Interreg
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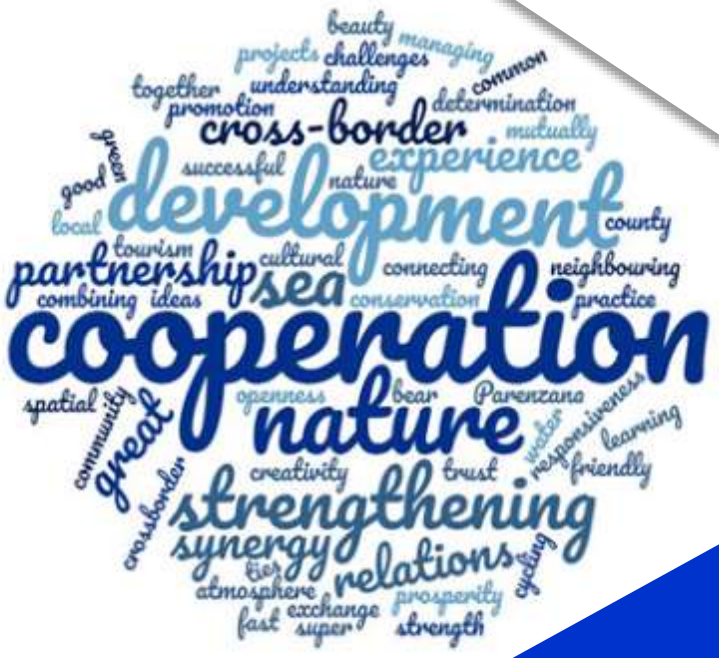


# STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA)

## Environmental Report -draft version

Interreg Programme Slovenia-Croatia 2021-2027

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Draft version, March 2022

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*Nothing in this document could prejudice the final delimitation between Croatia and Slovenia and the graphics and depictions of the border are exclusively for the purpose of this document.*

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## ACRONYMS

| | |
|---|---|
| ERDF | European Regional Development Fund |
| EC | European Commission |
| ESI | European structural and investment funds |
| ETC | European Territorial Cooperation |
| EUSALP | EU Strategy for the Alpine Region |
| EUSDR | EU Strategy for the Danube Region |
| CSI | Continuum Suitability Index |
| IP | Interreg Programme |
| MRSs | Macro-regional strategies |
| PO | Policy objectives |
| SEA | Strategic Environmental Assessment |
| SO | Specific objectives |
| ISO | Interreg Specific Objectives |
| IC | Impact Class |

# 1. INTRODUCTION

In parallel to the preparation of the Interreg Programme Slovenia–Croatia for the programming period 2021–2027, a Strategic Environmental Assessment (SEA) is being conducted. The SEA aims to contribute to the integration of environmental considerations and ensure a high level of environmental protection in the preparation and adoption of the programme. The legal basis for such an assessment is the Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment ("SEA Directive") and Ordinance SEA Reports and detailed SEA procedure (Official Gazette of the Republic of Slovenia, No. 73/05).

This document represents the environmental report which is the core output of the SEA procedure. The following information is presented in the subsequent chapters:

- Non-technical summary of the report
- Description of the methodological approach
- Brief description of the programme and its main objectives and supported actions as well as the relation to other programmes and plans
- Outline of the relevant environmental objectives

- Description of the current state of the environment and its development without the programme intervention as well as main environmental challenges
- Assessment of the foreseeable impacts on the environment for each specific objective as well as assessed alternatives and measures to reduce, prevent or offset significant negative environmental impacts
- Description of encountered difficulties
- Description of planned monitoring measures

## 1.1. Time limitations

The time frame of the SEA is determined by the period of validity of the programme under evaluation. This is primarily the duration of the programming period from 2021-2027 but includes the subsequent period until 2029 as well. Based on the Commission's proposed regulations on the rules for the ESI funds, the ERDF and INTERREG, programme-based payments are still possible for this time. Thus, at the current point in time, 31.12.2029 or, if different, the formal programme closure is to be regarded as the end date of possible financing. To assess the status quo and possible future developments, the latest available data is used as the basis for this SEA.

## 1.2. Spatial limitations

In spatial terms, the area of expected environmental impacts of the assessed IP is determined by the area of its validity. Therefore, the primary investigation area is the territory of the cross-border area of Slovenia and Croatia. Most of the expected environmental impacts are nevertheless likely to be limited to this primary study area, as the majority of the measures have a strong regional focus. However, some individual measures, especially climate- or air/water-related (which cannot always be strictly spatially delineated), are assessed beyond the primary study area. Of particular relevance here are significant transboundary environmental impacts (effecting other countries than Slovenia or Croatia), the occurrence of which, according to Article 7 of the SEA Directive, requires the possibility for the affected state to be involved in a consultation process.

## 1.3. Content limitations and depth of the assessment

The subject of this SEA is the IP Slovenia-Croatia 2021-2027, for which the expected environmental effects of particular measures of the programme are assessed. The target framework is set at an international, EU, national and regional level. The delimitation of the included objectives or the corresponding protective goods is determined by The SEA directive. These conditions determine the depth of the assessment, which is directly linked to the measures of the programme. However, due to the nature of the IP, these measures do not relate to concrete projects but define solely the framework of possible projects. Thus, the way

certain projects are delimited depends on the particular level of detail of the measures presented in the IP. This rather abstract nature of the programme influences the assessment of potential environmental impacts and results in a primarily qualitative evaluation.

# 2. SUMMARY

## 2.1. NON-TECHNICAL SUMMARY

The Interreg Programme (IP) Slovenia-Croatia 2021-2027 is a programme in the framework of the European Territorial Cooperation (ETC) and funded by the European Regional Development Fund (ERDF). The purpose of such Cross-Border programmes is to support Member States to implement joint projects, address joint challenges and overcome border obstacles.

The programme development was accompanied by a Strategic Environmental Assessment (SEA) which aims at identifying potential negative impacts on the environment at an early stage. The process includes consultation with the relevant environmental authorities in both countries.

According to the legal framework (various national legislation and guidelines under the umbrella of the SEA directive (2001/42/EC)), the assessment methodology and process was designed and presented to the authorities on the scoping workshop.

The assessment is based on the Interreg programme Slovenia-Croatia 2021-2027, Draft version 3, 31 January 2022, which is an advanced state of programme development where no major changes are expected anymore. The time period for implementation of the programme stretches from 2021 to 2027 (+2 years for finalisation of projects).

The Priorities, Specific objectives (SO) and Interreg specific objectives (ISO) that will be supported by the IP 2021-2027 (see chapter 2) are the following:

- Priority 1: A green and adaptive region
  - SO 1.1: Promoting climate change adaptation, disaster risk prevention and resilience, from an ecosystem approach SO 1.2: Enhancing protection and preservation of nature biodiversity, and green infrastructure, including in urban areas, and reducing all forms of pollution
- Priority 2: Resilient and sustainable region
  - SO 2.1: Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovation
- ISO 1: An accessible and connected region
  - Specific objective 3.1 - Interreg-specific objective 1: Enhance efficient public administration by promoting legal and administrative cooperation and cooperation between citizens, civil society actors and institutions, in particular with a view toward resolving legal and other obstacles in border regions;

- Specific objective 3.2 - Interreg-specific objective 1: Build up mutual trust, in particular by encouraging people to people actions

Under those Priorities and specific objectives, the programme outlines different types of actions, thematic focus points and examples of what is intended to be funded. The focus of actions is mostly laid on cooperation, exchange, joint strategies and management plans and similar activities. Investments in physical assets and construction activities are possible under some of the Specific Objectives, but due to the overall budget of the programme they are usually represent small scale investments.

The baseline analysis of the programme area revealed that the overall state of the environment is not bad, however the development in both countries is quite heterogeneous depending on the individual aspects of the environment and also differing between countries. Monitoring reveals most negative tendencies in relation to:

- land use and soil sealing, where both countries clearly miss their targets for sustainable land consumption and both countries have shown a considerable increase in artificial areas in the past decades
- state of protected areas, where both species and habitats of European interest show a large share of non-favourable states and where even some deterioration can be seen for some species or habitats.

landscape quality, with an increase in landscape fragmentation and risk of agricultural land abandonment visible in both countries. Against those trends, the potential impacts of the programme for each specific objective and each environmental aspect, were identified. The basis for those assessments were descriptions of actions within the programme itself as well as further documentation and information from the programme authorities The results were presented in impact matrices accompanied by textual explanations.

The main results are:

- Four of the Specific Objectives ( *SO 1.2 – Enhancing protection and preservation of nature, biodiversity, and green infrastructure, including in urban areas, and reducing all forms of pollution, SO 1.1 – Promoting climate change adaptation, disaster risk prevention and resilience, from an ecosystem-based approach , SO 2.1 – Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovation, SO 3.1 - ISO 1 – Enhancing efficient public administration by promoting legal and administrative cooperation and cooperation between citizens, civil society actors and institutions, in particular, with a view toward resolving legal and other obstacles in border regions*) will lead to positive and negative environmental impacts.
- Interreg specific objective (SO 3.2 - ISO 1 – Build up mutual trust, in particular in particular by encouraging people-to-people actions) will lead to no immediate concrete environmental impacts, neither negative nor positive.

No Specific Objective creates significant negative environmental impacts on programme level. However, multiple effects strongly depend on the actual location of projects and actual measures within those projects, both of which are not known at the current stage. It is therefore possible, that depending on the type of project implemented and its location, further assessments are necessary which is also outlined in the report.

In terms of potential impacts on environmental aspects, positive impacts are concentrated on the following:

- *Flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity,* addressed by supporting strategically planned green infrastructure and through improvement of protection and preservation of endangered habitats, species, and landscape (SO 1.2)
- *Human health and well-being*, addressed by improvement of resilience of society to climate change (SO 1.1) and through enhancement of the resilience and efficiency of public administration in the fields of health care, social inclusiveness and welfare (SO 3.1 - ISO 1).
- *Climate and energy*, being explicitly addressed through strengthening of risk preparedness and response capacities on climate change and increasing the resilience to climate change effects (SO 1.1) and through enhancement of the resilience and efficiency of public administration in the field of energy efficiency SO 3.1-ISO 1).

Negative impacts in the context of the programme are expected to be minor, however are linked to some concrete environmental aspects and actions mostly:

- *Flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity* where increased tourism pressure and increased construction measures can negatively impact habitats and species (SO 2.1);
- *Soil, land use*, where construction projects are likely to lead to soil sealing. In the wider context, spill over effects of new necessary infrastructure to accommodate higher tourist numbers are possible as well (SO 1.2, SO 2.1);
- *Human health, Air and Climate and energy*, the pilot actions (directly) or higher amounts of generated traffic (indirectly) could lead to noise and air emissions (SO 1.1, SO 1.2, SO 2.1).

For other aspects, only very minor negative impacts could be identified. Table below shows an overview of the assessment results for each environmental aspect and each SO. Concrete descriptions of those assessments are included in the main Environmental Report. Overall impacts of the IP on the environment will likely be minor and non-significant. Cumulative impacts with other ESI-fund programmes will not significantly change this assessment. Furthermore, many impacts will be mid- to long-term due to increased awareness, built

capacity and established or prolonged cooperation in specific fields. Some measures to reduce even the minor negative impacts or to improve the potential positive impacts have been formulated as outlined in the table below.

Environmental aspects and main environmental objectives

| Environmental aspects | Main environmental objectives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | overall | SO1.1 | SO1.2 | SO2.1 | SO3.1-ISO1 | SO 3.2 SO 1 | Alternatives, enhancement and mitigation measures, recommendations |
| Human health and well-being | Reduce the population share exposed to excessive air pollution<br>Reduction of emission levels in consideration of respective emission limits<br>Reduce the population share exposed to excessive noise levels<br>Improved flood risk management<br>Reduced light pollution | B | B | B | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary.<br>For enhancement measures and recommendations see chapter 9.1.2. |
| Flora, fauna, habitats, biodiversity, areas with nature | Safeguarding the biodiversity of the flora and fauna including protected/threatened species and habitats, | B | B | B | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary.<br>For enhancement measures and recommendations see chapters 9.1.1., 9.1.2. and 9.1.3. |

| Environmental aspects | Main environmental objectives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | overall | SO1.1 | SO1.2 | SO2.1 | SO3.1-ISO1 | SO 3.2 SO 1 | Alternatives, enhancement and mitigation measures, recommendations |
| protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity | geodiversity and landscape diversity, maintaining the quality of areas with nature protection status, including protected areas, Natura 2000 areas and fostering ecological connectivity between them where possible | | | | | | | |
| Soil, land use | Minimized land take for the economy and reduction of the environmental impacts of existing economic land use.<br><br>Protection of soil functions | B | B | B | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary.<br><br>For enhancement measures and recommendations see chapter 9.1.2. and 9.1.3. |

| Environmental aspects | Main environmental objectives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | overall | SO1.1 | SO1.2 | SO2.1 | SO3.1-ISO1 | SO 3.2 SO 1 | Alternatives, enhancement and mitigation measures, recommendations |
| Cultural heritage | Favourable conditions for cultural heritage (both objects and areas) through protection, preservation, and awareness-raising | B | B | B | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary.<br>For enhancement measures and recommendations see chapter 9.1.2. and 9.1.3. |
| Landscape | Favourable condition of protected natural and cultural areas (natural parks, cultural landscape) through management | B | B | B | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary.<br>For enhancement measures and recommendations see chapter 9.1.2. and 9.1.3. |
| Water | Protection of groundwater against pollution and harmful substances | B | B | B | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary.<br>For enhancement measures and recommendations see chapter 9.1.2. and 9.1.3. |

| Environmental aspects | Main environmental objectives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | overall | SO1.1 | SO1.2 | SO2.1 | SO3.1-ISO1 | SO3.2 SO1 | Alternatives, enhancement and mitigation measures, recommendations |
| | Protection of surface water against pollution and harmful substances<br>Sustainable water use and preservation of good quantity status of water bodies<br>Effective water and risk management | | | | | | | |
| Climate and energy | Reduction of GHG emissions (non -ETS) by 20% in 2030 compared to 2005 for Slovenia<br>Reduction of GHG emissions (non -ETS) by 18.5 to 21.7 % in 2030 compared to 2005 for Croatia<br>Fostering of renewable energy sources | B | B | B | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary.<br>For enhancement measures and recommendations see chapter 9.1.2. and 9.1.3. |

| Environmental aspects | Main environmental objectives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | overall | SO1.1 | SO1.2 | SO2.1 | SO3.1-ISO1 | SO 3.2 SO 1 | Alternatives, enhancement and mitigation measures, recommendations |
| | Improvement of energy efficiency<br>Climate resilience | | | | | | | |
| Material assets, raw material resources | Reduction and efficient recycling of waste<br>Promotion of recycling and the circular economy | B | A* | A* | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary.<br>For enhancement measures and recommendations see chapter 9.1.2. and 9.1.3. |
| Impact class (IC): **A** no impact (*) or positive impact; **B** negligible negative impact; **C** negligible negative impact due to implementation of mitigation measures; **D** significant negative impact; **E** devastating negative impact; **X** impact assessment is not possible | | | | | | | | |

## 2.2. POLJUDNI POVZETEK

Program Interreg (IP) Slovenija – Hrvaška 2021-2027 je program Evropskega teritorialnega sodelovanja (ETC), financiran s strani Evropskega sklada za regionalni razvoj (ERDF). Namen tovrstnih čezmejnih programov je podpora držav članic pri izvedbi skupnih projektov, naslovitvi skupnih izzivov in premagovanju mejnih ovir.

Pripravo programa je spremljala tudi Celovita presoja vplivov na okolje (CPVO), ki stremi k prepoznavanju potencialnih negativnih vplivov na okolje že v zgodnji fazi. Proces CPVO vključuje tudi posvetovanja s pristojnimi okoljskimi organi v obeh državah.

Glede na zakonski okvir (nacionalno zakonodajo in smernice za izvedbo SEA direktive (2001/42/EC)) sta bila določena metodologija presoje in proces postopka, ki sta bila predstavljena pristojnim organom na delavnici vsebinjenja.

Presoja temelji na vsebini Interreg programa Slovenija – Hrvaška 2021-2027, osnutek verzija 3, 31.1.2022, ki predstavlja napredno fazo priprave programa, kjer ni več predvidenih večjih sprememb. Časovno obdobje za izvajanje programa je od leta 2021 do 2027 (+2 leti za zaključek projektov).

Prioritete, posebni cilji (SO) in posebni cilji Interreg (ISO), ki bodo podprti v IP 2021-2027 so sledeči:

- Prioriteta 1: Zelena in prilagodljiva regija
  - SO 1.1: Promocija prilagajanja na podnebne spremembe, preprečevanje nevarnosti nesreč in odpornost, z vključevanjem ekosistemskega pristopa
  - SO 1.2: Izboljšanje zaščite in obvarovanja narave, biodiverzitete, zelene infrastrukture, vključno z urbanimi površinami, in zmanjševanjem vseh oblik onesnaženja
- Prioriteta 2: Odporna in trajnostna regija
  - SO 2.1: Izboljšanje vloge kulture in trajnostnega turizma v ekonomskem razvoju, socialna vključenost in socialne inovacije
- ISO 1: Dostopna in povezana regija
  - SO 3.1-ISO 1: Izboljšana učinkovitost javne uprave s promocijo zakonskega in upravnega sodelovanja med prebivalci, akterji civilne družbe in institucijami, še posebej s ciljem reševanja pravnih in preostalih ovir v obmejnih območjih
  - SO3.1 -ISO 1: Vzpostavitev medsebojnega zaupanja, še posebej s spodbujanjem projektov povezovanja med ljudmi

V okviru teh prednostnih nalog in posebnih ciljev program opisuje različne vrste aktivnosti, tematska področja in primere tega kar bo financirano. Poudarek je večinoma na sodelovanju, izmenjavi, skupnih strategijah in načrtih upravljanja ter podobnih aktivnostih. Naložbe v fizična sredstva in gradbene dejavnosti so možne pod nekaterimi posebnimi cilji, vendar pa glede na skupni proračun programa predstavljajo naloge manjšega obsega.

Analiza programskega območja je razkrila, da splošno stanje okolja ni slabo, vendar pa je razvoj v obeh državah precej nesorazmeren glede na posamezne vidike okolja, kjer prihaja tudi do razlik med državama. Spremljanje okolja je razkrilo, da so negativni trendi prisotni predvsem na področjih:

- Rabe tal in pozidava tal, pri čemer obe državi glede na trend povečevanja pozidanih in sorodnih zemljišč ne dosegata zastavljenih ciljev glede trajnostne rabe zemljišč;. Prav tako je v zadnjih desetletjih opaziti znatno porast pozidave tal.
- Stanja zavarovanih območij glede na visok delež prioritetnih vrst in habitatnih tipov, ki imajo opredeljeno neugodno stanje ali je zanje celo opazen trend slabšanja stanja.
- Krajinska pestrosti in kakovosti krajine, ki jo v obeh državah ogrožajo predvsem posegi, ki povzročajo fragmentacijo krajine in opuščanje kmetijskih zemljišč

Potencialni vplivi programa so bili identificirani za vsak posebni cilj in okoljski vidik. Kot podlaga za vrednotenje so služili opisi aktivnosti programa kot tudi nadaljnja dokumentacija in informacije s strani programskih organov. Rezultati so predstavljeni tudi v obliki matrike vplivov, ki jo spremljajo besedilna pojasnila.

Glavni poudarki so::

- Štirje posebni cilji ( *SO 1.2 – Izboljšanje zaščite in obvarovanja narave, biodiverzitete, zelene infrastrukture, vključno z urbanimi površinami, in zmanjševanjem vseh oblik onesnaženja, SO 1.1 – Promocija prilagajanja na podnebne spremembe, preprečevanje nevarnosti nesreč in odpornost, z vključevanjem ekosistemskega pristopa, SO 2.1 – Izboljšanje vloge kulture in trajnostnega turizma v ekonomskem razvoju, socialna vključenost in socialne inovacije, SO 3.1 - ISO 1 – Izboljšana učinkovitost javne uprave s promocijo zakonskega in upravnega sodelovanja med prebivalci, akterji civilne družbe in institucijami, še posebej s ciljem reševanja pravnih in preostalih ovir v obmejnih območjih)* bodo imeli pozitivne in negativne vplive na okolje.
- Posebni cilj Interreg (*SO 3.2 - ISO 1 – Vzpostavitev medsebojnega zaupanja, še posebej s spodbujanjem projektov povezovanja med ljudmi*) ne bo imel takojšnjih okoljskih vplivov, ne pozitivnih in ne negativnih.
- Nobeden izmed posebnih ciljev ne bo vodil do bistvenih negativnih vplivov na okolje na nivoju programa. Kljub temu pa bodo številni učinki odvisni od dejanske lokacije projektov in vrste projektov, ki v trenutni fazi programa niso znani. Zato je možno, da bodo za določene projekte potrebne dodatne presoje.

V okviru potencialnih vplivov na vidike okolja, smo prepoznali naslednje pozitivne vplive programa:

- *Flora, favna, habitati, biotska raznovrstnost, območja z naravovarstvenim statusom vključno z zavarovanimi območji in območji Natura 2000, geodiverziteta in krajinska raznovrstnost;* ki je naslovljena s podpiranjem strateško planirane zelene infrastrukture in prek izboljšanja zaščite in ohranjanja ogroženih vrst, habitatov in krajine ( SO 1.2).

- *Zdravje ljudi in dobro počutje*, ki je naslovljeno z izboljšanjem odpornosti družbe na podnebne spremembe ( SO 1.1) in z okrepitvijo odpornosti in učinkovitosti javne uprave na področju zdravstva, socialne vključenosti in blaginje (SO 3.1 - ISO 1 ).
- *Podnebje in energija*, sta neposredno naslovljena s krepitvijo pripravljenosti na tveganja in odzivnih sposobnosti v povezavi s podnebnimi spremembami, ter tudi s povečanjem odpornosti na posledice podnebnih sprememb ( SO 1.1) in s povečanjem odpornosti in učinkovitosti javne uprave na področju energetske učinkovitosti (SO 3.1 - ISO 1).

Negativni vplivi programa bodo predvidoma majhni, pojavljajo pa se predvsem pri naslednjih okoljskih vidikih in ciljih:

- *Flora, favna, habitati, biotska raznovrstnost, območja z naravovarstvenim statusom vključno z zavarovanimi območji in območji Natura 2000, geodiverziteta in krajinska raznovrstnos t*, pri čemer lahko razvoj turizma in izvedba gradbenih ukrepov negativno vpliva na habitate in vrste ( SO 2.1).
- *Tla, raba zemljišč*, kjer bi gradbeni projekti najverjetneje vodili do pozidave tal. V širšem kontekstu so možni tudi posredni vplivi v povezavi z novo infrastrukturo za namestitev večjega števila turistov (SO 1.2, SO 2.1).
- *Zdravje ljudi (Zrak) in Podnebje in energetika*, pri čemer bi lahko pilotne aktivnosti (neposredno) ali večje količine prometa (posredno) vodile do večjih emisij hrupa in onesnaževal v zrak (SO 1.1, SO 1.2, SO 2.1).

