessions aimed at exchanging ideas and experiences, resulting in reports intended to inform and influence public policy.

Question 6. In your view, what type of governance mechanisms can further improve the prevention and/or enforcement of transnational wildlife crime and cross-border pollution?

Please let us know if your answer is based on an experience outside our area of study. If so, could you tell us where or in what context?

Question 7. Specifically:

- In your view, what kind of involvement of non-state actors—such as NGOs and other civil society organisations—can further improve the prevention and/or enforcement of transnational wildlife crime and cross-border pollution?
- In your view, what kind of cooperation between law enforcement agencies and non-state actors—such as NGOs and other civil society organisations—can further improve the prevention and/or enforcement of transnational wildlife crime and cross-border pollution?

Please let us know if your answers are based on an experience outside our area of study. If so, could you tell us where or in what context?

Question 8. Is there anything we didn't ask that you would like to add?