Pri preostalih okoljskih vidikih so bili prepoznani le zelo majhni negativni vplivi. Tabela spodaj prikazuje pregled rezultatov presoje za vsak okoljski vidik in posebni cilj. Detajlni opisi vrednotenja vplivov pa so podani v okoljskem poročilu. Skupaj bodo negativni vplivi programa na okolje najverjetneje majhni in zanemarljivi. Tudi kumulativni vplivi z ostalimi ESI-skladi in programi ne bodo znatno spremenili te presoje. Kljub temu pa so v okviru presoje podani tudi nekateri ukrepi za zmanjšanje manjših negativnih vplivov oz. za izboljšanje potencialnih pozitivnih vplivov. Številni pozitivni vplivi programa bodo srednje- in dolgoročni zaradi večje ozaveščenosti, boljše kapacitete in vzpostavljenega sodelovanja na različnih področjih.

| Okoljski vidiki | Glavni okoljski cilji | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Skupaj | SO1.1 | SO1.2 | SO2.1 | ISO3.1-ISO1 | SO3.2-ISO1 | Alternative, omilitveni ukrepi in ukrepi za izboljšanje, priporočila |
| Zdravje in dobro počutje ljudi | Zmanjšanje deleža prebivalstva, izpostavljenega prekomerno onesnaženem zraku<br>Zmanjšanje ravni emisij ob upoštevanju mejnih vrednosti<br>Zmanjšanje deleža prebivalstva, izpostavljenega prekomerni ravni hrupa<br>Izboljšano obvladovanje tveganj poplav<br>Zmanjšano svetlobno onesnaženje | B | B | B | B | B | A | Identificiranih ni nobenih bistvenih neposrednih ali posrednih negativnih vplivov na okoljski vidik, zato ni potrebnih omilitvenih ukrepov ali predlogov alternativ.<br>Ukrepi za izboljšanje in priporočila so zapisani v poglavju 9.1.2. |
| Flora, favna, habitati, biotska raznovrstnost, | Zaščita biotske raznovrstnosti flore in favne, vključno z zaščitenimi/ogroženimi | B | B | B | B | B | A | Identificiranih ni nobenih bistvenih neposrednih ali posrednih negativnih vplivov na okoljski vidik, zato ni potrebnih omilitvenih ukrepov ali predlogov alternativ. |

| Okoljski vidiki | Glavni okoljski cilji | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Skupaj | SO1.1 | SO1.2 | SO2.1 | ISO3.1-ISO1 | SO 3.2 - ISO1 | Alternative, omilitveni ukrepi in ukrepi za izboljšanje, priporočila |
| območja z naravovarstvenim statusom vključno z zavarovanimi območji in območji Natura 2000, geodiverziteta in krajinska raznovrstnost | vrstami in habitati, geodiverziteta in krajinska pestrost, ohranjanje kakovosti območji z naravovarstvenim statusom, vključno z zavarovanimi območji, območij Natura 2000 in spodbujanje ekološke povezanosti med njimi, kjer je to mogoče. | | | | | | | Ukrepi za izboljšanje in priporočila so zapisani v poglavjih 9.1.1., 9.1.2. in 9.1.3. |
| Prst, raba zemljišč | Zmanjšana pozidava zemljišč za gospodarstvo in zmanjšanje okoljskih vplivov obstoječe pozidave tal Varstvo funkcij tal | B | B | B | B | B | A | Identificiranih ni nobenih bistvenih neposrednih ali posrednih negativnih vplivov na okoljski vidik, zato ni potrebnih omilitvenih ukrepov ali predlogov alternativ.<br>Ukrepi za izboljšanje in priporočila so zapisani v poglavjih 9.1.2. in 9.1.3. |

| Okoljski vidiki | Glavni okoljski cilji | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Skupaj | SO1.1 | SO1.2 | SO2.1 | ISO3.1-ISO1 | SO3.2-ISO1 | Alternative, omilitveni ukrepi in ukrepi za izboljšanje, priporočila |
| Kulturna dediščina | Ugodni pogoji za kulturno dediščino (objekti in območja) prek ohranjanja, varstva in ozaveščanja | B | B | B | B | B | A | Identificiranih ni nobenih bistvenih neposrednih ali posrednih negativnih vplivov na okoljski vidik, zato ni potrebnih omilitvenih ukrepov ali predlogov alternativ.<br>Ukrepi za izboljšanje in priporočila so zapisani v poglavjih 9.1.2. in 9.1.3. |
| Krajina | Ugodni pogoji za zaščitena naravna in kulturna območja (naravni parki, kulturna krajina) prek upravljanja | B | B | B | B | B | A | Identificiranih ni nobenih bistvenih neposrednih ali posrednih negativnih vplivov na okoljski vidik, zato ni potrebnih omilitvenih ukrepov ali predlogov alternativ.<br>Ukrepi za izboljšanje in priporočila so zapisani v poglavjih 9.1.2. in 9.1.3. |
| Voda | Varovanje podtalnice pred onesnaženjem in škodljivimi snovmi<br>Varovanje površinskih voda pred onesnaženjem in škodljivimi snovmi | B | B | B | B | B | A | Identificiranih ni nobenih bistvenih neposrednih ali posrednih negativnih vplivov na okoljski vidik, zato ni potrebnih omilitvenih ukrepov ali predlogov alternativ.<br>Ukrepi za izboljšanje in priporočila so zapisani v poglavjih 9.1.2. in 9.1.3. |

| Okoljski vidiki | Glavni okoljski cilji | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Skupaj | SO1.1 | SO1.2 | SO2.1 | ISO3.1-ISO1 | SO 3.2 - ISO1 | Alternative, omilitveni ukrepi in ukrepi za izboljšanje, priporočila |
| | Trajnostna raba vode in ohranjanje dobrega količinskega stanja vodnih teles<br>Učinkovito upravljanje z vodami in tveganji | | | | | | | |
| Podnebje in energetika | Zmanjšanje emisij toplogrednih plinov (ne-ETS) za 20% v 2030 glede na 2005 za Slovenijo<br>Zmanjšanje emisij toplogrednih plinov (ne-ETS) iz 18.5 na 21.7 % v 2030 glede na 2005 za Hrvaško<br>Spodbujanje obnovljivih virov energije | B | B | B | B | B | A | Identificiranih ni nobenih bistvenih neposrednih ali posrednih negativnih vplivov na okoljski vidik, zato ni potrebnih omilitvenih ukrepov ali predlogov alternativ.<br>Ukrepi za izboljšanje in priporočila so zapisani v poglavjih 9.1.2. in 9.1.3. |

| Okoljski vidiki | Glavni okoljski cilji | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Skupaj | SO1.1 | SO1.2 | SO2.1 | ISO3.1-ISO1 | SO3.2-ISO1 | Alternative, omilitveni ukrepi in ukrepi za izboljšanje, priporočila |
| | Izboljšanje energetske učinkovitosti<br>Podnebna odpornost | | | | | | | |
| Materialne dobrine in surovine | Zmanjšanje in učinkovito recikliranje odpadkov<br>Promocija recikliranja in krožnega gospodarstva | B | A* | A* | B | B | A | Identificiranih ni nobenih bistvenih neposrednih ali posrednih negativnih vplivov na okoljski vidik, zato ni potrebnih omilitvenih ukrepov ali predlogov alternativ.<br>Ukrepi za izboljšanje in priporočila so zapisani v poglavjih 9.1.2. in 9.1.3. |
| Razred vpliva (IC): **A** ni vpliva (*) ali pozitiven vpliv; **B** zanemarljiv negativen vpliv; **C** zanemarljiv negativen vpliv zaradi izvedbe omilitvenih ukrepov; **D** znaten negativen vpliv; **E** uničujoč negativen vpliv; **X** ocena vpliva ni mogoča | | | | | | | | |

## 2.3. NETEHNIČKI SAŽETAK

Interreg program (IP) Slovenija-Hrvatska 2021.-2027. je program u okviru Europske teritorijalne suradnje (ETC) i financiran iz Europskog fonda za regionalni razvoj (ERDF). Svrha takvih prekograničnih programa je potpora državama članicama u provedbi zajedničkih projekata, rješavanju zajedničkih izazova i prevladavanju graničnih prepreka.

Razvoj programa bio je popraćen Strateškom procjenom utjecaja na okoliš (SEA) koja ima za cilj identificirati potencijalne negativne utjecaje na okoliš u ranoj fazi. Proces uključiva konzultacije s nadležnim tijelima za zaštitu okoliša u obje zemlje.

Sukladno zakonskom okviru (različiti nacionalni zakoni i smjernice pod okriljem SEA direktive (2001/42/EZ)), metodologija i proces procjene osmišljeni su i prezentirani nadležnim tijelima na scoping radionici.

Procjena se temelji na sadržaju Interreg programa Slovenija-Hrvatska 2021.-2027. temeljna verzija 3, 31.1.2022., a koje je napredno stanje razvoja programa u kojem se više ne očekuju velike promjene. Vremensko razdoblje za provedbu programa proteže se od 2021. do 2027. (+2 godine za završetak projekata).

Prioriteti, Specifični ciljevi (SO) i specifični ciljevi Interrega (ISO) koje će podržati IP 2021-2027 su sljedeći:

- Prioritet 1: Zelena i prilagodljiva regija
  - SO 1.1: Promicanje prilagodbe klimatskim promjenama, otpornost i prevencije rizika od katastrofa i otpornosti, temeljeno na ekosistemskom pristupu
  - SO 1.2: Jačanje zaštite i očuvanja prirode, biološke raznolikosti, i zelene infrastrukture, uključujući urbano okruženje, te smanjenje svih oblika onečišćenja
- Prioritet 2: Otporna i održiva regija
  - SO 2.1: Jačanje uloge kulture i održivog turizma u gospodarskom razvoju, socijalnoj uključenosti i društvenim inovacijama
- ISO 1: Dostupna i povezana regija
  - SO 3.1. - ISO 1: Unaprijediti učinkovitu javnu upravu promicanjem pravne i administrativne suradnje i suradnje između građana, aktera civilnog društva i institucija, posebno s ciljem rješavanja pravnih i drugih prepreka u pograničnim regijama.
  - SO 3.2. - ISO 1: Izgraditi međusobno povjerenje, posebno poticanjem ljudi na međudruštvene akcije.

U okviru tih prioriteta i specifičnih ciljeva, program ocrtava različite vrste akcija, tematske fokusne točke i primjere onoga što se namjerava financirati. Težište djelovanja uglavnom je usmjereno na suradnju, razmjenu, zajedničke strategije i planove upravljanja i slične aktivnosti. Ulaganja u fizičku imovinu i građevinske aktivnosti moguća su u okviru nekih od specifičnih ciljeva, ali zbog ukupnog proračuna programa obično predstavljaju ulaganja manjih razmjera.

Analiza trenutnog stanja programskog područja pokazala je da cjelokupno stanje okoliša zadovoljavajuće, ali je razvoj u obje zemlje prilično heterogen ovisno o pojedinim aspektima okoliša, a također se razlikuje među zemljama. Praćenje odnosno monitoring otkriva većinu negativnih tendencija u odnosu na:

- korištenje zemljišta i zauzimanje (prekrivanje) tla, gdje obje zemlje očito promašuju svoje ciljeve za održivu potrošnju zemljišta i obje su zemlje pokazale značajan porast antropogenih (zauzetih) površina u prošlim desetljećima
- stanje zaštićenih područja, gdje i vrste i staništa od europskog interesa pokazuju veliki udio nepovoljnih stanja i gdje se za neke vrste ili staništa može uočiti čak i određeno pogoršanje stanja.

Povećanje fragmentacije krajobraza s rizikom od napuštanja poljoprivrednog zemljišta je vidljivo u obje zemlje.

Nasuprot tim trendovima, identificirani su potencijalni učinci programa za svaki specifični cilj i svaki aspekt okoliša. Osnova za te procjene bili su opisi radnji unutar samog programa kao i daljnja dokumentacija i informacije od nositelja programa. Rezultati su prikazani u matricama utjecaja popraćenim tekstualnim objašnjenjima.

Glavni rezultati su:

- Četiri od specifičnih ciljeva ( *SO 1.2 – Jačanje zaštite i očuvanja prirode i biološke raznolikosti, poboljšanje i zelene infrastrukture, uključujući urbano okruženje, te smanjenje svih oblika onečišćenja, SO 1.1 – Promicanje prilagodbe klimatskim promjenama, otpornost i prevencije rizika od katastrofa i otpornosti, uzimajući u obzir pristupe ekosustava temeljeno na ekosistemskom pristupu, SO 2.1 – Jačanje uloge kulture i održivog turizma u gospodarskom razvoju, socijalnoj uključenosti i društvenim inovacijama, SO 3.1 - ISO 1 – Unaprijeđenje učinkovite javne uprave promicanjem pravne i administrativne suradnje i suradnje između građana, aktera civilnog društva i institucija, posebice, uklanjanje pravnih i drugih prepreka u pograničnim regijama)* dovest će do pozitivnih i negativnih utjecaja na okoliš.
- Specifični cilj Interrega (*SO 3.2 - ISO 1 – Izgradnja međusobnog povjerenja, posebno poticanjem ljudi na međudruštvene akcije*.) neće dovesti do neposrednih konkretnih utjecaja na okoliš, ni negativnih ni pozitivnih.
- Niti jedan specifičan cilj ne stvara značajne negativne utjecaje na okoliš na razini programa. Međutim, višestruki učinci uvelike ovise o stvarnoj lokaciji projekata i stvarnim mjerama unutar tih projekata, a koji nisu poznati u trenutnoj fazi. Stoga je moguće da su, ovisno o vrsti projekta koji se provodi i njegovoj lokaciji, potrebne daljnje procjene što je također navedeno u izvješću.

U smislu potencijalnih utjecaja na aspekte okoliša, pozitivni utjecaji su koncentrirani na sljedeće:

- *Flora, fauna, staništa, bioraznolikost, područja sa statusom očuvanosti prirode, uključujući zaštićena područja i Natura 2000 područja, georaznolikost i krajobrazna raznolikost*, je omogućeno podržavanjem strateški planirane zelene infrastrukture i poboljšanjem zaštite i očuvanja ugroženih staništa, vrsta i krajolika ( SO 1.2)
- *Ljudsko zdravlje i dobrobit*, je podržano poboljšanjem otpornosti društva na klimatske promjene ( SO 1.1) i poboljšanjem otpornosti i učinkovitosti javne uprave u područjima zdravstvene skrbi, socijalne uključenosti i dobrobiti (ISO 1 (II)) .
- *Klima i energija*, je izričito podržano jačanjem pripravnosti na rizik i kapaciteta odgovora na klimatske promjene i povećanjem otpornosti na učinke klimatskih promjena ( SO 1.1) te kroz poboljšanje otpornosti i učinkovitosti javne uprave u području energetske učinkovitosti (SO 3.1. – ISO 1).

Očekuje se da će negativni utjecaji u kontekstu programa biti mali, no uglavnom su povezani s nekim konkretnim aspektima okoliša i aktivnostima:

- Flora, fauna, staništa, bioraznolikost, područja sa statusom očuvanosti prirode, uključujući zaštićena područja i Natura 2000 područja, georaznolikost i krajobrazna raznolikost gdje povećan pritisak turizma i pojačane mjere izgradnje mogu negativno utjecati na staništa i vrste ( SO 2.1.);
- *Tlo, korištenje zemljišta*, gdje će građevinski projekti vjerojatno dovesti do zauzimanja tla. U širem kontekstu, mogući su i učinci pojave nove potrebne infrastrukture za smještaj većeg broja turista (SO 1.2., SO 2.1.);
- *Ljudsko zdravlje, zrak i klima te energija*, pilot akcije (izravno) ili veće količine generiranog prometa (posredno) mogu dovesti do buke i emisija u zrak (*SO 1.1., SO 1.2., SO 2.1.)*.

Za ostale aspekte mogli su se identificirati samo vrlo mali negativni utjecaji. Tablica u nastavku prikazuje pregled rezultata procjene za svaki aspekt okoliša i svaki SO. Konkretni opisi tih procjena uključeni su u glavno Izvješće o okolišu. Ukupni utjecaji IP-a na okoliš vjerojatno će biti mali i malo značajni. Kumulativni učinci s drugim programima ESI fondova neće značajno promijeniti ovu procjenu. Nadalje, mnogi će učinci biti srednjoročni do dugoročni zbog povećane svijesti, izgrađenih kapaciteta i uspostavljene ili produljene suradnje u određenim područjima. Neke mjere za smanjenje čak i manjih negativnih učinaka ili za poboljšanje potencijalnih pozitivnih učinaka formulirane su kako je navedeno u donjoj tablici.

Aspekti zaštite okoliša i glavni ekološki ciljevi

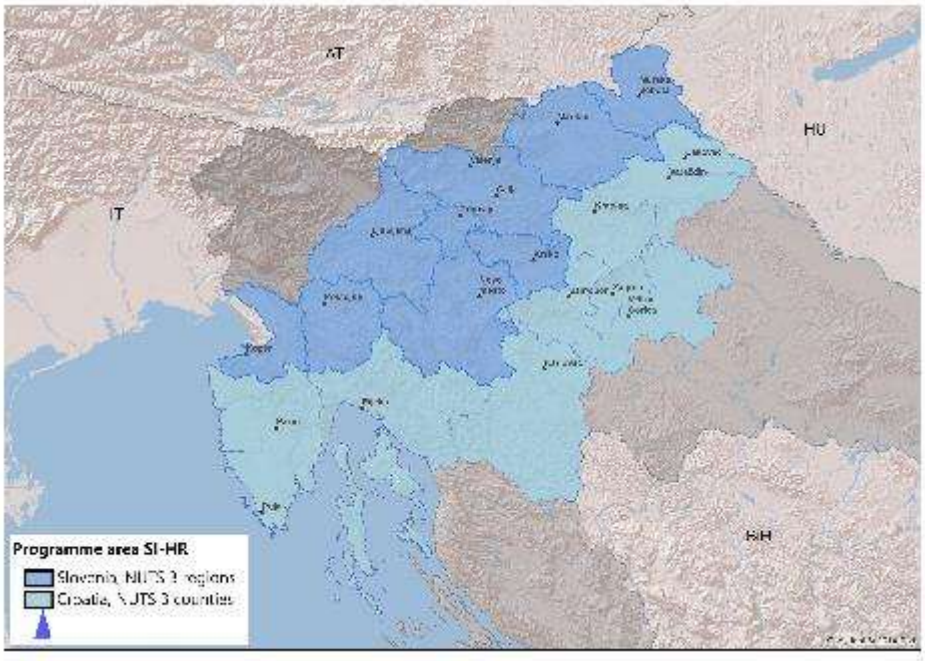
| Aspekti okoliša | Glavni ciljevi zaštite okoliša | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | sve ukupno | SO 1.1. | SO 1.2. | SO 2.1. | SO 3.1. – ISO 1. | SO 3.2. – ISO 1. | Alternative, mjere poboljšanja i ublažavanja, preporuke |
| Ljudsko zdravlje i dobrobit | Smanjiti udio stanovništva izloženog prekomjernom onečišćenju zraka<br>Smanjenje razina emisija uzimajući u obzir odgovarajuće granice emisija<br>Smanjiti udio stanovništva izloženog prekomjernoj razini buke<br>Poboljšano upravljanje rizikom od poplava<br>Smanjeno svjetlosno onečišćenje | B | B | B | B | B | A | Budući da nema značajnih izravnih ili neizravnih negativnih utjecaja na aspekt okoliša, nisu potrebne mjere ublažavanja ili dodatni prijedlozi alternativa.<br>Za mjere poboljšanja i preporuke pogledati poglavlje 9.1.2. |
| Flora, fauna, staništa, bioraznolikost, područja sa statusom očuvanosti prirode, | Očuvanje biološke raznolikosti flore i faune uključujući zaštićene/ugrožene vrste i staništa, georaznolikosti i krajobrazne raznolikosti, održavanje kvalitete zaštićenih područja, Natura 2000 | B | B | B | B | B | A | Budući da nema značajnih izravnih ili neizravnih negativnih utjecaja na aspekt okoliša, nisu potrebne mjere ublažavanja ili dodatni prijedlozi alternativa.<br>Za mjere poboljšanja i preporuke pogledati poglavlja 9.1.1., 9.1.2. i 9.1.3. |

| Aspekti okoliša | Glavni ciljevi zaštite okoliša | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | sve ukupno | SO 1.1. | SO 1.2. | SO 2.1. | SO 3.1. – ISO 1. | SO 3.2. – ISO 1. | Alternative, mjere poboljšanja i ublažavanja, preporuke |
| uključujući zaštićena područja i Natura 2000 područja, georaznolikost i krajobrazna raznolikost | područja i njegovanje ekološke povezanosti između njih gdje je to moguće | | | | | | | |
| Tlo, korištenje zemljišta | Minimizirano korištenje zemljišta za gospodarstvo i smanjenje utjecaja postojećeg gospodarskog korištenja zemljišta na okoliš.<br>Zaštita funkcija tla | B | B | B | B | B | A | Budući da nema značajnih izravnih ili neizravnih negativnih utjecaja na aspekt okoliša, nisu potrebne mjere ublažavanja ili dodatni prijedlozi alternativa.<br>Za mjere poboljšanja i preporuke pogledati poglavlje 9.1.2. i 9.1.3. |
| Kulturna baština | Povoljni uvjeti za kulturnu baštinu (objekte i zone) kroz zaštitu, očuvanje i podizanje svijesti | B | B | B | B | B | A | Budući da nema značajnih izravnih ili neizravnih negativnih utjecaja na aspekt okoliša, nisu potrebne mjere ublažavanja ili dodatni prijedlozi alternativa.<br>Za mjere poboljšanja i preporuke pogledati poglavlje 9.1.2. i 9.1.3. |

| Aspekti okoliša | Glavni ciljevi zaštite okoliša | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | sve ukupno | SO 1.1. | SO 1.2. | SO 2.1. | SO 3.1. – ISO 1. | SO 3.2. – ISO 1. | Alternative, mjere poboljšanja i ublažavanja, preporuke |
| Krajobraz | Povoljno stanje zaštićenih prirodnih i kulturnih krajobraza kroz upravljanje. | B | B | B | B | B | A | Budući da nema značajnih izravnih ili neizravnih negativnih utjecaja na aspekt okoliša, nisu potrebne mjere ublažavanja ili dodatni prijedlozi alternativa.<br>Za mjere poboljšanja i preporuke pogledati poglavlje 9.1.2. i 9.1.3. |
| Vode | Zaštita podzemnih voda od onečišćenja i štetnih tvari<br>Zaštita površinskih voda od onečišćenja i štetnih tvari<br>Održivo korištenje voda i očuvanje dobrog stanja vodnih tijela<br>Učinkovito upravljanje vodama i rizikom vezanim uz vode | B | B | B | B | B | A | Budući da nema značajnih izravnih ili neizravnih negativnih utjecaja na aspekt okoliša, nisu potrebne mjere ublažavanja ili dodatni prijedlozi alternativa.<br>Za mjere poboljšanja i preporuke pogledati poglavlje 9.1.2. i 9.1.3. |
| Klima i energija | Smanjenje stakleničkih plinova emisije (non-ETS) za 20% u odnosu na 2005. godinu za Sloveniju<br>Smanjenje stakleničkih plinova | B | B | B | B | B | A | Budući da nema značajnih izravnih ili neizravnih negativnih utjecaja na aspekt okoliša, nisu potrebne mjere ublažavanja ili dodatni prijedlozi alternativa.<br>Za mjere poboljšanja i preporuke pogledati poglavlje 9.1.2. i 9.1.3. |

| Aspekti okoliša | Glavni ciljevi zaštite okoliša | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | sve ukupno | SO 1.1. | SO 1.2. | SO 2.1. | SO 3.1. – ISO 1. | SO 3.2. – ISO 1. | Alternative, mjere poboljšanja i ublažavanja, preporuke |
| | emisije (non-ETS) od 18,5 do 21,7 % u 2030. u odnosu na 2005. Godinu za Hrvatsku<br>Poticanje obnovljivih izvora energije<br>Poboljšanje energetske učinkovitosti<br>Otpornost na klimu | | | | | | | |
| Materijalna imovina i sirovinski resursi | Smanjenje i učinkovito recikliranje otpada<br>Promicanje recikliranja i kružnog gospodarstva | B | A* | A* | B | B | A | Budući da nema značajnih izravnih ili neizravnih negativnih utjecaja na aspekt okoliša, nisu potrebne mjere ublažavanja ili dodatni prijedlozi alternativa.<br>Za mjere poboljšanja i preporuke pogledati poglavlje 9.1.2. i 9.1.3. |
| Klasa utjecaja (IC): **A** bez utjecaja (*) ili pozitivan utjecaj; **B** zanemariv negativan utjecaj; **C** zanemariv negativan utjecaj zbog provedbe mjera ublažavanja; **D** značajan negativan utjecaj; **E** razoran negativan utjecaj; **X** procjena utjecaja nije moguća | | | | | | | | |

# 3. OVERVIEW OF INTERREG PROGRAMME

| Title | Interreg programme Slovenia-Croatia 2021-2027 |
|---|---|
| Version | Draft version 3, January 2021 |
| Managing Authority | Government Office of the Republic of Slovenia for Development and European Cohesion policy; European Territorial Cooperation and Financial Mechanism Office; Cross-border Programmes Management Division |
| Programme area | 31,728 km² (SI: 73%:  HR: 30%²), 3,8 Mio. inhabitants (SI: 1,7 Mio., HR: 2,1 Mio.)<br>8 Croatia NUTS 3 regions: Primorsko-goranska, Istarska, Zagrebačka, Krapinsko-zagorska, Varaždinska, Međimurska and Karlovačka county and City of Zagreb.<br>9 Slovenian NUTS 3 regions: Podravska, Pomurska, Savinjska, Zasavska, Posavska, Jugovzhodna Slovenija, Obalno-kraška, Osrednjeslovenska, Primorsko-notranjska region<br>Figure 1: Programme area<br>  <br>Source: http://www.si-hr.eu |
| Implementation period | 2021–2027 (additional 2 years for the finalisation of funded projects) |

## 3.1. Vision and mission of IP

The programme area between Slovenia and Croatia has identified several potentials, needs and challenges that clearly show that the territory is ahead of important transitions that can be jointly addressed. The programme is focusing on a limited number of thematic areas and will pool resources to drive the change and take opportunity for increased level of cooperation capacity, new development and common solutions to identified challenges.

The Interreg Programme Slovenia-Croatia aims at achieving a preserved, resilient, and connected cross-border region where sustainable development is recognised and used as a main tool in reaching economic viability, safety, biodiversity protections, and social well-being of all inhabitants. The Programme envisages mutual learning and joint actions leading to a change in all its priorities, primarily to re-connect across the border, to understand the current joint needs and threats of a rapidly changing reality, and to work together to improve resilience and adaptability of people, organisations, and communities, assisting the programme area in becoming greener and more digital, and thus fit for the future.

All of the Programme's actions respect the horizontal principles of the Charter of Fundamental Rights of the European Union, gender equality, non-discrimination including accessibility, sustainable development including UN Sustainable Development Goals and "do no significant harm" principle. Activities aimed at increasing the social and environmental responsibility of all stakeholders are given special attention, which will have a long-term impact that is positive for future generations. Additionally, the Programme supports social innovation and social tourism by fostering equality and equity among stakeholders and individuals.

The Programme contributes to the European Green Deal targets in terms of environmental sustainability by promoting climate change adaptation and disaster risk prevention, as it faces the unavoidable impacts of climate change. Apart from climate change, the program seeks to eliminate the negative impacts of humans on the environment by conserving biodiversity and halting the degradation of ecosystem services through enhanced protection and preservation of nature, biodiversity, and green infrastructure, as well as reducing all forms of pollution in accordance with the EU Biodiversity Strategy for 2030 as a central element of the European Green Deal.

## 3.2. Complementarity and synergies with strategies and other funding opportunities

Complementarity and potential synergies of European, national, regional strategies and programmes with the Interreg Programme Slovenia-Croatia 2021-2027 have been taken into account in the programming process. Parts of the programme area overlap with other Interreg cross-border programmes (Italy – Slovenia, Slovenia – Hungary, Slovenia – Austria, Croatia - Serbia, Hungary – Croatia, Croatia – Bosnia and Herzegovina – Montenegro) and transnational programmes (Alpine space, Danube and Central Europe).

During programming synergies and complementarities were sought also with EU macro-regional strategies (MRSs). The most important MRS covering the analysed territories are the EU Strategy for the Danube Region (EUSDR) and EU Strategy for the Adriatic and Ionian Region.

It will be even more important to seek for synergies and complementarities also during the phase of implementation.

## 3.3. Priorities

Table 1: Selected policy objectives and the Interreg-specific objectives with specified activities, thematic fields and expected results

| Priority/Specific objective | The aim of the SO | Types of actions |
|---|---|---|
| **Priority 1: A green and adaptive region** | | |
| SO 1.1 Promoting climate change adaptation, disaster risk prevention and resilience, from an ecosystem-based approach | The aim of this specific objective is to enhance the preparedness of local communities and responsiveness of rescue response units by joint trainings and unified equipment, the establishment of joint protocols (concrete and comprehensive plans), and co-ordination mechanisms, so that units from both countries will be able to jointly respond to the same disaster and adapt to different climate change-related and other shared risks along the entire cross-border area, including the capacity building of different target groups to protect against shared risks. The activities must be aligned with responsible authorities for provision and co-ordination of protection, rescue, and relief in case of natural and other disasters from both countries. | Type of action 1: Strengthening of risk preparedness and response capacities in the cross-border area<br><br>Type of action 2: Increasing the resilience to climate-change effects in the programme area |
| SO 1.2: Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution. | The aim of the specific objective is to enhance, develop, or introduce green infrastructure as strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services, particularly addressing the biodiversity loss as a key environmental threat in the programme area. Cross-border | Type of action 1. Strategically planned green infrastructure for provision of environmental and socio-economic benefits<br><br>Type of action 2 Improved protection and preservation of endangered habitats, species, |

| Priority/Specific objective | The aim of the SO | Types of actions |
|---|---|---|
| | cooperation for improved protection, restoration, and management of the environment will be boosted (incl. Natura 2000 and other protected areas and areas of ecological importance). Actions will be focused to mitigation of impacting threats (e.g., pollution, climate change, invasive species, biodiversity loss, habitat fragmentation) and good cross-border landscape management as the key to improving biodiversity in the programme area. | and landscapes in the programme area |
| SO 2.1: Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovation | The aim of the specific objective to facilitate the recovery of tourism and culture in the Programme area by greening of tourism, supporting shift from quantity towards quality, increasing diversify cultural tourism products, and supporting cultural tourism entrepreneurship and innovation. Special attention will be given to rural border areas to unlock their hidden potentials and abilities to offer demand-driven products and services, while conserving their cultural uniqueness and protecting the natural environment. All the actions supported by this priority will contribute to strengthening communities, increasing competitiveness, and job creation in the Programme area. | Type of action 1 Supporting sustainable tourism and green transition of public and private organizations through pilot and demonstration actions, collaborative learning and awareness-raising of tourists and all stakeholders in tourism, and culture<br>Type of action 2 Enhancing resilience and recovery of tourism and culture by development and upgrade of joint cross-border tourism products and services |
| SO 3.1 - ISO 1: Enhance efficient public administration by promoting legal and administrative cooperation, and cooperation between citizens, civil society actors, and institutions, in particular with a view | The aim of the specific objective is to support public administration in its role as an initiator/coordinator of processes aimed at improving the quality of services and developing of innovative solution in the area of health care, social inclusion and welfare, energy efficiency, and accessibility in the border region. A place-based and participatory approach, sustainability, digitalisation, and inclusion are the guiding principles when implementing the activities | Type of action: Improvement of the quality and diversity of the services and development of innovative solutions in the areas of health care, social inclusiveness and welfare, accessibility and energy efficiency in the border regions by overcoming legal and administrative obstacles |

| Priority/Specific objective | The aim of the SO | Types of actions |
|---|---|---|
| to resolving legal and other obstacles in border regions; | within this priority. The cross-border cooperation and resolving legal and other obstacles is crucial when taking into account the functional relations between the different actors and activities in the border area. | |
| SO 3.2 - ISO 1: Build up mutual trust, in particular by encouraging people to people actions | The aim of the specific objective is to build trust and understanding among people living in the cross-border area by supporting joint cross-border events, intergenerational cooperation, and joint learning and awareness-raising. | Type of action: People-to-people projects to improve cultural and social relations, and to get actively engaged in the community |

## 3.4. Financing plan

Table 2: Total financial appropriations by fund and national co-financing

| Policy objective No | Priority | Fund (as applicable) | Basis for calculation EU support (total eligible cost or public contribution) | EU contribution (a)=(a1)+(a2) | Indicative breakdown of the EU contribution | | National contribution(b)=(c)+(d) | Indicative breakdown of the national counterpart | | Total (e)=(a)+(b) | Co-financing rate (f)=(a)/(e) | Contributions from the third countries (for information) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | without TA pursuant to Article 27(1) (a1) | for TA pursuant to Article 27(1) (a2) | | National public (c) | National private (d) | | | |
| 2 | Priority 1 | ERDF | Total eligible cost | 16.520.746 | 15.230.000 | 1.290.746 | 4.130.187 | 3.658.320 | 471.867 | 20.650.933 | 80,00 | 0,00 |
| 4 | Priority 2 | ERDF | Total eligible cost | 17.703.124 | 16.320.000 | 1.383.124 | 4.425.781 | 3.833.507 | 592.274 | 22.128.905 | 80,00 | 0,00 |
| ISO1 | Priority 3 | ERDF | Total eligible cost | 5.120.623 | 4.720.555 | 400.068 | 1.280.156 | 1.241.424 | 38.732 | 6.400.779 | 80,00 | 0,00 |
| | Total | ERDF | Total eligible cost | 39.344.493 | 36.270.555 | 3.073.938 | 9.836.124 | 8.733.251 | 1.102.873 | 49.180.617 | 80,00 | 0,00 |
| | **Total** | **All funds** | **Total eligible cost** | **39.344.493** | **36.270.555** | **3.073.938** | **9.836.124** | **8.733.251** | **1.102.873** | **49.180.617** | **80,00** | **0,00** |

# 4. METHODOLOGY

## 4.1. Assessment steps

As part of the accompanying SEA for the programming of the Interreg Programme Slovenia-Croatia 2021-2027, a comprehensible and well-tested set of methods will be applied. As required by the SEA Directive, the assessment includes as main steps a description of the current state of the environment and its likely development, an assessment of the potential impacts of the programme and the assessment of alternatives and definition of measures for mitigating negative and enhancing positive effects on the environment.

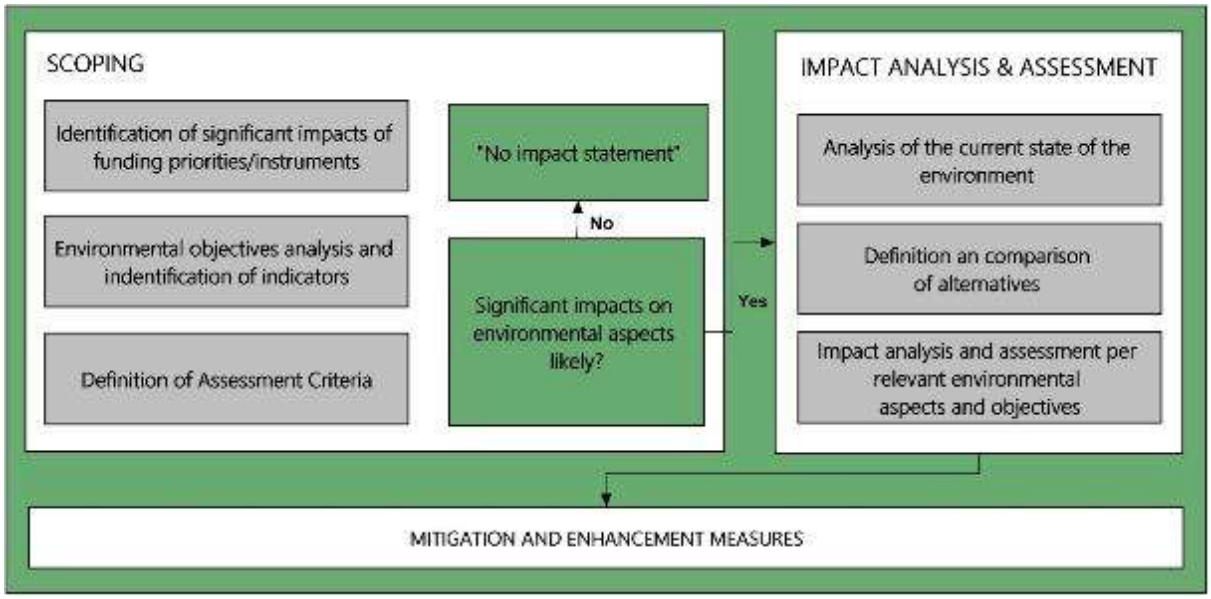
The relevant frame for assessments is set up by the environmental aspects outlined in the SEA directive and the subsequently identified relevant environmental objectives which are potentially impacted by the programme.

Figure 2 shows the basic process of Strategic environmental assessment, including the following steps.

Scoping:

- Identification of significant impact of funding priorities/instruments (use of relevance matrices)
- Environmental objectives analysis and identification of indicators
- Definition of assessment criteria
- Impact analyses of the IP
- Evaluation of the current state of the environment,
- Definition of a zero alternative
- Evaluation of the effects of the IP using impact matrices

Figure 2: Flowchart of the evaluation of the environmental impact of the new IP



## 4.2. Identification of potential significant impacts (SEA-Directive, Article 5 (4))

In order to focus analyses of the Environmental report (ER) (written result of SEA), a first assessment of potential significant impacts is to be conducted. The outline of each Specific Objective, the fields addressed and indicative actions to be supported will be carefully screened and potential impacts of the programme implementation will be firstly identified and described shortly. Their significance will be determined taking into account the expected scale of impacts, the relevance and sensitivity of the protective good under consideration and the opportunities to improve the positive impacts of the SO and indicative actions.

To ensure the focus on significant environmental impacts, the proposed method is designed in such a way that aspects, in which no significant environmental impacts are expected in relation to the environmental objectives, can be eliminated from further assessment with a no-impact statement.

Interactions of both a positive or a negative nature that may occur between different environmental objectives (e.g. impacts on air quality can also impact human health) are examined separately. This qualitative assessment is carried out in the ER and presented in tabular form.

## 4.3. The current state of the environment (SEA-Directive, Annex I, b-d)

The SEA Directive (Annex I, b) requires a description of the current state of the environment, including its likely development in the event of non-implementation of the IP (= zero alternative). In order to define the zero alternative, a qualitative trend estimation is being performed, based on concrete data and empirical values.

Table 3: Qualitative trend assessment (zero alternative)

| Symbol | Trend |
|---|---|
| ↗ | Improvement: general improvement of the current state of the environment |
| ←↗ | Partial improvement: improvement of the current state of the environment in parts only |
| ←→ | No change: no significant change of the current state of the environment |
| ←↘ | Partial deterioration: deterioration of the current state of the environment in parts only |
| ↘ | Deterioration: general deterioration of the current state of the environment |

For aspects for which it was assessed at the scoping stage that the implementation of the programme would not cause any significant effects on the environment, no analysis and impact assessment is carried out.

This description of the current environmental situation in the potentially impacted cross-border-regions of Slovenia and Croatia is based on a review of already existing data sources. Primary data collection is not foreseen within the framework of the SEA but is also not necessary, due to the relatively abstract strategic nature of the programme. However, such data collection could be necessary for the implementation of concrete projects (e.g. in the context of approval procedures).

## 4.4. Analysis and Assessment of the expected significant environmental impacts of the IP (SEA Directive, Annex I, f)

For the programme priorities and the measures and instruments of the IP assigned to them, assessments of possible effects on the environmental objectives are made, based on the environmental indicators examined. Both direct and indirect effects are examined:

Direct effects are those which are directly linked to the implementation of a measure. This includes e.g. noise pollution during a construction project.

Indirect effects refer to those which are a direct or indirect consequence of subsidized measures. This includes e.g. emissions from the operation of production facilities whose construction was supported by the programme.

Considering the already abstract nature of the funding programme itself, indirect effects, in particular, are often difficult to assess. This can mean a reduction in the concreteness of assessments; however, it must be weighed against the loss of information if the corresponding effects are not included. In most cases, the qualitative methodology applied allows for an assessment of the direction of impact and relevance of indirect effects.

The assessment of the significance of the impacts (relevance matrix, impact matrix) is of qualitative nature. In those areas where concrete quantitative information is available, numerical information is also provided. The assessment scale covers both positive and negative impacts on the environment.

The environmental impact of the programme is assessed by comparing the potential environmental impact of the IP with the zero alternative. This allows statements to be made on the extent to which the environmental situation changes as a result of the implementation of the planned measures in the IP (= "variant IP") compared with a situation without the measures planned therein (= "zero alternative").

Relevance matrices are used for the presentation of the assessment since they can be used to illustrate impacts in a way that is easy to understand on a qualitative level. In this way, important systemic relationships between the IP and the environmental aspects are presented

without creating a false sense of precision that cannot be achieved with a qualitative methodology.

In order to ensure the comparability of the qualitative and quantitative assessments of potential changes in the selected indicators, a judgement on a five-grade ordinal scale is provided for all environmental indicators. Impact matrices are used for the presentation of foreseeable effects. The zero alternative serves as a basis for comparison to assess the environmental impacts of the IP and the alternatives. The following evaluation scale is proposed:

Table 4: Qualitative assessment system

| Symbol | Trend |
|---|---|
| ++ | Substantial improvement of the environmental situation in comparison to the zero alternative |
| + | Slight improvement of the environmental situation in comparison to the zero alternative |
| 0 | No meaningful change of the environmental situation in comparison to the zero alternative |
| - | Slight deterioration of the environmental situation in comparison to the zero alternative |
| -- | Substantial deterioration of the environmental situation in comparison to the zero alternative |
| x | Assessment not possible |

In cases where environmental impacts of individual activities cannot be assessed due to e.g. vague formulations or the broadness of the descriptions in the IP, no judgement on potential impacts is made which is indicated in the impact matrices by an "X".

Interactions of both a positive or a negative nature that may occur between different environmental objectives (e.g. impacts on air quality can also impact human health) are examined separately. This qualitative assessment is carried out in the ER and presented in tabular form.

Programme impacts on environmental objectives will be assessed according to the Ordinance on Environmental Report and detailed SEA procedure (Official Gazette of the Republic of Slovenia, No. 73/05) and given tags from A to E and X when the impact cannot be assessed.

Table 5: Scale of potential programme impacts on obtaining set environmental goals

| Impact class | Description |
|---|---|
| A | No impact or positive impact |
| B | Non-significant impact |
| C | Non-significant impact due to implementation of mitigation measures |
| D | Significant impact |
| E | Devastating impact |
| X | Impact assessment is not possible |

If all of the impacts from the programme implementation are assessed as A or B, the programme itself is acceptable. If any of the impacts is assessed as C, impacts from programme implementation and the programme itself are acceptable providing mitigation measures are implemented. If any of the impacts is assessed as D, E or X, impacts from programme implementation and the programme itself are not acceptable for the environment.

Compared to other programmes with a lower degree of abstraction, the definition of "reasonable alternatives" in an SEA to an Interreg programme faces several difficulties. Thereby, it is not possible to draw up and evaluate a completely different supporting programme as an alternative, which is why two approaches are pursued in the context of a SEA:

Comparison of the IP with the zero alternative, whereby the non-implementation of the programme is seen as an alternative to the implementation of the programme.

Close interlocking and multiple feedback loops of the SEA with the programming process. Due to this iterative process, preliminary results of the SEA are directly incorporated into the programming of the IP, which means that the programme version assessed in the ER can be regarded as an improved version in which micro alternatives or reduction measures for environmental impacts are already included at the measure level. This process is documented in the protocols of the programming groups and in the final version of the ER.

## 4.5. Structure of the Environmental Report

The ER serves both to assess the environmental impacts of the programme and to document the SEA processes. It follows the scoping phase and is based on the first draft of the programme. The ER is divided into several sections:

- Non-technical summary
    - for a generally understandable explanation of the process and the results of the SEA

- Brief description of the content and main objectives of the programme and its relationship with other relevant plans and programmes
    - Overview of the structure of the programme including the planned measures as a basis for assessing possible environmental impacts
- Methodology
    - Description of the method: assessment steps and final qualitative assessment based on a review of data and indicators.
- Presentation of the environmental protection objectives relevant to the programme
    - Based on the results of the scoping phase and including the feedback from environmental authorities
- Description of the main characteristics of the environment, its current state, likely trends, and an indication of current significant environmental problems
    - For each individual protective good included in the SEA
    - Assessment of the expected development of the environmental status in the event the IP is not implemented (zero alternative)
- Description of the potential (significant) effects of the programme on the environmental objectives and a description of the measures planned to prevent, reduce these effects or implement alternatives.
    - Establishment of the impact matrices for each individual protective good
    - Assessment of the interactions between the protective goods
    - Assessment of the programme impacts on individual environmental objective
    - Description of measures to reduce negative environmental impacts
- Indications of difficulties encountered in the assessment
- Description of the planned monitoring measures
- Annex
    - Documentation of the consultation phase of environmental authorities and the general public
    - Summary of the comments received during the consultation process

### 4.5.1. Public disclosure

The draft environmental report will be publicly disclosed following the programming progress. Then, written comments can be submitted by any interested party (i.e. including environmental authorities already formally involved in the process), which will subsequently be taken into account in the revision of the report. For each comment, the SEA team will explain how and why it was taken into account in the environmental report or not.

### 4.5.2. Interlinkages with the programming process

The SEA process in general (and the environmental report in particular) serve to ensure that environmental considerations are taken into account in the preparation process of programmes. The aim is not to propose completely new objectives and measures, but rather

to examine, based on the measures chosen, what environmental effects may result, how potential positive effects can be enhanced and how potential negative effects can be mitigated. The SEA procedure thus has an advisory character.

# 5. ENVIRONMENTAL OBJECTIVES AND AVAILABLE DATA

The following tables set out the environmental objectives in relation to the relevant protective goods for the possible programme contents, compiled from different legal matters and strategy documents at an international, European, and national level. In addition, "main objectives" have been aggregated from objectives of a similar nature, which will serve as a basis for the assessment of the environmental impacts. These serve to present the current state of the environment, to assess any environmental impacts possibly caused by the IP, to evaluate possible alternatives, and, if necessary, to propose mitigation measures and monitoring actions. The basis for the selection of the environmental objectives is Interreg programme Slovenia-Croatia 2021-2027, Draft version 3, 31 January 2022 and the SEA environmental report for the 2014-2020 programme. The legal matters and strategies listed in the 2014 environmental report were reviewed for further relevance and updates, adapted if necessary, and extended by new strategies and legal matters.

The strict assignment or separation of objectives to groups of protective goods is not always possible. For example, protection objectives for groundwater and surface water are primarily formulated in relation to "water" as a protective good, but they are equally relevant to human health or to species with water as their natural habitat. An analysis of these concrete interactions regarding the impacts of the IP is carried out in the environmental report.

For the selection of indicators to illustrate the state of the environment in relation to the main objectives, as shown in the tables below, two factors are of particular relevance:

The content suitability of the indicator to accurately illustrate the current state in relation to the main objective.

The availability of the indicator. As no primary data collection is carried out within the framework of the SEA, the indicator system is based on already existing and available data.

Both objectives and indicators can be adapted and updated as the programme evolves. A revised version of the following tables is included in the environmental report.

Furthermore, it has to be noted, that indicators in the SEA are not formulated with specific quantitative objectives (e.g. reduction of Nitrate emissions by amount x) in mind but rather to assess the development direction. Some specific quantitative monitoring measures (e.g. amount of CO2 emissions reduced by measures within the projects) can be prescribed in the course of the SEA at a later stage.

Table 6: Human health and well-being

| Main environmental objectives | Sources for objectives | Indicators | Source of the indicator |
|---|---|---|---|
| Reduce the population share exposed to excessive noise levels | EU-Directive 2002/49/EC (Environmental Noise Directive)<br>WHO, 2018, Environmental Noise Guidelines for the European Region<br>Regulation on limit values for environmental noise indicators for the Republic of Slovenia<br>Operational Programme for Noise Protection, 2018, Government of the Republic of Slovenia<br>Croatian noise protection act | Number of people exposed to excessive noise levels | Government of the Republic of Slovenia – Operational Programme for Noise Protection<br>Croatian Ministry of Health |
| Reduce the population share exposed to excessive air pollution | Agenda 2030<br>EU-Directive 2008/50/EC on ambient air quality and cleaner air for Europe<br>Slovenian Decree on Ambient Air Quality<br>Slovenian Operational Programme of Air Pollution Control<br>Slovenian Operational Programme for the Protection of Ambient Air against Pollution Caused by PM10<br>Decree on national obligations to reduce emissions of certain air pollutants in the Republic of Croatia | Number of people exposed to air pollution<br>Average and maximum emission levels of the main air pollutants ($NO_x$, $PM_{10}$+ $PM_{2,5}$, Ozone, $SO_2$) | European Environment Agency, Slovenia – Air pollution country fact sheet<br>Slovenian Environment Agency<br>National Institute for Public Health<br>Cross-sectional studies<br>Croatian Meteorological and Hydrometeorological Service<br>Ministry of Economy and Sustainable Development of the Republic of Croatia |

| Main environmental objectives | Sources for objectives | Indicators | Source of the indicator |
|---|---|---|---|
| | Regulation on emission limit values for air pollutants from stationary sources | | |
| Improved flood risk management | EU-Directive 2007/60/EC (Floods Directive)<br>Slovenian Water Act (ZV-1)<br>Flood Risk Reduction Management Plan 2017–2021, Government of the Republic of Slovenia<br>Croatian Water Act<br>Multiannual programme for construction of regulation and protection water infrastructure and melioration infrastructure for the period 2013-2022, Croatian Waters | Number of people affected by flood risk (HQ100) | Ministry of Defence, Administration of the Republic of Slovenia for Civil Protection and Disaster Relief (ACPDR) – Assessment of Flood Risk in the Republic of Slovenia and Preliminary Assessment of Flood Risk in the Republic of Slovenia<br>Croatian Waters<br>Ministry of Interior<br>Assessment of Preliminary Assessment of Flood Risk in the Republic of Croatia and Flood Risk Management Plan |
| Reduced light pollution | Decree on limit values due to light pollution of environment (SI) | Degree of light pollution – radiance (nW/sr $cm^2$) | Light pollution map (VIIRS 2021) |

Table 7: Flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity

| Main environmental objectives | Sources for objectives | Indicators | Source of the indicator |
|---|---|---|---|
| Safeguarding the biodiversity of the flora and fauna including protected/threatened species and habitats, geodiversity and landscape diversity, maintaining the quality of protected areas, Natura 2000 areas and fostering ecological connectivity between them where possible | Agenda 2030<br>EU-Directive 92/43/EEC (Habitats Directive)<br>EU-Directive 2009/147/EC (Birds Directive)<br>EU Biodiversity Strategy 2030<br>EU Strategy on Green Infrastructure<br>Slovenian Nature Conservation Act<br>Slovenian National Environment Protection Programme with programmes of measures until 2030<br>Nature 2000 Management Programme for Slovenia for the Period 2015-2020<br>Protocol Concerning Specially Protected Areas and Biological Diversity Mediterranean<br>The Nature Protection Strategy and Action Plan of the Republic of Croatia for the period 2017-2025<br>Action Programme of Marine Strategy Framework Directive - Monitoring and observation system for continuous assessment of the state of the Adriatic Sea 2021-2026 | Development of nature protection areas (by categories), specially protected areas | The Institute of the Republic of Slovenia for Nature Conservation<br>Slovenian Environment Agency<br>Interreg DinAlpConnect reports<br>Croatian Ministry of Economy and Sustainable Development |
| | | Favourable condition of species of European interest | |
| | | Number of natural values in favourable condition | |
| | | Continuum Suitability Index (CSI) to assess ecological connectivity | |

| Main environmental objectives | Sources for objectives | Indicators | Source of the indicator |
|---|---|---|---|
| | Croatian Nature Protection Act | (Interreg DinAlpConnect) | |

Table 8: Soil, land use

| Main environmental objectives | Sources for objectives | Indicators | Source of the indicator |
|---|---|---|---|
| Minimized land take for the economy and reduction of the environmental impacts of existing economic land use. | The Seventh Environment Action Programme (7th EAP)<br>Spatial Development Strategy of Slovenia<br>Slovenian Spatial Planning Act<br>Slovenian Agricultural Land Act<br>Slovenian Forest Act<br>Spatial Development Strategy of Croatia<br>Croatian Spatial Planning Act<br>Croatian Agricultural Land Act<br>Croatian Forest Act | Land take<br><br>Land use/cover change by categories | European Environment Agency, Land take and net land take (available on a national level)<br>European Environment Agency, Imperviousness and imperviousness change in Europe (available on a national level)<br>OECD, Corine Land Cover Change<br>Slovenian Ministry of Environment and Spatial Planning<br>Croatian Ministry of Spatial Planning, Construction and State Property<br>Croatian Ministry of Agriculture |
| Protection of soil functions | EU Soil Thematic Strategy<br>Agenda for Sustainable Development | Quality of soil and soil pollution | EUSIS – European soil information system |

| Main environmental objectives | Sources for objectives | Indicators | Source of the indicator |
|---|---|---|---|
| | Slovenian National Environmental Protection Program<br>Slovenian Environmental Protection Act<br>Croatian Environmental Protection Act<br>Croatian Agricultural Land Act<br>National Project for Irrigation and Management of Agricultural Land and Waters in the Republic of Croatia (NAPNAV) (2005)<br>Croatian Thematic Strategy for Soil Protection (2012) | | Slovenian Environment Agency, functionally degraded areas<br>European Environment Agency, Progress in management of contaminated sites<br>Croatian Ministry of Agriculture - Directorate for Agricultural Land, Crop Production and Market |

Table 9: Cultural heritage, landscape

| Main environmental objectives | Sources for objectives | Indicators | Source of the indicator |
|---|---|---|---|
| Favourable conditions cultural heritage (both objects and areas) through protection, preservation, and awareness-raising | UNESCO World Heritage Convention<br>European Cultural Heritage Strategy for the 21st Century<br>European Framework for Action on Cultural Heritage<br>Slovenian Cultural Heritage Protection Act | Number of registered units of cultural heritage | UNESCO, World Heritage List Statistics by region<br>UNESCO, World heritage list<br>UNESCO, List of World Heritage in Danger by Year |

| Main environmental objectives | Sources for objectives | Indicators | Source of the indicator |
|---|---|---|---|
| | Slovenian Cultural Heritage Strategy 2020-2023<br>Croatian Cultural Heritage Protection Act<br>Strategy for protection, preservation and sustainable economic use of the cultural heritage of the Republic of Croatia for the period 2011-2015 | Number of units of intangible cultural heritage | Ministry of culture of the Republic of Slovenia– register of cultural heritage (eVRD)<br>Coordinator for the Safeguarding of the Intangible Cultural Heritage, Register of the Intangible Cultural Heritage<br>Ministry of Culture and Media of the republic of Croatia - Directorate for the Protection of Cultural Heritage |
| Favourable condition of protected natural and cultural areas (natural parks, cultural landscape) through management | European Landscape Convention<br>Spatial Development Strategy of Slovenia<br>Slovenian Environmental Protection Act<br>Slovenian Cultural Heritage Protection Act<br>Slovenian Cultural Heritage Strategy 2020-2023<br>Slovenian Spatial Planning Act<br>Croatian Spatial Planning Act<br>Croatian Cultural heritage protection act<br>Croatian Environmental Protection Act<br>National Development Strategy of the Republic of Croatia until 2030 | The extent of protected landscapes (cultural or natural).<br>Risk of agricultural land abandonment<br>Landscape fragmentation | LUISA Territorial Modelling Platform<br>European Environment Agency, Landscape fragmentation pressure and trends in Europe<br>Ministry of culture of the Republic of Slovenia– register of cultural heritage (eVRD)<br>Slovenian Environment Agency, Protected areas (WFS)<br>Ministry of Culture and Media of the republic of Croatia<br>Croatian Ministry of Economy and Sustainable Development<br>Croatian Ministry of Agriculture |

Table 10: Water

| Main environmental objectives | Sources for objectives | Indicators | Source of the indicator |
|---|---|---|---|
| Protection of groundwater against pollution and harmful substances | EU-Directive 2000/60/EC (Water Framework Directive)<br>UNECE Convention on the Protection and Use of Transboundary Watercourses<br>Agenda 2030<br>Slovenian Water Act (ZV-1)<br>Slovenian Water Management Plan<br>Croatian Water Act<br>Croatian Water Management Strategy<br>Croatian River Basin Management Plan | Chemical and quantitative status of groundwater bodies | Slovenian Environment Agency – Assessment of the chemical status of groundwater in Slovenia; Quantitative status of groundwater in Slovenia; Chemical and Ecological status of surface waters in Slovenia<br>Statistical Office of the Republic of Slovenia<br>Croatian Waters – Assessment of chemical status of groundwater in Croatia, chemical and ecological status of surface waters in Croatia |
| Protection of surface water against pollution and harmful substances | | Ecological and chemical status of surface water bodies. | |
| Sustainable water use and preservation of good quantity status of water bodies | | Quantitative status of groundwater bodies | Slovenian Environment Agency – Assessment of quantitative status of groundwater in Slovenia; |
| | | Water Exploitation Index | Statistical Office of the Republic of Slovenia |

| Main environmental objectives | Sources for objectives | Indicators | Source of the indicator |
|---|---|---|---|
| Effective water and risk management | | Annual damage due to flooding | Ministry of environment and spatial planning - Flood risk reduction plan 2017-2021 |
| | | Built-up areas in areas with higher risk of erosion | Ministry of environment and spatial planning - Slovenian water agency<br>Ministry of Agriculture, Forestry and Food |
| | | Built-up areas in areas with higher risk of landslides | Ministry of environment and spatial planning - Slovenian water agency<br>Ministry of Agriculture, Forestry and Food |

Table 11: Climate and energy

| Main environmental objectives | Sources for objectives | Indicators | Source of the indicator |
|---|---|---|---|
| Reduction of GHG emissions (non -ETS) by 20% in 2030 compared to 2005 for Slovenia | Paris agreement<br>EU 2030 Climate- and Energy Framework | Annual GHG emission levels ($CO_2$ eq.) | European Environment Agency – Approximated estimates for greenhouse gas emissions |

| Main environmental objectives | Sources for objectives | Indicators | Source of the indicator |
|---|---|---|---|
| Reduction of GHG emissions (non -ETS) by 18.5 to 21.7 % in 2030 compared to 2005 for Croatia | Slovenian National Plan for Lowering Greenhouse Gas Emissions<br>Integrated National Energy and Climate Plan of the Republic of Slovenia<br>Strategy of low-carbon development of the Republic of Croatia until 2030 with a view to 2050<br>Integrated national energy and climate plan for the Republic of Croatia for the period from 2021 to 2030 | | Integrated National Energy and Climate Plan of the Republic of Slovenia<br>Slovenian Environment Agency – Environmental Indicators Platform<br>National Inventory Report Slovenia<br>Croatian Ministry of Economy and Sustainable Development - Greenhouse gas inventory |
| Fostering of renewable energy sources | EU Renewable Energy Directive II<br>Slovenian Energy Act<br>Integrated National Energy and Climate Plan of the Republic of Slovenia<br>Croatian Law on Renewable Energy Sources and High-Efficiency Cogeneration<br>Draft proposal of the Energy Development Strategy of the Republic of Croatia until 2030 with a view to 2050<br>Integrated national energy and climate plan for the Republic of Croatia for the period from 2021 to 2030 | Share of renewable energy in energy production | Energy Agency – Report on the State of Energy<br>Croatian Ministry of Economy and Sustainable Development - Register of renewable energy sources and cogeneration and eligible producers<br>Croatian Regional Energy Agencies |

| Main environmental objectives | Sources for objectives | Indicators | Source of the indicator |
|---|---|---|---|
| Improvement of energy efficiency | EU-Directive Energy 2012/27/EU (Energy Efficiency Directive)<br>Slovenian Energy Act<br>Integrated National Energy and Climate Plan of the Republic of Slovenia<br>Integrated national energy and climate plan for the Republic of Croatia for the period from 2021 to 2030<br>Croatian Energy Act | Final energy consumption<br>Public attitude towards energy consumption | Statistical Office of the Republic of Slovenia (SiStat)<br>Slovenian Environment Agency<br>Croatian Ministry of Economy and Sustainable Development<br>Croatian Fund for Environmental Protection and Energy Efficiency<br>Croatian Bureau of Statistics |
| Climate resilience | EU Climate Adaptation Strategy<br>Slovenia's long term climate strategy until 2050<br>Strategic framework for adaptation to climate change<br>Climate change adaptation strategy in the Republic of Croatia for the period up to 2040 with a view to 2070<br>Croatian Law on Climate Change and Ozone Layer Protection | Vulnerability to climate change | Expert basis for risk and vulnerability assessment in Slovenia<br>Croatian Ministry of Economy and Sustainable Development - Climate Activities Directorate |

Table 12: Material assets, raw materials, and resources

| Main environmental objectives | Sources for objectives | Indicators | Source of the indicator |
|---|---|---|---|
| Reduction and efficient recycling of waste | EU Directive 2008/98/EC (Waste Framework Directive)<br>Waste Management Programme and Waste Prevention Programme of the Republic of Slovenia, 2016, Government of the Republic of Slovenia<br>Slovenian Decree on Waste<br>Croatian Law on Waste Management<br>Waste Management Plan of the Republic of Croatia for the period 2017-2022 | Resource consumption per capita (in t/year) | Statistical Office of the Republic of Slovenia<br>Croatian Ministry of Economy and Sustainable Development - Sector for sustainable waste management, plans, programs and information system<br>Croatian Fund for Environmental Protection and Energy Efficiency<br>Croatian Bureau of Statistics |
| Promotion of recycling and the circular economy | | Generated and deposited waste per capita (in kg/year) | |
| | | Recycling rate of municipal waste [% of total municipal waste generated] | |

# 6. THE CURRENT STATE OF THE ENVIRONMENT AND THE ZERO ALTERNATIVE

The following chapters present the characteristics of the environment that are relevant for the assessment of possible environmental impacts of the program as well as the current state of the environment, including significant environmental problems. This description is required by the SEA Directive (Annex 1 (b)) and includes its expected development in the event of non-implementation of the Operational Programme (= zero alternative). According to Annex 1 paragraph c of the SEA Directive, the focus lies on those areas that are likely to be significantly affected.

To define the zero alternative, a qualitative trend estimation for the program period until 2030 is carried out, based on the indicators and other sources described in the previous sections. If detailed regional environmental data is not available for the individual programming area, national data will be used instead to describe the current status of the environment and to estimate probable trends. The assessment of the zero alternative is based on the previous trend description. It is carried out separately for each indicator.

## 6.1. Human health and well-being

In the context of this SEA, three main threats to human health and well-being are potentially impacted by the programme, namely air pollution, noise pollution and flood events.

Air pollution is the most important environmental risk factor for human health, affecting an average of 400,000 premature deaths in the EU and costing Europeans an average of more than EUR 166 billion a year (ARSO, 2021). The most important air pollutants include, particulate matter ($PM_{10}$ and $PM_{2.5}$), sulphur dioxide ($SO_2$), nitrogen oxides ($NO_x$) and non-methane volatile organic compounds (NMVOC). Tropospheric ozone differs from some other pollutants, as it is a product of photochemical reactions. Ozone precursors, especially nitrogen oxides and hydrocarbons, are substances from which ozone is formed in photochemical reactions. (ARSO, 2021)

Noise pollution, i.e. continuous exposure to high levels of noise increases the health risk of cardiovascular diseases, high blood pressure and many other diseases. Thereby, noise pollution does not necessarily have to be consciously perceived by those affected (e.g., while sleeping) in order to develop negative effects on human health. The thresholds for “noise pollution” differ between day and night, as night times are considered resting times and therefore lower thresholds are applied. The most important measurements thus are:

- Number of people affected by noise pollution > 65 dB [= $L_{den}$ (day-evening-night noise index[1])]
- Number of people affected by noise pollution > 55 dB [= $L_{night}$ (night noise index[2])] (ARSO 2018a, 12).

Floods are one of the most important natural disasters affecting human well-being. Close proximity of human settlements to rivers and streams is based on historic needs for transport in many areas, and a necessity due to limited space available for settlements in mountainous areas in particular. Exposure to some level of flood risk is thus inevitable, however considerable efforts are undertaken to limit the negative impacts. The most important measurements are the risk of population affected by a 30-year flood (HQ30) and a 100-year floods (HQ100) which are calculated for most significant water bodies in Europe.

### 6.1.1. Air pollution

Current status in Slovenia

Air pollution with $PM_{10}$ was on average lower in 2020 than in previous years. The number of exceedances of the daily limit value for $PM_{10}$ (50 ug/$m^3$) surpassed allowed number of exceedances (35) only at one monitoring site in mainland Slovenia, and at this monitoring site two out of thirty-six exceedances are due to desert dust, which is considered as natural source of pollution. The annual limit value for $PM_{10}$ and $PM_{2.5}$ particles was not exceeded at any monitoring site. Less polluted air with particles is the result of favourable meteorological conditions that prevailed in the winter period of the year. These allows the dilution of emissions from small combustion plants and traffic, which are the main sources of $PM_{10}$ particles emissions in Slovenia. Despite the fact that in recent years there has been a noticeable trend of decreasing particulate matter levels, occasionally, especially in adverse weather conditions, levels that pose a risk to human health are still measured. It is a worrying fact that in 2019 47% of children were exposed to concentrations of 21-30 µg $PM_{10}$/$m^3$, and 53% to concentrations of 31-40 µg/$m^3$ (in Europe, most children live in an environment where $PM_{10}$ concentrations are below 30 µg/$m^3$) (ARSO, 2021).

In Slovenia, the percentage of urban population exposed to concentrations above EU standards for $PM_{10}$ (50% to 26,7), $0_3$ (100% to 0%) has reduced from 2015 to 2019 but remain the at the same level for BaP (99%) and PM2,5 (25%) (EEA, 2021).

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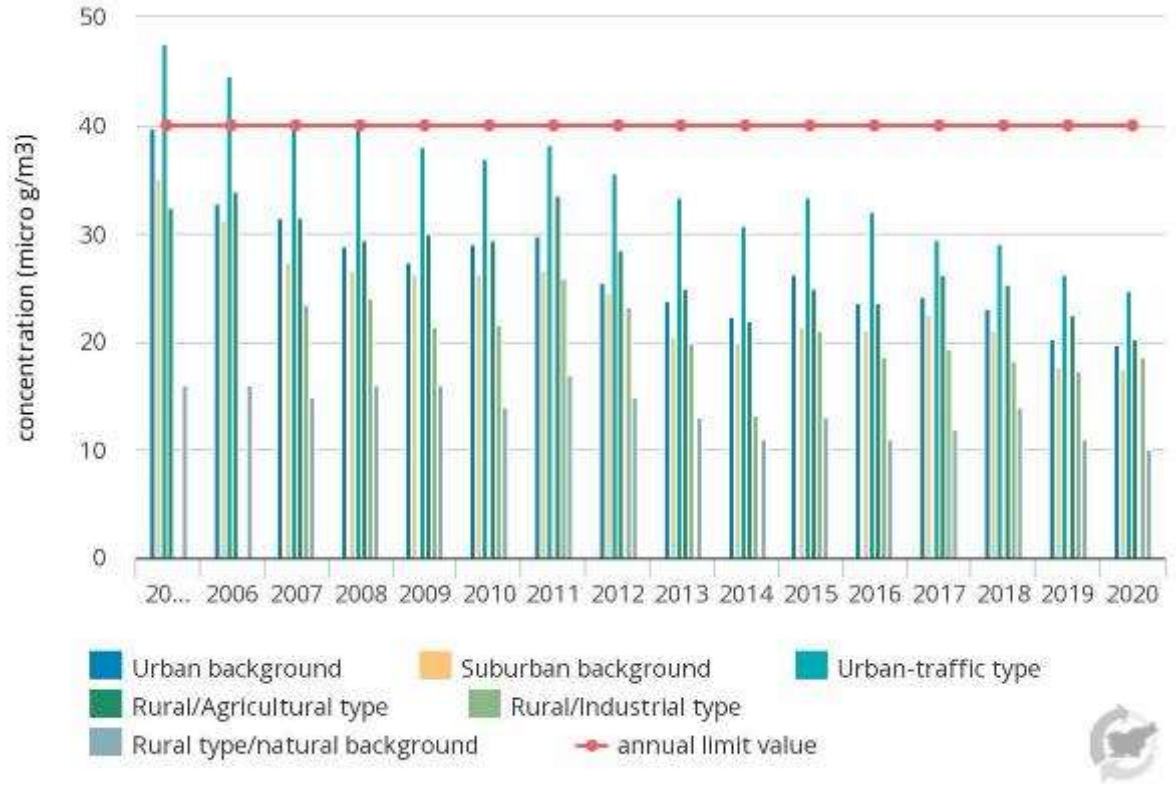
[1] The $L_{den}$ is used to determine the average noise level over the entire year and describes the exposure over 24 hours (Day-Evening-Night). The $L_{den}$ is therefore used to evaluate the general noise pollution.

[2] The $L_{night}$ describes the environmental noise pollution in the annual average at night (exposure from 22.00 – 6.00).

Figure 3: Average annual concentration of PM10 (annual limit value is 40 µg/m3)




Sources: National automatic measurement air quality network database, Slovenian Environment Agency, database of complementary automated measurement networks, 2020 (Thermal power plant Šoštanj, TE-TO Thermal power plant Ljubljana, Environment Information System Anhovo, Municipality of Ljubljana, Municipality of Celje, Municipality of Maribor, Municipality of Miklavž in the Drava field, Municipality of Ruše, Municipality of Ptuj and Municipality of Grosuplje) (12.03.2021)

Since 2006 concentrations of sulphur dioxide in ambient air are no longer harmful for human health. Also, the critical annual value (20 µg/m$^3$) for the protection of vegetation is no longer exceeded. The improvement of the situation in the last decade is a result of the use of low-sulphur fuels in industry and the operation of desulphurisation facilities in thermal power plants (ARSO, 2021).

Concentrations of nitrogen dioxide and total nitrogen oxides in ambient air do not exceed the prescribed limit values. Consequently, they are not harmful for human health and vegetation (ARSO, 2021).

In recent years, ambient concentrations of ozone in urban and suburban areas have been above target value for human health protection. Long-term targets (the maximum daily 8-hour mean value for ozone (120 µg/m$^3$) must not be exceeded) have been exceeded at almost all measuring sites. Due to fewer hot sunny summer seasons, the information threshold levels (180 µg/m$^3$) have been exceeded only in the Primorska region and in some places at higher altitudes – Otlica. However, also some exceedances have been recorded at measuring sites that

are not directly exposed to traffic. Emissions of total ozone precursors in Slovenia decreased by 55% in the period 1990 to 2018. Emissions of nitrogen oxides decreased by 53%, carbon monoxide by 68%, non-methane volatile organic compounds by 51% and methane by 24%. The reason is mainly the introduction of more stringent emission standards for motor vehicles. This measure contributed to a significant reduction in emissions of nitrogen oxides and carbon dioxide from road transport which is the main source of ozone precursors. Emissions of nitrogen oxides and non-methane volatile organic compounds were in 2018 below the prescribed target values, which must not be exceeded from 2010 onwards. (ARSO, 2021)

In Slovenia projections show a reduction in $SO_2$, NOx, NMVOC, $NH_3$ and $PM_{2.5}$ emissions by 2030, mainly due to stricter legislation and implementing a number of sectoral policy measures. For $PM_{2.5}$, NMVOC and $SO_2$ emissions in 2030 are only slightly lower than according to targets, so there is a possibility that targets will not be met (ARSO, 2021).

Current status in Croatia

Croatian air pollution was monitored on 69 stations in 2020. The territory is divided into 5 zones and 4 agglomerations with similar air quality. Zones and agglomerations bordering with Slovenia are zones HR 1, HR3 and HR 4 and agglomerations HR ZG and HR RI.

Air pollution with relation to Croatia shows a slight decrease in the last seven years (2013. – 2020.) but the decrease is not significant on every station (Figure 4). In the zones and agglomerations bordering with Slovenia only HR ZG agglomeration had concentrations of $PM_{10}$ above the limit values (50 μg/m³) in 2020. Concentrations of $PM_{2.5}$ have not surpassed the limit values (20 μg/m³) in 2020. Main sources of air pollution in Croatia, and especially of PM are households that still use wood for heating. This is an obvious conclusion from comparing the daily concentrations of PM and the average air temperature where there is a clear correlation between lower temperatures and higher PM concentrations.

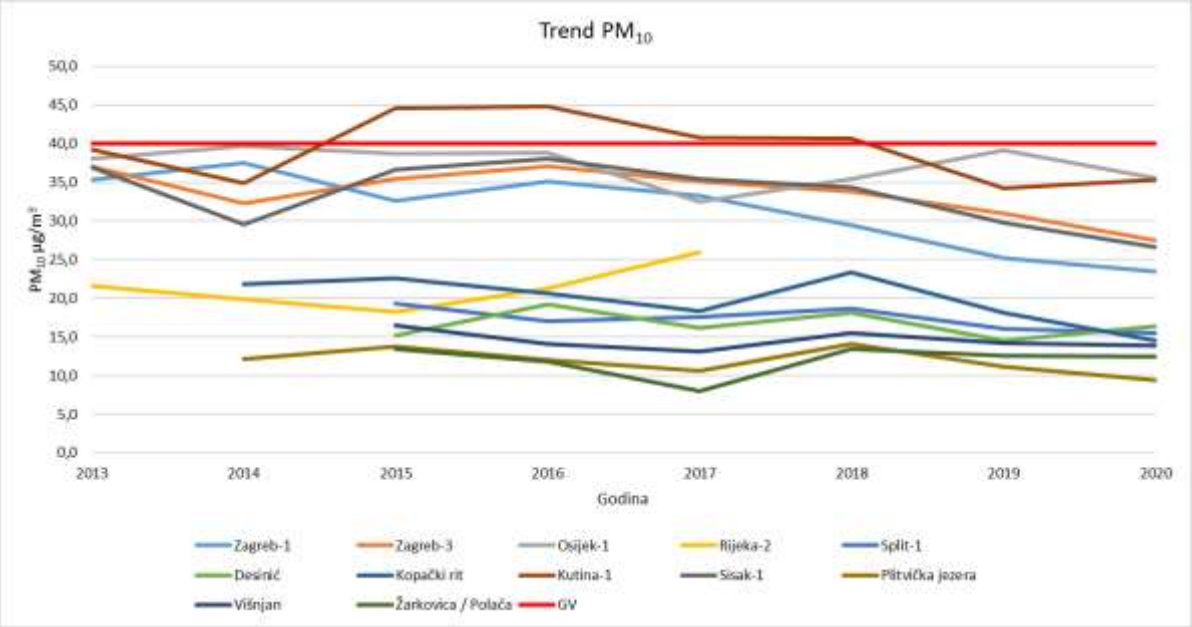
Concentrations of $SO_2$ measured in 2020 were below the limit values (350 μg/m³) on every station in Croatia. This is the result of the national and international regulations on sulphur content in fuels and coal used mostly in vehicles and industries. Some contribution can also be attributed to the general trend towards more efficient engines and boilers with incentives to transition to renewable energy sources.

Concentrations of $NO_2$ also did not surpass the limit values (200 μg/m³) in 2020. In Croatia. Most of $NO_2$ emission in Croatia originate from the vehicle engines. Because of more efficient engines, better fuels, and the general trend towards electric vehicles this result is not surprising.

Ozone levels have been above the limit values in 2020 in coastal regions of Croatia. The zone HR 4 represents the Istria peninsula that borders with Slovenia. Ozone is not directly emitted, rather it is created in the atmosphere in the presence of ozone precursors like nitrogen oxides, methane, carbon monoxide, and others. Croatia is in an unfortunate geographical position because most of the ozone precursors are brought by the prevailing winds from other

countries. This makes the goal of reducing ozone pollution more challenging and requires international cooperation.

Figure 4: $PM_{10}$ pollution trend for selected monitoring stations in Croatia from 2013 to 2020.




Source: Report on air quality monitoring in the territory of Republic of Croatia for 2020

In general, it can be concluded that air quality in Croatia is at a satisfying level, especially in regions bordering with Slovenia. An exception to this conclusion is the ozone concentrations that are above the limit values.

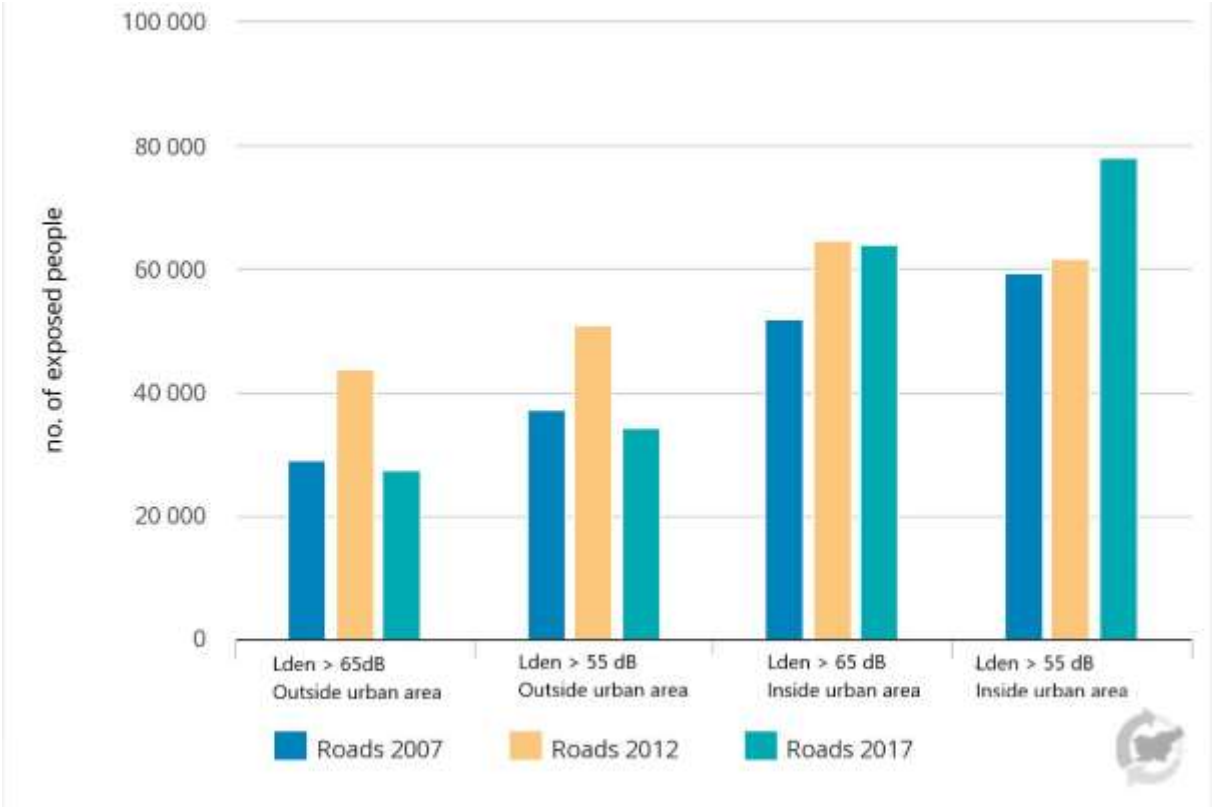
### 6.1.2. Noise pollution

Current status in Slovenia

The number of inhabitants who live in the impact area of major roads outside urban areas has decreased in recent decade. In 2017 around 16,000 fewer inhabitants (around 34,000) were exposed to high noise levels throughout the day and during the night compared to 2012. In urban areas, the number of inhabitants exposed to road traffic noise has not decreased. The number of inhabitants who are exposed to high noise levels throughout the day has remained at the same level as in 2012 and is estimated at 64,000. The number of inhabitants who are exposed to noise during the night along major roads in urban areas (around 78,000) has slightly increased. (ARSO, 2021).

The number of inhabitants who live along major railways outside urban areas did not change significantly between 2012 and 2017. In 2017, around 7,000 inhabitants were exposed to high noise levels throughout the day and around 10,700 inhabitants during the night. Despite a decrease in the number of inhabitants exposed to noise during the night within urban areas, around 8,800 inhabitants were exposed to high noise levels during the night in 2017 (ARSO, 2021).

Figure 5: Number of people exposed to noise levels above value 65 dB throughout the day and 55 dB during the night, along roads inside and outside urban areas




Sources: ARSO 2021

Current status in Croatia[3]

The World Health Organization (WHO) considers road traffic noise as the second most important cause of impairment of human health in Europe, after the air pollution caused by particulate matter. According to the Law on Noise Protection (OG 30/09, 55/13, 153/13, 41/16, 114/18), environmental noise measurement is carried out in populated areas with more than 100 000 inhabitants exposed to environmental noise, coming from high density road traffic, rail and air traffic, and industrial operations and facilities. To avoid, prevent or reduce the adverse effects of noise interference, data are monitored and exchanged with the European Environment Agency (EEA)4, every five years, strategic noise maps are developed and environmental noise management action plans are adopted.

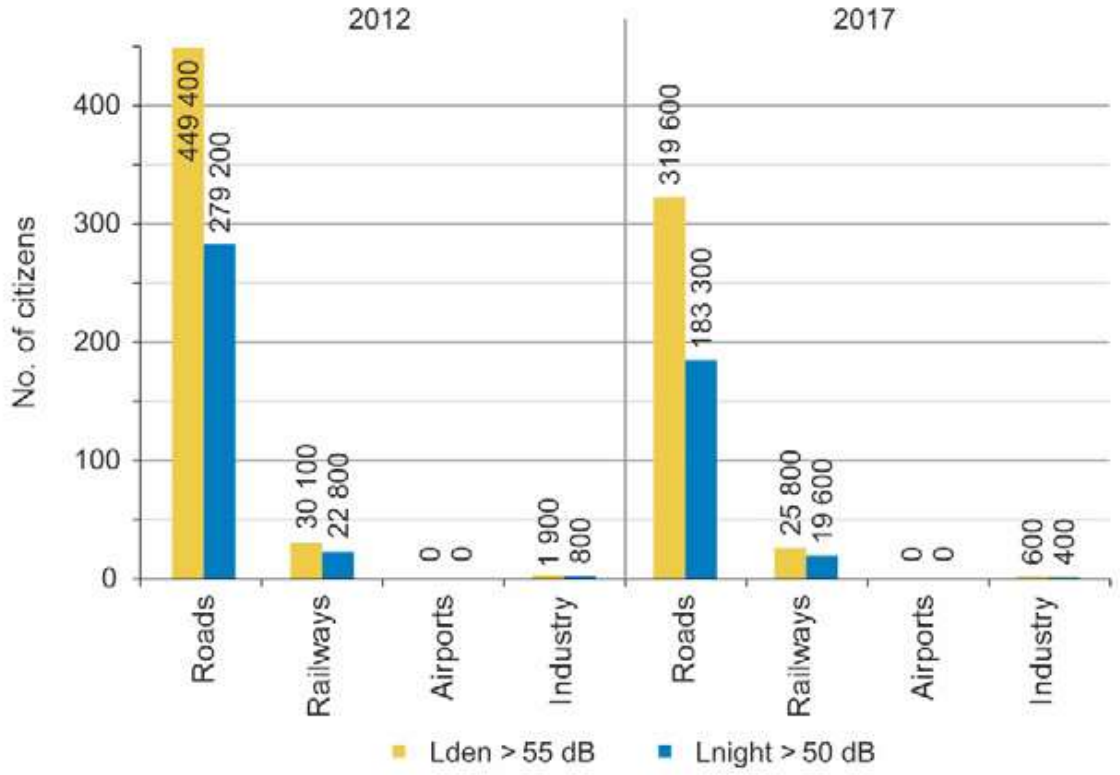
[3] Source: The Environment in Your Pocket I-2020, Ministry of Economy and Sustainable Development.

[4] https://www.eea.europa.eu/themes/human/noise/noise-fact-sheets/noisecountry-fact-sheets-2019/croatia

*Trend and current state*

Long-term exposure to noise can cause a wide variety of cardiovascular diseases, adverse metabolic and cognitive effects and disorders and serious sleep interferences and disorders5. As in other European countries, in Croatia in 2017, the main source of noise interference was road traffic. Environmental exposure values measured within populated areas in 2017 in the cities of Zagreb, Rijeka, Split and Osijek show that the population of exposed residents was 319.600, that is significantly less than in 2012 when the number of exposed residents was 449.400. In the same period, the number of inhabitants exposed to environmental noise from railway traffic and the noise of industrial operations and facilities was reduced in the area of the mentioned cities, while there were no exposed environmental noise coming from airports in Croatia.

Figure 6: Population in areas with more than 100 000 inhabitants (Zagreb, Split, Rijeka, Osijek) exposed to noise overdose Lden > 55 d




Sources: Ministry of health

[5] Noise indicator Lden (day-evening-night), maximum permissible values> 55 dB, the total noise nuisance is assessed, while the night noise indicator Lnight, maximum allowable value value> 50 dB, evaluates sleep disturbance.

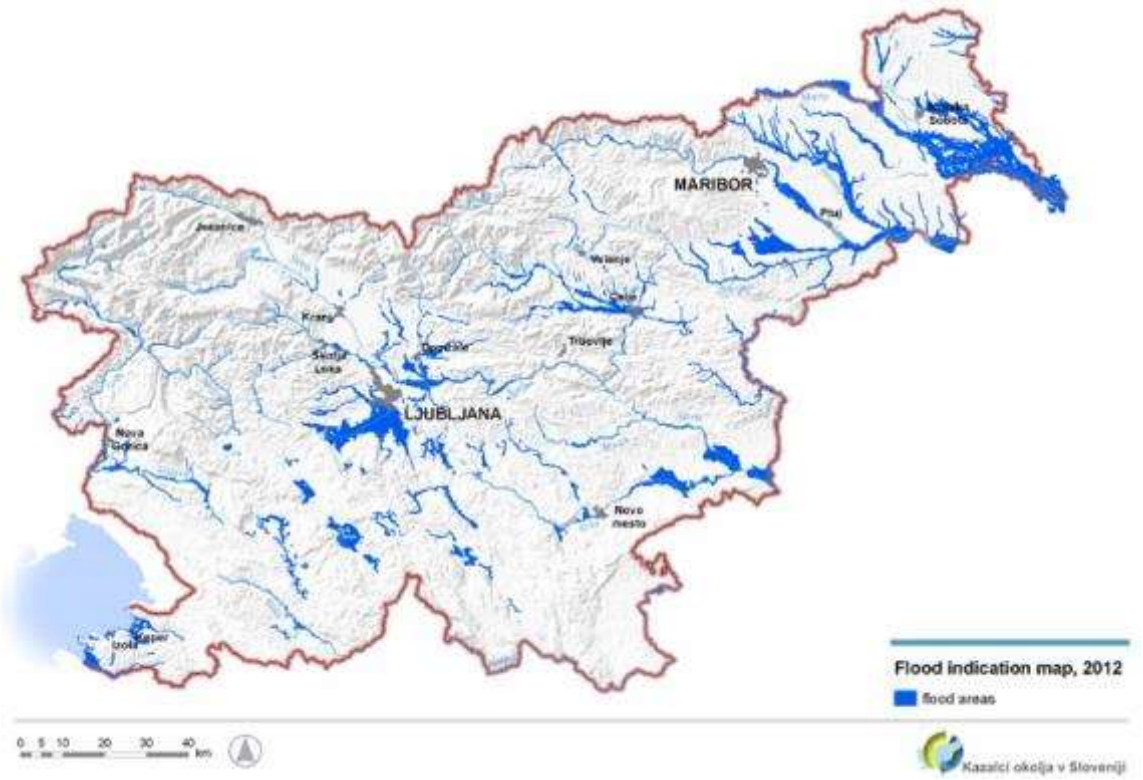
### 6.1.3. Flood risk

Current status in Slovenia

Considering the data from 2013, 7% of people lived in flood-prone areas in Slovenia. The most extensive flood areas are in northeast and in subpannonian Slovenia, in subalpine valleys and basins and plains along Ledava, Mura and Ščavnica. The largest share of the population in areas of flooding is in Savinjska (13%), Koroška (12%), Zasavska, (10%) and Osrednjeslovenska (9%) statistical region (ARSO, 2021).

Flood risk management plan 2017-2021 is based on the fact that measures within the 61 areas with significant impact of floods have to be implemented within each of 17 sub-basins. Areas with significant impact of floods covered 11,079 ha in 2017 and 128,650 people lived within those areas (NZPO SI, 2017). Since 86 areas with significant impact of floods are defined in 2020 and they cover 14,001 ha it is expected that more people are affected by flood risk nowadays (MESP, 2020).

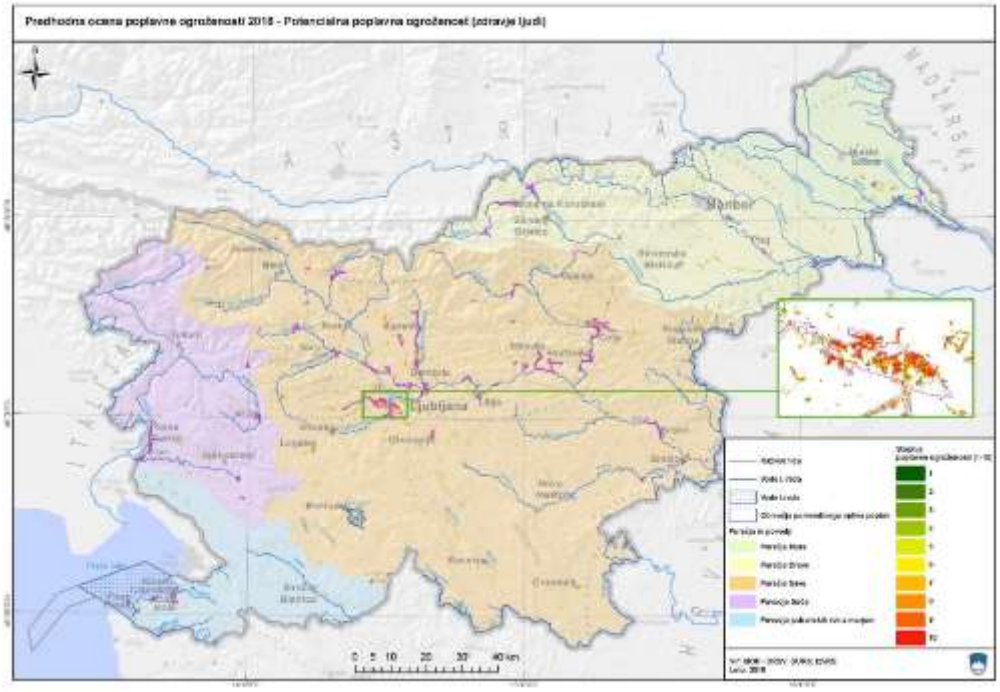
Figure 7: Areas at risk of flooding according to the indicative flood map 2012




Sources: Institute for Water of the RS, 2012

Flood risk areas are mostly located in the regions adjacent to the Croatian border such as Prekmurje, Podravska, Posavska and Primorska.

Figure 8: Potential flood risk areas – human health

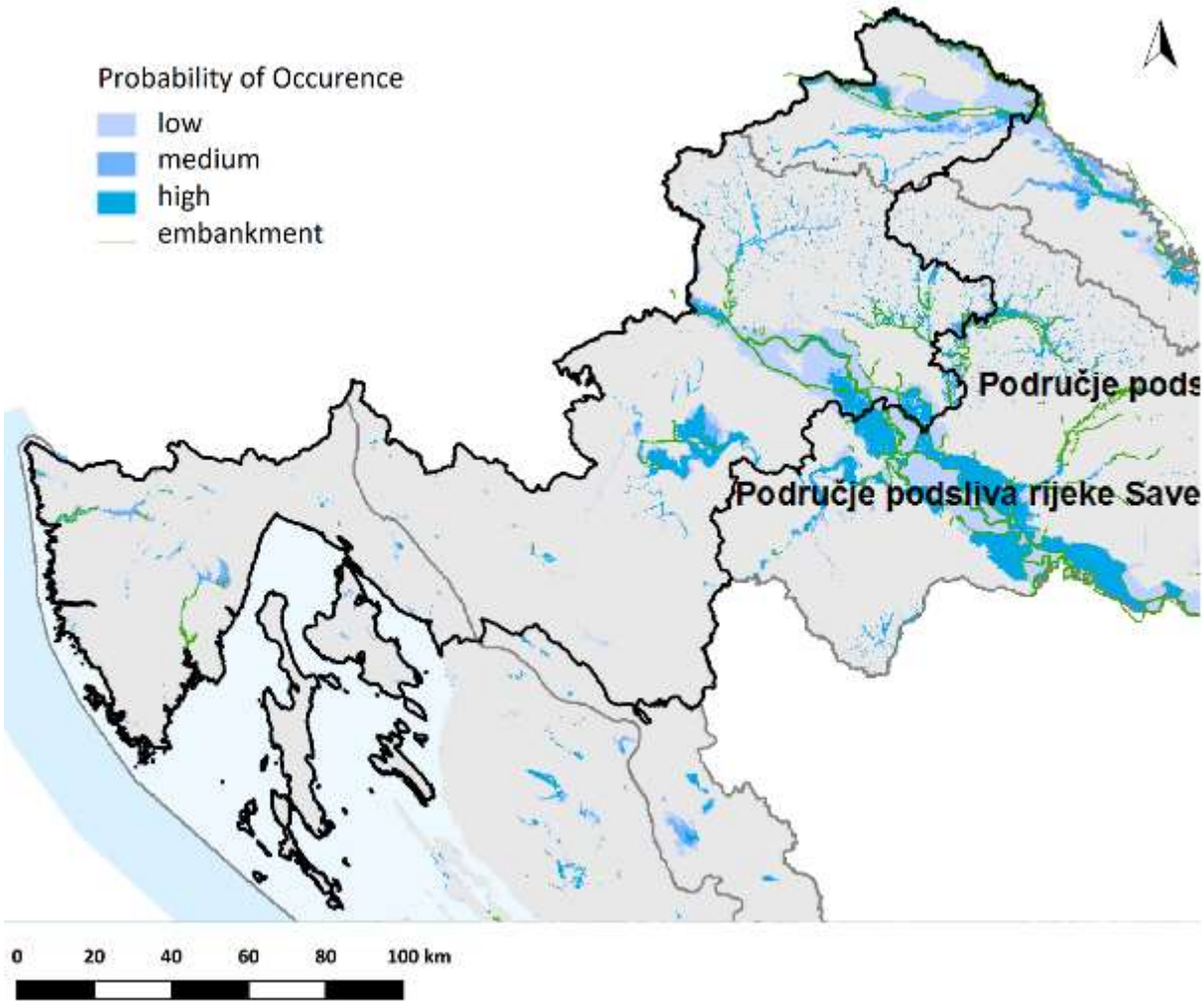



Source: MESP, 2019

Current status in Croatia

Flood areas in Croatia, adjacent to Slovenia are mostly connected to rivers Mura, Drava, Sava and Kolpa/Kupa and their respective tributaries. Also flood areas can be spotted in bay areas along the coastline. Around 15,000 citizens live in flood prone areas in Croatia. Bigger floods were recorded 2008: in Pula, Rijeka, Rovinj and Umag. Around 6.2 % of Croatia territory is under high, 8.1 % under medium, and 17.1% under low probability of flood occurrence.

Figure 9: Areas at risk of flooding according to the indicative flood map of Croatia




### 6.1.4. Light pollution

Today, light pollution is a global problem that is attributed to economic, astronomical, security, but also health problems that affect humans and cause many adverse health effects. Light pollution is a newer term for the general public as opposed to water, soil or air pollution (MINGOR, 2021).

Light pollution is a change in the level of natural light at night caused by the emission of light from artificial light sources, which adversely affects human health and endangers traffic safety due to glare, direct or indirect light radiation to the sky interferes with life and / or migration of birds, bats, insects and other animals and disrupts the growth of plants, threatens the natural balance in protected areas, interferes with professional and / or amateur astronomical observation of the sky and unnecessarily consumes energy and distorts the image of the night landscape(MINGOR, 2021).

The most recognizable side effect of light pollution is an increase in the illumination of the sky during the night, which is caused by excessive use of lighting, and occurs due to scattering of

visible and invisible light (ultraviolet and infrared light) of natural or artificial origin. man, and his environment (MINGOR, 2021).

Light pollution has a number of harmful consequences (MINGOR, 2021).:

- the disruption of the natural alternation of day and night affects human health and the normal functioning of most of the living world
- excessive artificial light at night in some ecosystems is a serious threat to species survival
- causes unnecessary energy consumption and carbon dioxide emissions, which are harmful to the environment.

Since a certain level of disturbance of natural darkness by artificial lighting of streets, roads, public places and monuments is a prerequisite for urban lifestyle, the term "light pollution" primarily means any unnecessary light emission or emission into space outside the zone to be illuminated (MINGOR, 2021).

Protection against light pollution ensures the protection of human health, comprehensive preservation of environmental quality, preservation of biodiversity and landscape diversity, preservation of ecological stability, protection of flora and fauna, rational use of natural resources and energy in the most favourable way for the environment. and the foundation of the concept of sustainable development (MINGOR, 2021).

Measures to protect against light pollution include protection against unnecessary and harmful light emissions into space, in the zone and outside the zone to be illuminated, and measures to protect the night sky and natural water bodies and protected areas from artificial lighting, taking into account health, biological, economic, cultural, legal, security, astronomical and other conditions and needs (MINGOR, 2021).

Current status in Slovenia

Legislation in Slovenia (Decree on limit values due to light pollution of environment OJ RS, no. 81/07, 109/07, 62/10 in 46/13) defines the use of lamps with a proportion of upward luminous flux equal to 0%. Lighting of roads and public areas is limited by the annual electricity consumption of lamps managed by the municipality, which is calculated according to residents with permanent or temporary residence in the municipality and may not exceed 44.5 kWh per person. In Slovenia, public lighting consumes an average of 83 kWh of electricity per capita per year, which is about twice as much as in Germany or the Netherlands (Žiberna I., Ivanjšič D., 2018).

Measurements show an increase in light pollution, depending on the location, which can be seen from both satellite images and light pollution measurements carried out by thousands of amateur astronomers and environmentalists (Mohar A, et. al., 2014). The figure below shows the values of light sources at night based on data collected by the Suomi NNP satellite using the VIIRS (Visible Infrared Imager Radiometer Suite) instrument. It also detects well at night and

thus allows the observation of light pollution. The only disadvantage of the instrument sensor is that it does not detect the extremely blue part in the visible part of the spectrum, in which the LED lamps have the maximum brightness. It is obvious that light pollution is particularly pronounced in larger cities, or is related to population density. In addition to point or light pollution of areas (urban areas), line strokes are also visible - indicating road infrastructure. There are the most light sources, and consequently the most illuminated sky (NOAA, 2021).

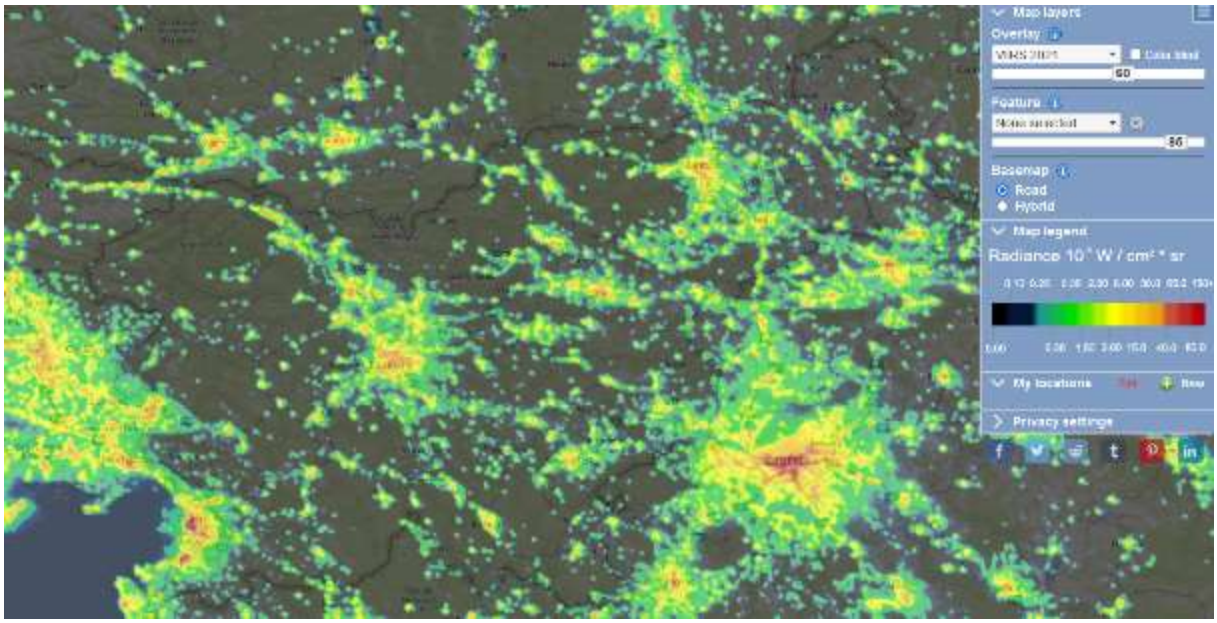



Figure 10: Light pollution - radiance, situation in 2019 (NOAA, 2021)

Light pollution is not monitored in Slovenia. Based on data collected by the Suomi NNP satellite using the VIIRS instrument, an average radiance was calculated for Slovenia in year 2017. An average radiance of 0.780 nW / sr cm$^2$ was recorded and most of the surface belonged to the radiance class between 0.25 and 0.5 nW / sr cm$^2$ (49.25% of the surface). Only 22.72 % had a radiance below 0.25 nW / sr cm$^2$, which indicates conditions with average light pollution conditions. In other words, only a good fifth of Slovenia's territory can boast of average light pollution conditions. More than a quarter of Slovenia's territory is in above-average light-polluted conditions: 14.88 % are in the radiance class between 0.5 and 1.0 nW / sr cm$^2$, and more than 15 % of the surface is in the class above 1 nW / sr cm$^2$. 590.4 ha of the surface is in extremely light-polluted conditions in which the radiance exceeds 40 nW / sr cm$^2$(Žiberna I., Ivanjšič D., 2018).

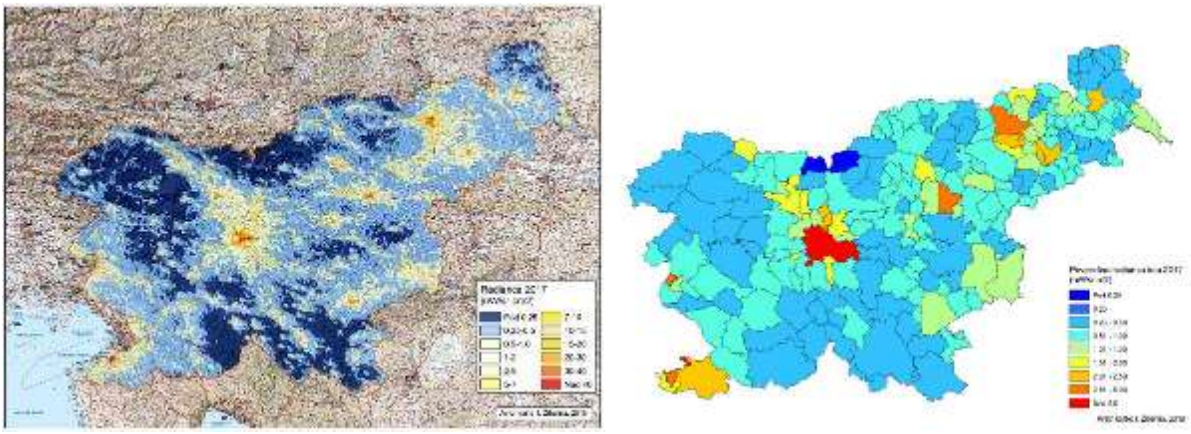


Figure 11: Radiance, average situation in 2017 (Žiberna I., Ivanjšič D., 2018)

The radiance limit above which we can reliably speak of a light-polluted sky (0.25 nW / sr cm$^2$) is determined arbitrarily. The results show that in Slovenia in the Natura 2000 area there is only 40.23 % of the area with a radiance below 0.25 nW / sr cm$^2$, while outside the Natura 2000 area there is only 13.16 %. Just under half of Natura 2000 sites have a radiance between 0.25 and 0.5 nW / sr cm$^2$, and a good 13% have a radiance even above 0.5 nW / sr cm$^2$, which proves that most Natura 2000 sites in Slovenia are already light-polluted (Žiberna I., Ivanjšič D., 2018).

VIIRS Country statistics is showing slightly positive trends, since the average mean radiance in 2020 is 0.726 nW / sr cm$^2$ with calculated trend of -17%.

Today, modern LED lamps are widely used, which are quite energy efficient when using lower powers. Due to higher efficiency, white LED lamps with a colour temperature of 4000 K are most often used, which is also the current standard of industrial lighting. It is worrying, however, that such lamps emit a high proportion of blue light, as the extremely blue colour in the atmosphere sheds 16 times more than the extreme red, and also that such light attracts insects, which disrupt the natural cycle.

Greater efficiency of LED lights also leads to their irrational installation, as it is possible to install more lights with significantly lower electricity consumption (which is limited by the regulation) (Šubic A, 2021).

Current status in Croatia

The Light Protection Act (Official Gazette, No. 14/19) regulates the principles of protection, entities implementing protection, the manner of setting lighting management standards in order to reduce electricity and other energy consumption and mandatory lighting methods, and measures to protect against excessive lighting , restrictions and prohibitions related to light pollution, planning of construction, maintenance and reconstruction of lighting, and the responsibility of manufacturers of products used for lighting. The Ordinance on lighting zones, permitted lighting values and methods of managing lighting systems (Official Gazette, No. 128/20) based on Article 9 of the Light Pollution Protection Act (Official Gazette, No. 14/19) entered into force on the eighth day published in the Official Gazette. The Ordinance prescribes

mandatory lighting control methods and conditions, lighting zones, protection measures, maximum permissible lighting values, conditions for selection and installation of lamps, energy efficiency criteria, conditions, maximum permissible values of correlated light source colour and use of environmentally friendly lamps (MINGOR, 2021).

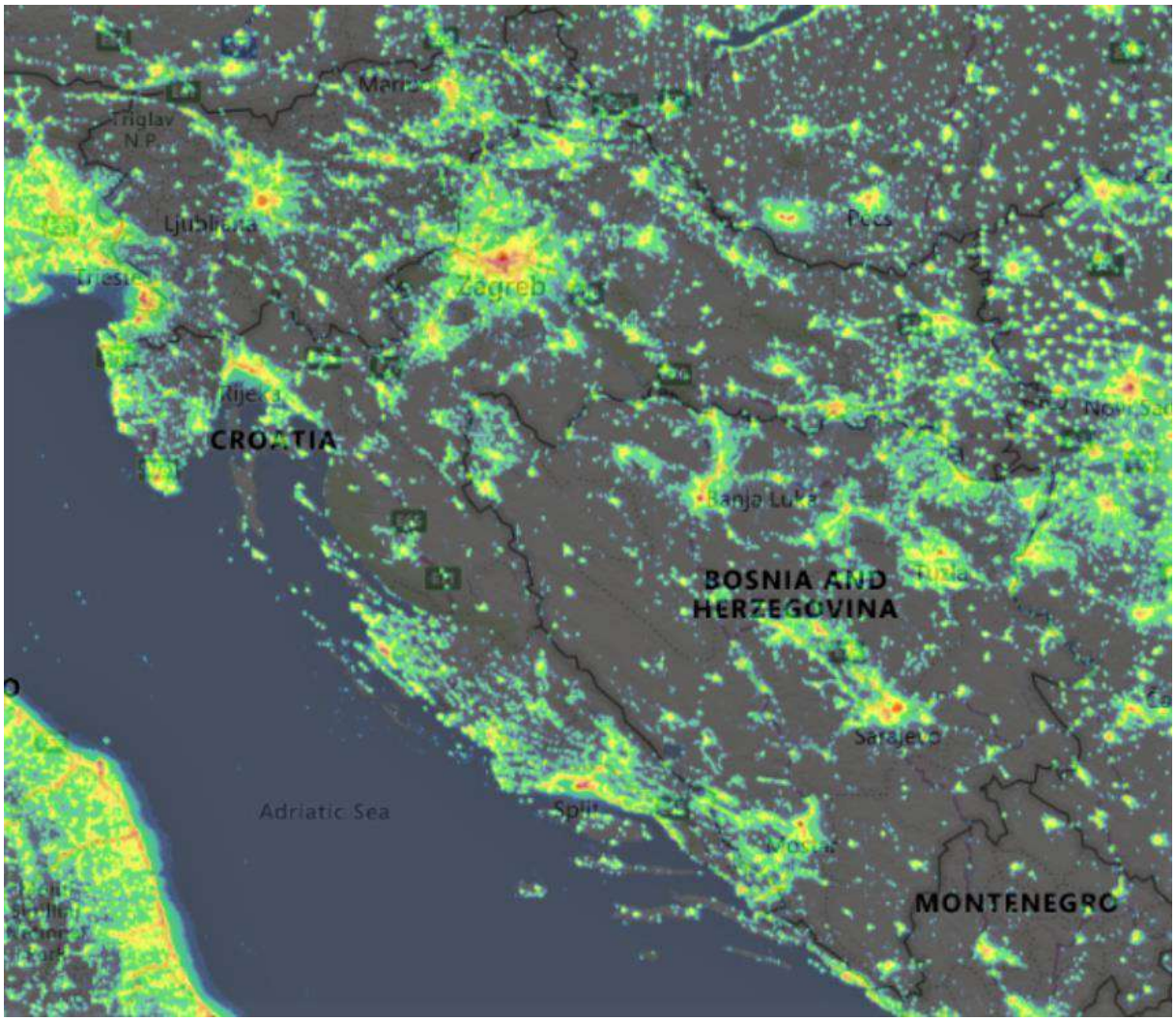



Figure 12: Overview of light pollution in the Republic of Croatia (Glavaš R., Strossmayer J.J., 2021)

VIIRS Country statistics is showing negative trends (+0.86%) with the average mean radiance in 2020 1.020 nW / sr $cm^2$(NOAA, 2021a).

Table 13: Assessment of the development according to the zero alternative

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| Human health and well-being | Number of people | SI (ARSO, 2021): 47% of children were exposed to concentrations of 21-30 µg $PM_{10}/m^3$, and 53% to concentrations of 31-40 µg/$m^3$ (in Europe, most | ←↗ |

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| | exposed to air pollution | children live in an environment where PM10 concentrations are below 30 µg/m$^3$). However, the percentage of urban population exposed to concentrations of PM10 and 03 is reducing (EEA, 2021). | |
| | | HR (Air quality report, 2021): Limit values of $PM_{10}$ concentrations were exceeded in three zones: HR 02, HR ZG and HR OS. Total population living in these zones is 1,390,977 or 32.46% of Croatia's population that is exposed to concentrations that are considered unhealthy. Efforts made in recent years had a positive effect on reducing air pollution with most of stations recording lesser concentrations. | ←↗ |
| | Average and maximum emission levels of the main air pollutants ($NO_x$, $PM_{10}$, $PM_{2,5}$, $O_3$, $SO_2$) | SI (ARSO, 2021):<br>$PM_{10}$: the number of exceedances of the daily limit value surpassed allowed number of exceedances only at one monitoring site in mainland Slovenia (2020)<br>$PM_{10}$, $PM_{2,5}$: the annual limit value was not exceeded at any monitoring site (2020).<br>$SO_2$: since 2006 concentrations are no longer harmful for human health.<br>$NO_2$, $NO_x$: concentrations do not exceed the prescribed limit values.<br>$O_3$: in recent years, ambient concentrations have been above target value for human health protection. Long-term targets have been exceeded at almost all measuring sites.<br>Emissions of total ozone precursors in Slovenia decreased by 55% in the period 1990 to 2018. Emissions of nitrogen oxides decreased by 53%, carbon monoxide by 68%, non-methane volatile organic compounds by 51% and methane by 24%. | ↗ |
| | | HR (Air quality report, 2021): | ←↗ |

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| | | $PM_{10}$: concentrations in zones HR 02, HR ZG and HR OS were above the limit values. Other zones recorded values below the limit values.<br>BaP in $PM_{10}$: concentrations were exceeded in zones HR ZG and HR 02. Evaluation was not made for other zones because of lack of measurements.<br>$PM_{2,5}$: concentrations were only above the limit values in zone HR 02.<br>$SO_2$, $NO_2$ and CO: concentrations were below the limit values on all stations in 2020.<br>$O_3$: concentrations in zones HR 04 and HR 05 were above the limit values in 2020. In other zones the concentrations were below the limit values. | |
| | Number of people exposed to excessive noise levels | SI (ARSO, 2021): 112,306 inhabitants lived in the impact area of roads and 19,482 inhabitants in the impact area of rails in 2017.<br>The number of inhabitants who are exposed to high roads noise levels outside urban areas has decreased between 2012 and 2017. In urban areas, the number throughout the day has remained at the same level, and during the night has slightly increased. The number of inhabitants who live along major railways outside urban areas did not change significantly between 2012 and 2017, and decreased within urban areas during the night. | ←↗ |
| | | CROATIA (MH, 2021) In 2017, the main source of noise interference was road traffic. Population of exposed residents was 319 600, that is significantly less than in 2012 when the number of exposed residents was 449 400. In the same period, the number of inhabitants exposed to environmental noise from railway traffic and the noise of industrial operations and facilities was reduced; there was no exposed environmental noise coming from airports. | ↗ |
| | Number of people | SI (NZPO SI, 2017; MESP, 2020): Areas with significant impact of floods covered 11,079 ha in 2017 and | ↘ |

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| | affected by flood risk | 128,650 people lived within those areas. Since 86 areas with significant impact of floods are defined in 2020 and they cover 14,001 ha it is expected that more people are affected by flood risk nowadays. | |
| | | HR: Around 15000 people are affected by flood risk according to Flood Risk Reduction Management Plan 2016–2021. One of the strategic goals is to maximise the effectiveness of anti-flood systems up to 87% by end of 2023. and 100% until end of 2038. | ↗ |
| | Degree of light pollution – radiance (nW/sr cm2) | SI: VIIRS Country statistics is showing slightly positive trends, since the average mean radiance in 2020 is 0.726 nW / sr cm2 with calculated trend of -17%. Still a large part of Slovenia's territory is in above-average light-polluted conditions. Greater efficiency of LED lights leads to their irrational installation, as it is possible to install more lights with significantly lower electricity consumption (which is limited by the regulation) | ←↗ |
| | | HR: VIIRS Country statistics is showing negative trends (+0.86%) with the average mean radiance in 2020 1.020 nW / sr cm2. | ←↘ |
| ↗ Improvement ←↗ Partial improvement ←→ No change ←↘ Partial deterioration ↘ Deterioration | | | |

## 6.2. Flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity

Natura 2000 is a network of protected areas covering Europe's most valuable and threatened species and habitats. It is the largest coordinated network of protected areas in the world. An important role in protecting natural areas have protected areas – clearly defined geographical space that is recognised as and dedicated to achieving the long-term conservation of nature. However, many species, habitats and ecosystems in Europe are threatened by urban sprawl, unsustainable farming and forestry, pollution and fragmentation. (EEA, 2021)

Biological diversity or biodiversity describes the variability of living organisms. The preservation of biodiversity is extremely important because if the loss of habitat and species continues, nature will become increasingly impoverished which also threatens the basis of human life. The ongoing loss of biodiversity is a complex problem and cannot be solved by isolated conservation activities but will require global cooperation. There are several international actions aiming to limit the loss of biodiversity such as the Convention on Biological Diversity (CBD) by the UN or the Habitats Directive and the Birds Directive at the EU level (Bundesamt für Naturschutz s.a.). However, according to scientific discussions (ClimateAdapt, 2019; Crooks and Sanjayan, 2006), protected areas alone will not succeed in addressing efficiently the conservation of biodiversity without ecological connectivity between them and towards their surroundings. The Conference of Parties (COP) as well as the EU and several conservation organizations are promoting national and even international networks of ecological connectivity, although their implementation is facing numerous obstacles (Jongman et al. 2011).

### 6.2.1. Species protection and biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas

Current status in Slovenia

Despite the country's small surface area, species diversity in Slovenia is extremely high. Slovenian flora comprises 3472 vascular taxa and is rich in endemic species, but unfortunately also rare and threatened species. Especially distinctive is the Illyrian floral element—that is, plants with limited distributions along the Dinaric Alps from Slovenia to Albania, mainly thermophilic and heliophilic endemic species. The vegetation of Slovenia differs from that of neighboring regions because of its rich flora as well as its different vegetation history and development after the last ice age. Slovenia is known for its extensive forest cover (58.9%), mostly dominated by beech. Slovenian fauna comprises more than 21,500 continental taxa and at least 1600 marine taxa (Šilc et al., 2020).

More than 900 alien species of animals, plants and fungi have been recorded in Slovenia. 30 of which are plant and 30 animal species that have such large populations that they are invasive and therefore affect biodiversity.

Large scale protected areas are national, regional and landscape parks while the small scale protected areas are strict nature reserves, nature reserve and natural monument. They together cover 11% of the programme area. Within the programme area in Slovenia (1.46 million ha) there are 50 parks that are protected natural areas either on national or local level due to outstanding natural features, as well as cultural, 5 regional parks and 45 landscape parks, together covering an area of 155,457 ha. In recent years, the total surface area of protected areas has expanded, largely due to the designation of five larger parks (ARSO, 2021a).

There are 1,704 natural values location and 1704 natural values areas within the programme area, covering 9% of the programme area. Many Natura 2000 areas are present – 273 Special Areas of Conservation (SAC areas) and 34 Special Protection Areas (SPA areas), covering 778

555 ha that represent half of the programme area. Ecologically important areas are defined on more than half of the programme area (ARSO, 2021a).

Table 14: Number and covered land (in ha) of nature conservation protection regimes in Slovenia

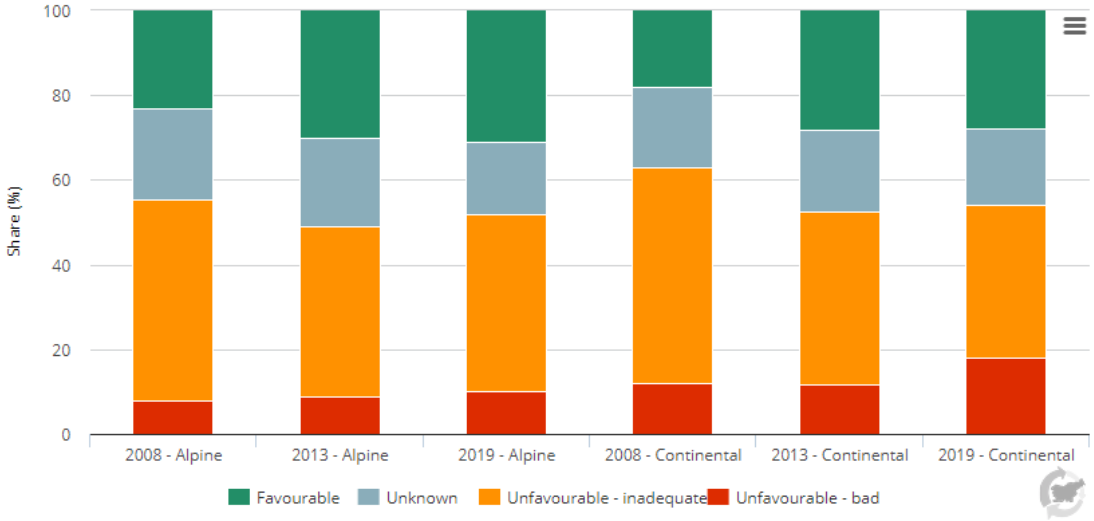
| Type of area protection | Number of units | Area (in ha)* | % of the programme area in Slovenia |
|---|---|---|---|
| Protected areas (large and small scale) | 358 | 155,457 | 11% |
| Natural values (areas) | 1,760 | 137,079 | 9% |
| Natural values (locations) | 1,704 | / | / |
| Natura 2000 area | 307 (273 SAC and 34 SPA areas) | 778,555 | 53% |
| Ecologically important areas | 277 | 907 005 | 62% |

Source: ARSO, 2021a
* The area represents the area of certain type of protection. If two (or more) units (e.g., protected areas) are covering the same are, the area is not included twice in this calculation.

Despite the country's small surface area, species diversity in Slovenia is extremely high. It is estimated that there are approximately 13,000–5,000 animal species, as well as more than 3,200 higher plant species in Slovenia. The abundance among numerous plant and animal species is decreasing, with some species becoming endangered with the possibility of extinction. For example, more than four fifths of all known amphibians and reptiles in Slovenia, as well as almost half of all mammals (this represents 41 species) are on the Red List of Threatened Species. Population trends of selected bird species show that the state of the environment in the cultural landscape is deteriorating, especially in some parts such as Prekmurje and Ljubljansko barje. Populations of selected forest bird species are in moderate decline, while wetland conditions have not changed in the last few years. Bird populations that overwinter on Slovenian rivers and other water bodies are stable or growing. Minor fluctuations are part of natural population changes (ARSO, 2021).

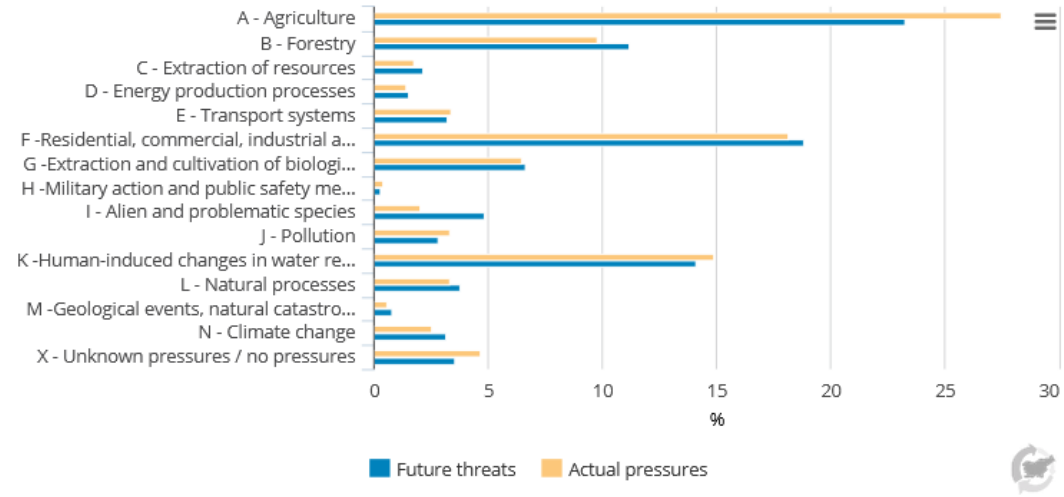
The conservation status of species of European interest in Slovenia indicates that only 30% of species have a favourable status. Furthermore, also the trends are unfavourable. In the years 2013-2018, the proportion of species with favourable conservation status remained stable according to the previous reporting period, while the proportion of species with poor conservation status has increased. As many as one third of Europe's important bird species have a negative or uncertain short-term trend (ARSO, 2021).

Figure 13: Conservation status of species of European interest in Slovenia by biogeographical region




Source: ARSO, 2021

Figure 14: Recorded pressures and threats faced by the major species in Slovenia

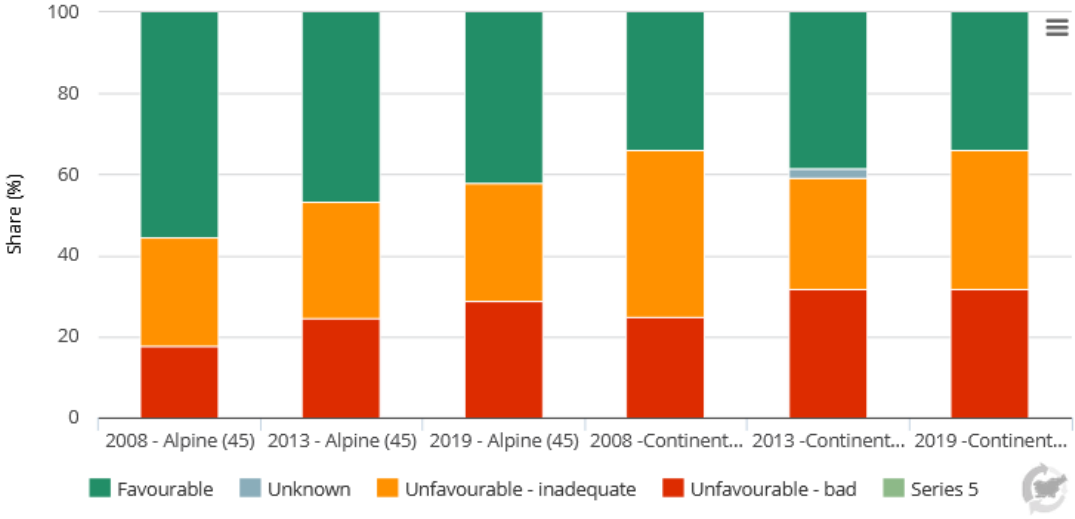



Source: ARSO, 2021

Some of the biggest actual pressures and future threats for the major species are connected with agriculture; residential, commercial, industrial and recreational infrastructure and areas as well as human-induced changes in water regimes.

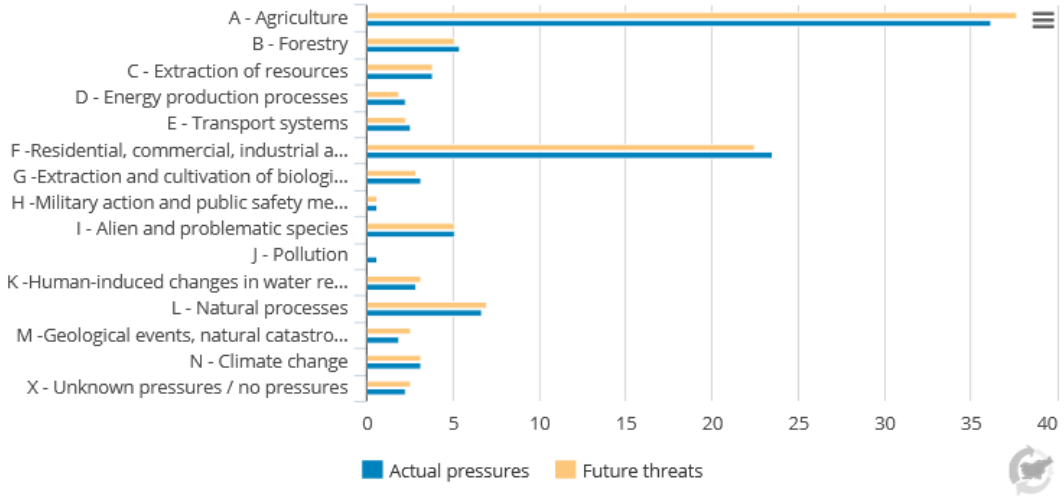
The favourable conservation status of habitat types in Slovenia is reached by just over a third of Europe's important habitat types. It is necessary to follow the guidelines of the Regulation on Special Conservation Areas (Natura 2000 sites) more rigorously and to implement the Natura 2000 management program. This is especially important for areas with freshwater, wetland, wetland and grassland habitat types (ARSO, 2021).

Figure 15: Conservation status of habitats by biogeographical region, 2008, 2013 and 2019




Source: ARSO, 2021

Figure 16: Recorded pressures and threats to habitat types of European interest in Slovenia, 2019




Source: ARSO, 2021

Some of the biggest actual pressures and future threats to habitat types of European interest in Slovenia are connected with agriculture and residential, commercial, industrial and recreational infrastructure and areas.

Current status in Croatia

Large scale protected areas include national, regional, and nature parks, and strict nature reserves while the small-scale protected areas may include special reserves, forest parks, significant landscapes and natural, and park architecture monuments. They together cover 4% of the total programme area. Within the programme area in Croatia there are 24 parks that are protected natural areas either on national or local level due to outstanding natural features, as well as cultural 3 national park, 1 regional park and 4 nature parks and 16 forest parks, together covering an area of 109,064 ha.

In addition, the programme area contains a portion of the UNESCO Transboundary Biosphere Reserve Mura-Drava-Danube. It is a protected area that extends to the territory of five countries (Croatia, Austria, Slovenia, Hungary, and Serbia) with an area of 931,820 ha. It is home to rare habitats (i.e., floodplain forests and riverine meadows) and sustains extraordinary biodiversity. The Reserve is also an important stopover site for more than 250,000 migratory birds every year (WWF, 2021a).

The Natura 2000 network in Croatia covers 36.67% of the land area and 16.26% of the coastal sea and consists of 745 Special Areas of Conservation (SAC areas) and 38 Special Protection Areas (SPA areas). Managing of the Natura 2000 network is based on the implementation of conservation measures for sites designated under the Birds and the Habitats Directives. The Ordinance on conservation objectives and conservation measures of target bird species in ecological network areas (OG 25/20, 38/20) was adopted, while an ordinance defining objectives and measures for conservation of other species and habitat types is being drafted for each Natura 2000 site.

Standard Natura 2000 database (called SDF forms - Standard Data Form) contains data on a particular Natura 2000 site, such as basic data on the location and area of each site, representation and conservation of target habitats, size and representation of target species populations, individual areas of importance, main threats and pressures, etc.

An abundance of Natura 2000 areas is present fully or partially within the programme area [6] – 271 Special Areas of Conservation (SAC areas) and 13 Special Protection Areas (SPA areas), covering 559,996 ha that represent one third of the programme area.

Table 15: Number and covered land (in ha) of nature conservation protection regimes in Croatia

| Type of area protection | Number of units | Area (in ha)* | % of the programme area in Croatia |
|---|---|---|---|
| Protected areas (large and small scale) | 195 | 141,670 | 8.4% |
| UNESCO Man and the Biosphere (MAB) | 1 | 96,249 | 5.7% |
| Natura 2000 area | 271 (258 SAC and 13 SPA areas) | 559,996 | 17.6% |

Source: WFS NATURE PROTECTION INFORMATION SYSTEM (www.bioportal.hr), 2021a
* The area represents the area of certain type of protection. If two (or more) units (e.g., protected areas) are covering the same are, the area is not included twice in this calculation.

[6] The Natura 2000 areas numbered are either fully or partially within the programme area. Only the acreage within the programme area was used when calculating the total area (ha) of said protected areas.

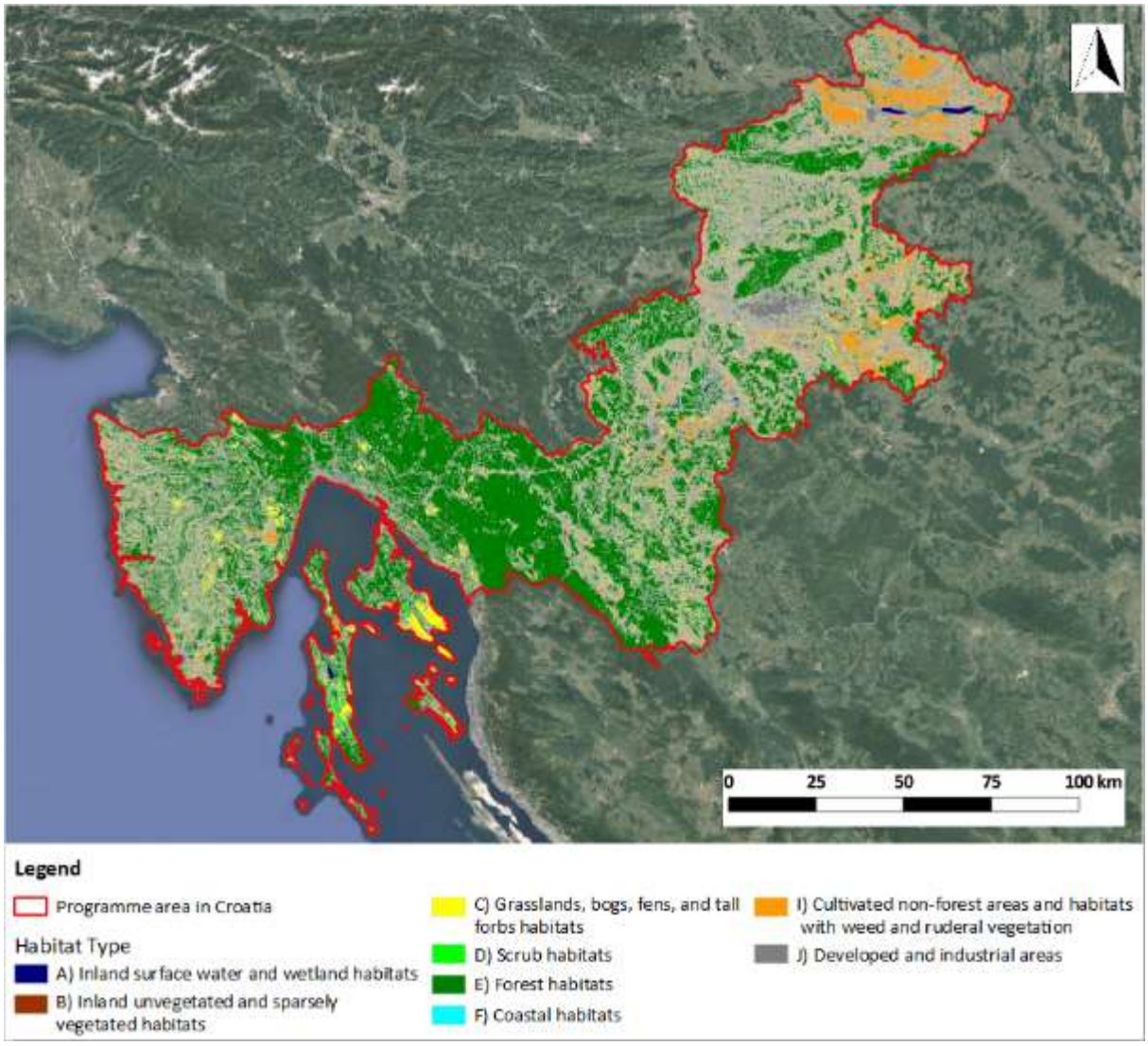
Due to its specific geographical position across several biogeographic regions and to its characteristic ecological, climatic, and geomorphologic conditions, Croatia is one of the richest European countries in terms of biodiversity. The number of known species in Croatia is just under 40,000 though the estimated number is far higher – from 50,000 to over 100,000 (DZZP, 2006 and NBSAP, 2017).

Most of the known species (around 25.000) belong to Invertebrates (Invertebrata). Approximately 3% of the total number of known species are endemic species (NBSAP, 2017). This is a very significant number for a relatively small country. The centres of endemism of the flora are the mountains Biokovo and Velebit, and for the endemic fauna underground habitats, Adriatic islands and karst rivers of the Adriatic basin. Despite the undeniable value and richness of Croatian species, many species are endangered and there is a trend of increasing the number of endangered species in almost all groups. As of 2017, a total of 2464 species are strictly protected by Croatian law (ref).

Through the International Union for Conservation of Nature (IUCN) threat status has been assessed for over 3,000 species, or around 8% of known species (including all vertebrate groups). Out of the assessed species, 42.3% have been classified as species facing high levels of risk of extinction (NBSAP, 2017). One mechanism used to combat these risks is repopulation or reintroduction which is important for the protection or conservation of species. Some recent projects include the reintroduction and repopulation of two plant species German Tamarisk (Myricaria germanica) and Dwarf Bulrush (Typha minima), and the Eurasian Lynx (Lynx lynx) through the LIFE Lynx project (MZOE, 2019). Despite the implementation of conservation measures and the abundance of biodiversity, many wild species are still endangered.

There are 77 protected habitats (not to be confused with protected areas) in Croatia under EU law; their conservation status mirrors that of species, with 46% of habitats considered to be poor or bad (BISE, 2021a). This is concerning because the survival of many species relies on the conservation of their unique habitats. For instance, approximately 62% of all threats to vascular flora in Croatia pertain to the loss and/or degradation of habitats due to anthropogenic impacts; with wetland habitats such as bogs and fens being threatened in particular (NBSAP, 2017). To assist in conservation and to emphasize habitat diversity and certain specific characteristics, such as habitats related to karst underground and marine environments, Croatia has developed a national habitat classification (NHC). Figure below shows this NHC, representing the habitat biodiversity of the programme area and enabling the analysis of distribution and coverage of habitat types.

Figure 17: Map of habitat types of the programme area in Croatia

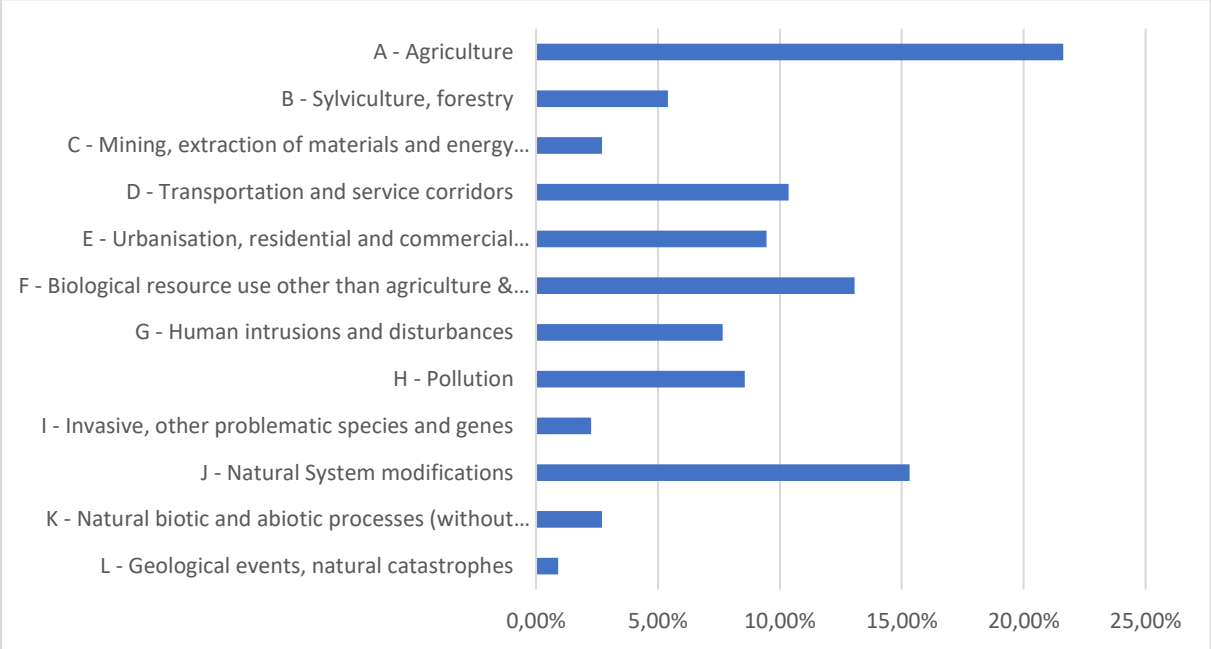



Source: www.bioportal.hr

As previously mentioned, Croatia has an abundance of biodiversity, geodiversity, and landscape diversity. Despite that, the trend of biodiversity, geodiversity, and landscape diversity loss is still present in the country. Fragmentation and degradation of natural areas are decreasing the area and quality of habitats, isolating animal populations into smaller and more vulnerable groups. According to assessments, the process of habitat fragmentation is expected to continue in the future, due to the development of infrastructural projects (NBSAP, 2017).

The major threats and pressures to the Natura 2000 areas within the programme area are shown in Figure below. The biggest being agriculture followed by natural system modifications (i.e., human induced changes in hydraulic conditions), biological resource use other than agriculture & forestry (i.e., fishing and hunting), and transportation and service corridors. Being aware of these threats and pressures is important for the conservation of both species and habitats.

Figure 18: Recorded pressures and threats of Natura 2000 areas in Croatia




Source: www.bioportal.hr

Invasive species are alien species that do not naturally inhabit a particular ecosystem, they were introduced intentionally or unintentionally. Some of the effects of their settlement and widespread are biodiversity loss, introduction of foreign plant and animal pests, depletion of water resources, changes in physicochemical properties of soil, negative impacts on human health, economic damage, etc. The most common ways of introducing invasive plant species are through human actions, transmission of seeds by wind or animals and vegetative propagation (Nikolić et al, 2014).

The spread of invasive plants is particularly pronounced in degraded habitats, and habitats under strong anthropogenic influence, i.e., where the natural composition of species and environmental conditions are significantly disturbed. These are primarily more or less urbanized areas, industrial and agricultural areas, construction sites, overexploited forest areas, forest edges, roadside areas, affected inland waters, altered soils etc. (Mitić, 2014.; Nikolić i sur. 2014.; Novak, Kravarščan 2011).

List of invasive alien species of Union concern includes 66 species, of which 24 have been recorded in Croatia (HAOP, 2021):

- fauna: mongoos (*Herpestes javanicus*), nutria (*Myocastor coypus*), racoon (*Procyon lotor*), muskrat (*Ondatra zibethicus*), common raccoon dog (*Nyctereutes procyonoides*), Egyptian goose (*Alopochen aegyptiacus*), Spinycheek crayfish (*Orconectes limosus*), signal crayfish (*Pacifastacus leniusculus*), marbled crayfish (*Procambarus fallax f. virginalis*), Chinese sleeper (*Perccottus glenii*), stone moroko (*Pseudorasbora parva*), pumpkinseed (*Lepomis gibbosus*), pond slider (*Trachemys scripta*),

- flora: milkweed (*Asclepias syriaca*), giant hogweed (*Heracleum mantegazzianum*), Kudzu (*Pueraria montana var. lobata*), Himalayan balsam (*Impatiens glandulifera*), orange wattle (*Acacia saligna*), ree of heaven (*Ailanthus altissima*), Japanese hop (*Humulus scandens*), floating primrose-willow (*Ludwigia peploides*), western waterweed (*Elodea nuttallii*), two-leaf watermilfoil (*Myriophyllum heterophyllum*).

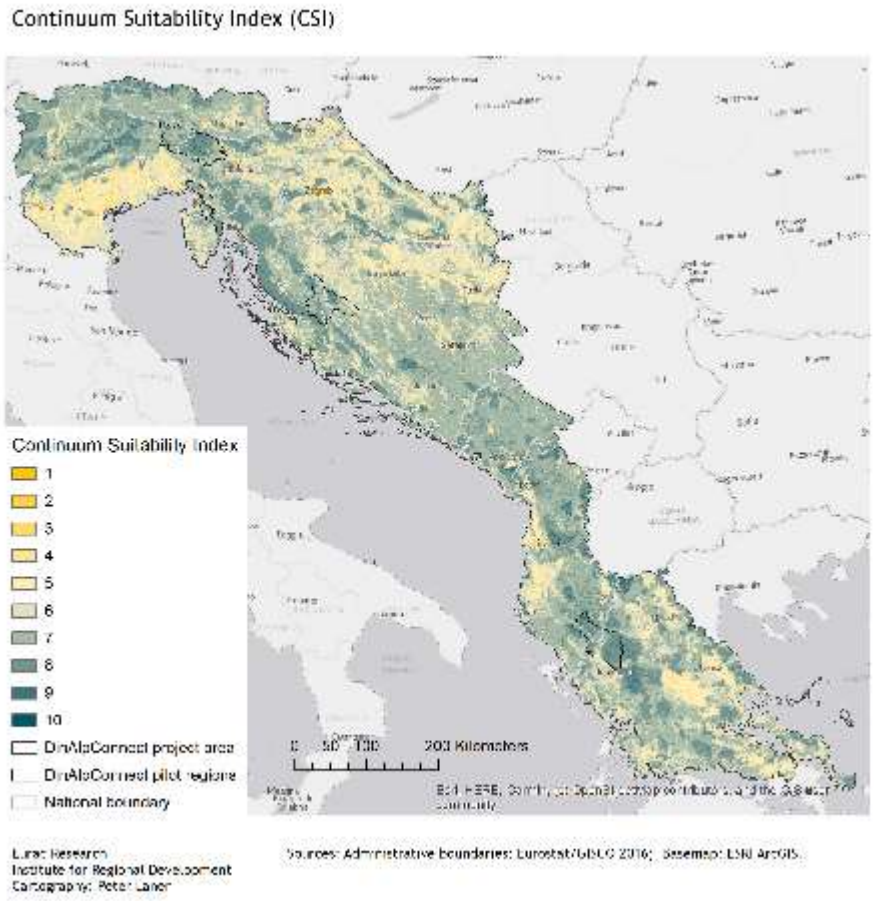
### 6.2.2. Ecological connectivity

The deterioration and fragmentation of natural ecosystems are key causes of the global biodiversity crisis. Many protected areas have been established to this day in order to preserve sites with high biodiversity values. However, according to scientific discussions (ClimateAdapt, 2019; Crooks and Sanjayan, 2006), protected areas alone will not succeed in addressing efficiently the conservation of biodiversity without connectivity of their surroundings. Ecological connectivity describes the movement of organisms or processes in a landscape; the more movement there is, the better the connectivity (Crooks and Sanjayan, 2006).

Within the framework of DINALPCONNECT INTERREG project, EURAC research has performed spatial data analysis by implementing a range of indicators that investigate the level of permeability regarding population pressure, environmental protection, fragmentation of landscapes (road and infrastructure obstacles), land cover assessment and topography. The Continuum Suitability Index (CSI) has been then computed by pondering the influences of each preliminary indicator from their weight as to ecological effects (Affolter 2020). The CSI as umbrella indicator provides a notation from 1 to 10 about the porousness of an area in favour of ecological connectivity. 1 corresponds to a low ecological connectivity and 10 a very efficient one. The draft map below has been produced by EURAC as preliminary result (Laner P., and Favilli F., 2021):

Between Jugovzhodna Slovenija and Primorsko-notranjska in Slovenia, and Primorsko-goranska in Croatia, the population pressure, fragmentation process, current land use and well-established protected regimes benefit ecological connectivity. The potential of the ecological connectivity given by this context can be improved by management measures (Laner P., and Favilli F., 2021). In other region from the cross-border IP Slovenia Croatia, the ecological connectivity is lower and would need interventions.

Figure 19: Continuum Suitability Index of the DINALPCONNECT project area




Source: Draft map produced by EURAC (September 2021)

### 6.2.3. Landscape diversity and geodiversity

With regard to diversity, ecosystems are characterized by their special biodiversity and geodiversity. Consequently, landscape ecosystems also have a characteristic diversity of living and abiotic elements and systems. Site-specific abiotic elements, complex units and processes form the primary framework for the composition and dynamics of organisms and, at least in part, the densities and activities of human populations. Nature and culture are specifically linked, mutually effective and interdependent in such landscape ecosystems. Geodiversity and biodiversity are thus subsets of the methodologically more complex model of landscape diversity (Leser H., Nagel P., 2001).

Current status in Slovenia

High landscape heterogeneity is generally beneficial for biodiversity. In the regional context a high degree of heterogeneity can mean habitat fragmentation, which is negative for many species important for biodiversity. The relationship between biodiversity and compositional heterogeneity of landscape features is stronger than in the case of configurational

heterogeneity (Golobič, 2015). The land cover characterizes (in particular natural and semi natural types) the landscape on macro level (see Chapter 8.4).

The programme area is rich in karst caves with 74,1 % of all caves recorded in the country within the programme area. 863 other elements of geological diversity are also present.

Table 16: Number and covered land (in ha) of nature conservation protection regimes in Slovenia

| Type of area protection | Number of units | Area (in ha)* | % of the programme area in Slovenia |
|---|---|---|---|
| Protected areas (large and small scale) | 358 | 155,457 | 11% |
| Natural values (areas) | 1,760 | 137,079 | 9% |
| Natural values (locations) | 1,704 | / | / |
| Natura 2000 area | 307 (273 SAC and 34 SPA areas) | 778,555 | 53% |
| Ecologically important areas | 277 | 907 005 | 62% |
| Geological and geomorphological natural values | 863 | / | / |
| Caves | 8997 | / | 74,1% |

* The area represents the area of certain type of protection. If two (or more) units (e.g., protected areas) are covering the same are, the area is not included twice in this calculation.

The UNESCO World Geoparks Network consists of areas of geological and geomorphological heritage of international importance. One area in Slovenia (programming area) was recognized by UNESCO as geologically important and valuable sites – Geopark Idrija (2013).

Current status in Croatia

Croatia's valuable geodiversity is conditioned by its geological structure and geographical and geomorphological position. In this regard, Croatia is specific with half of the country laying on karst terrain. The karst relief is primarily tied to carbonate rock -limestone and dolomite rock, and the influence of tectonics. Carbon dioxide enriched water penetrates through fissures in the carbonate rock and creates various karst forms such as funnels, depressions, karst fields, towers, caves, pits etc. In last decade, progress has been made in gathering and evaluating data on speleological objects in Croatia. Cadastre of speleological objects in Croatia is available online on web pages of Bioportal and Nature protection information system.

There are 53 protected geolocalities in Croatia, with most of them being nature monuments – geomorphological (35), geological (7), paleontological (3), hydrological (2), geological-geographical (1) and paleontological (1) followed by special reserve – geographical-botanical

(1) and protected mineral (1). Last nationally proclaimed geolocality was „Gorjanovićev praporni profil u Vukovaru“ in 2017.

The UNESCO World Geoparks Network consists of areas of geological and geomorphological heritage of international importance. Two areas in Croatia were recognized by UNESCO as geologically important and valuable sites – first Croatian Geopark Papuk (2007.) and Geopark Viški arhipelag (2019.).

The land cover characterizes (in particular natural and semi natural types) the landscape on macro level (see Chapter 8.4).

Table 17: Assessment of the development according to the zero alternative

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| Flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity | Development of nature protection areas (by categories), specially protected areas | SI (ARSO, 2021a): Protected areas cover 11% of the programme area in Slovenia. In recent years, the total surface area of protected areas has expanded, largely due to the designation of five larger parks. Natura 2000 cover half of the area as 273 Special Areas of Conservation (SAC areas) and 34 Special Protection Areas (SPA areas) are defined, 1,760 natural values are present and ecologically important areas cover more than half of the programme area in Slovenia. | ←↗ |
| | | HR: Protected areas cover 8.4% of the programme area in Croatia. MAB Reserve Mura-Drava-Danube covers 5.7% of the area. Natura 2000 covers 17.6% of the area as 258 SAC areas and 13 SPA areas. The Nature Protection Strategy and Action Plan of the Republic of Croatia for the Period 2017-2025 is currently being executed to help manage and conserve Croatia’s protected areas. | ←↗ |
| | Favourable condition of species of European interest | SI: As many as one third of Europe’s important bird species have a negative or uncertain short-term trend. Population trends of selected bird species show that the state of the environment in the cultural landscape is deteriorating. | ↘ |
| | | HR: IUCN threat status has been assessed 8% of known species. Out of the assessed species, 42.3% have been classified as species facing high levels of risk of extinction. Conservation efforts are in affect with projects repopulating and reintroducing target species. | ←↘ |

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| | Favourable condition of habitats of European interest | SI: The favourable conservation status of habitat types in Slovenia is reached by just over a third of Europe's important habitat types. The conservation status of habitats trends shows slight deterioration – with decrease of share of habitats with favourable status and increase of unfavourable – bad. | ←↘ |
| | | HR: The conservation status of 46% of habitats is poor or bad. Fragmentation and degradation of natural areas are decreasing the area and quality of habitats. According to assessments, the process of habitat fragmentation is expected to continue in the future, due to the development of infrastructural projects. | ↘ |
| | Number of natural values in favourable condition | SI: There are 1,704 natural values location and 1704 natural values areas within the programme area, covering 9% of the programme area. | ←↗ |
| | | HR: not applicable for Croatia | n/a |
| | Continuum Suitability Index (CSI) to assess ecological connectivity (INTERREG DinAlpConnect). | SL and HR: Between Jugovzhodna Slovenija and Primorsko-notranjska in Slovenia, and Primorsko-goranska in Croatia, the population pressure, fragmentation process, current land use and well-established protected regimes benefit ecological connectivity. The potential of the ecological connectivity given by this context can be improved by management measures (Laner P., and Favilli F., 2021). In other region from the cross-border IP Slovenia Croatia, the ecological connectivity is lower and would need interventions. | ←↘ |
| | Presence of Invasive alien species of Union concern | SI: More than 900 alien species of animals, plants and fungi have been recorded in Slovenia. 30 of which are plant and 30 animal species that have such large populations that they are invasive and therefore affect biodiversity. | ↘ |
| | | HR: Out of 66 species listed in List of invasive species of Union concern, 24 were recorded in Croatia. Most of the invasive species present within the programme area are found near the roads, urban areas and rivers or degraded habitats. | ↘ |

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| | Number of geological phaenomena designated as natural value | SI: The programme area is rich in karst caves with 74,1% of all caves recorded in the country within the programme area. 863 other elements of geological diversity are also present. | ↗ |
| | | HR: There are 13 nationally protected geolocalities within the programme area – 10 geomorphological, 2 geological and 1 paleontological nature monuments. | ←→ |
| ↗ Improvement ←↗ Partial improvement ←→ No change ←↘ Partial deterioration ↘ Deterioration | | | |

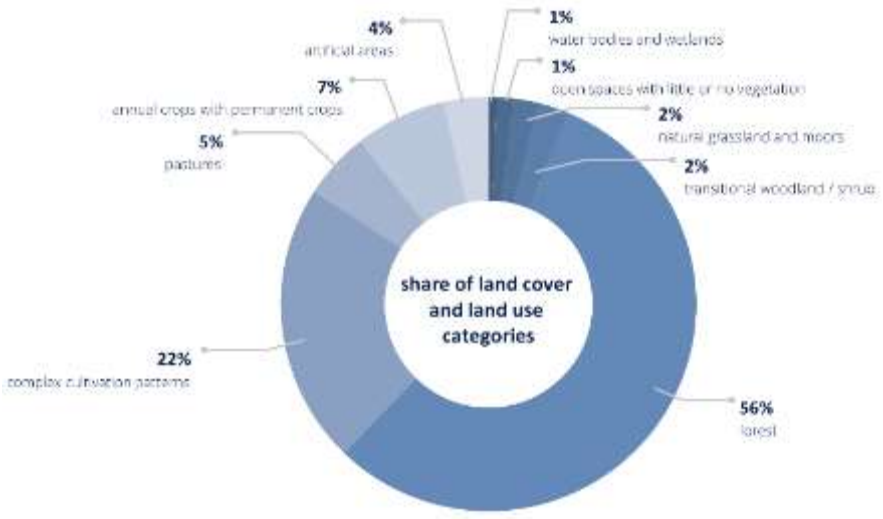
## 6.3. Soil, land use

### 6.3.1. Land use and soil sealing

Current status in Slovenia

Based on Corine Land Cover data, more than half of Slovenia's land area was covered by forests (56% or 58% including shrubland) in 2018, while other mostly natural vegetation accounted for 3%. Farmland occupied 34% of land area, while slightly less than 4% (70,908 ha) was artificial land, and less than 1% was water (ARSO, 2021).

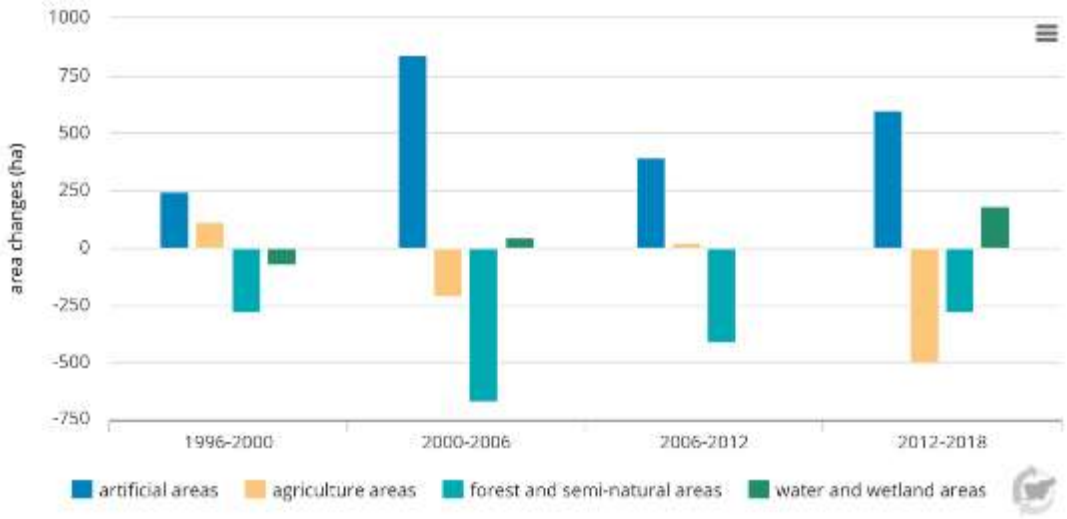
Figure 20: Share of land cover and land use categories in Slovenia in 2018 based on Corine Land Cover data




Source: ARSO, 2021 [TP01]

However, considering the CORINE Land Cover artificial areas increased for 598 ha in the period 2012-2018 and agricultural areas decreased for almost same extent – 504 ha (ARSO, 2021).

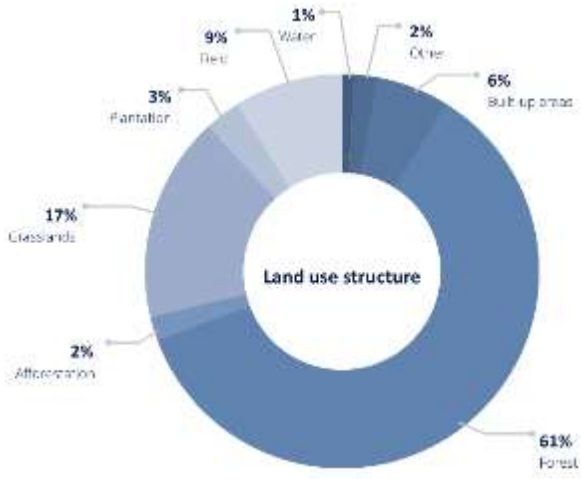
Figure 21: Changes in total area of land cover categories, Slovenia, by period, 1996-2000, 2000-2006, 2006-2012, 2012-2018 (Corine Land Cover data)




Source: ARSO, 2021

Considering the Graphic Data Land use for the whole of Slovenia provided by Ministry of Agriculture, Forestry and Food, 61 % of the Slovenia's land area was covered by forest, followed by grasslands (17 %) and fields (9 %) while the build-up areas represented 6% (113,129 ha) of the country in 2019.

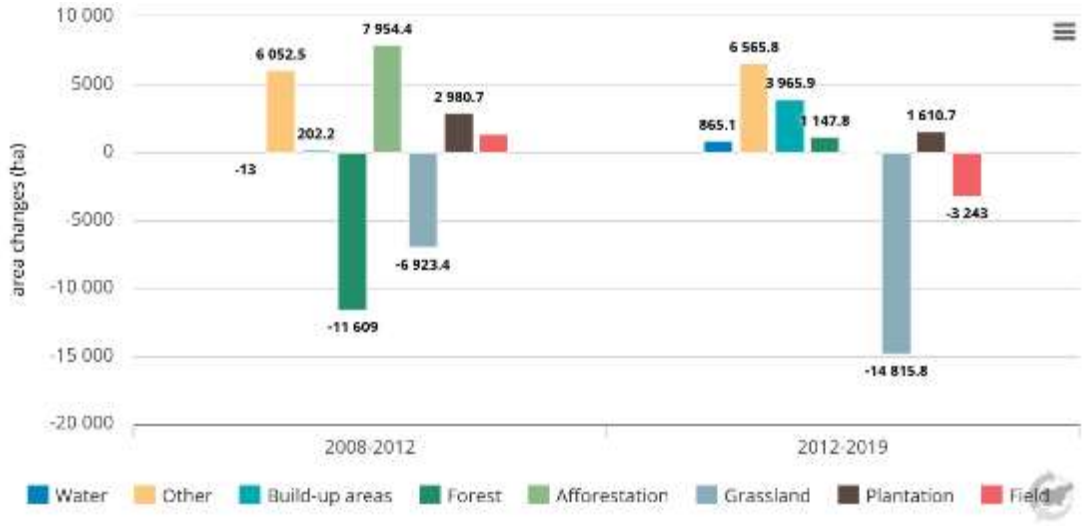
Figure 22: Land use structure




Source: Graphic data Land use for the whole of Slovenia, Ministry of Agriculture, Forestry and Food (2019).

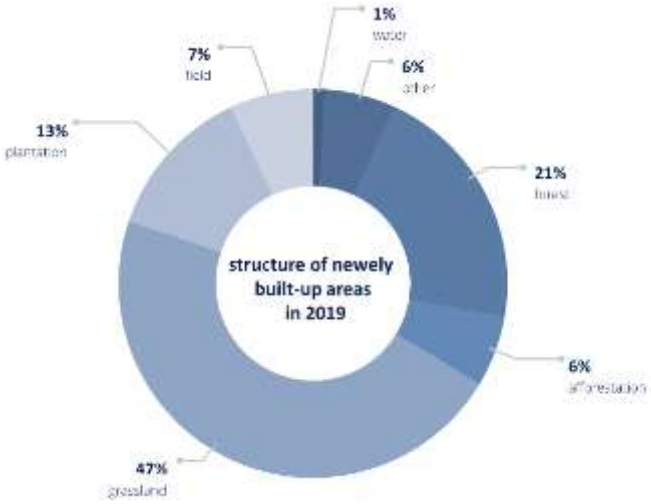
As shown in the picture below, land use change in period 2012-2019 in decline of grassland areas, increase of built-up areas and also in decline of fields is evident. (ARSO, 2021)

Figure 23: Land use changes 2008-2012 and 2012-2019 (Graphic data Land use for the whole of Slovenia, Ministry of Agriculture, Forestry and Food (2019))




Source: ARSO, 2021

Figure 24: Structure of newly built-up areas in 2019




Source: Graphic data Land use for the whole of Slovenia, Ministry of Agriculture, Forestry and Food (2019), ARSO, 2021

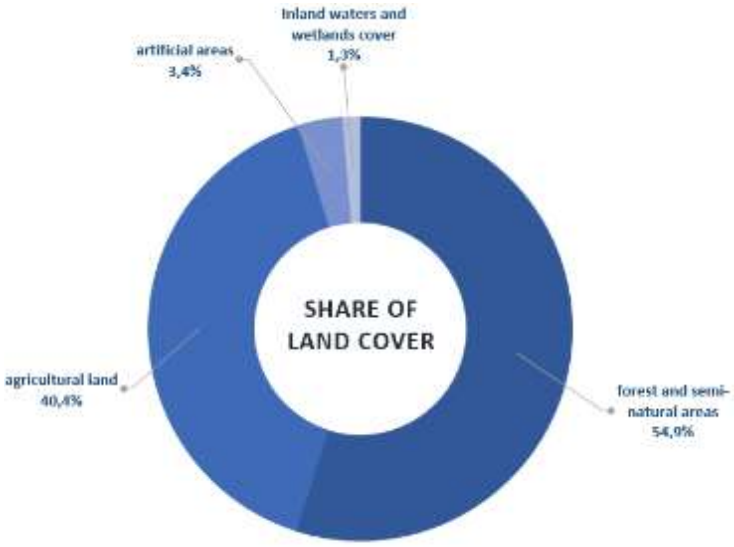
In period 2012-2019, built-up areas were predominantly spread to grasslands (47%), forests (21%) and permanent crops (13%). The total volume of built-up areas increased by 3,966 ha (ARSO, 2021).

In 2020, Slovenia recorded a slight increase in the number and total area of functionally depreciated areas (FDAs): 1,132 FDAs were recorded in the total area of 3,695.3 ha. Compared to 2017, their number increased by 51, with a total area of 272.5 ha. There is a lack of a systematic approach to environmental remediation and renovation, especially of those FDAs where old environmental burdens are present, as well as the establishment of a spatial development system that will tend to “no net land take” of agricultural and forest land (ARSO, 2021).

Current status in Croatia

Based on current Corine Land Cover (CLC) base, 54.9% (3,103,731 ha) of Croatia is covered by forest and semi-natural areas. Followed by agricultural land at 40.4% (2,285,749 ha), while artificial areas cover 3.4% of Croatia (194,134 ha). Inland waters and wetlands cover 1.3% (74,416 ha) of Croatia (HAZOP, 2019).

Figure 25: Share of Land Cover in Croatia

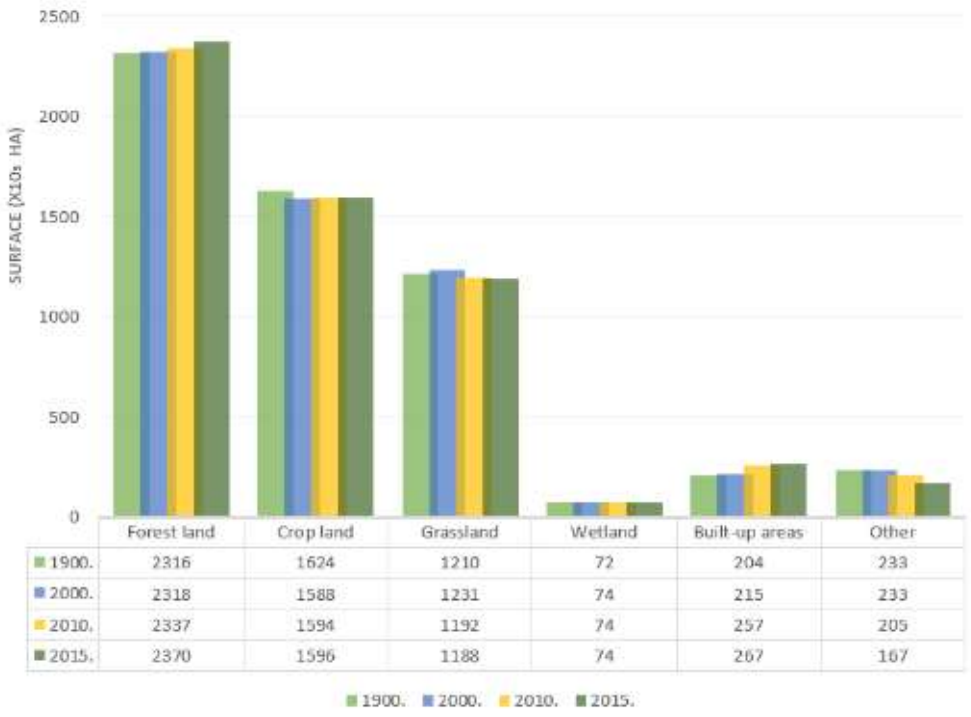



Source: HAZOP, 2019

According to the matrix of land cover changes based on the Corine Land Cover change bases, in a 22-year period (1990-2012) an increase in areas was recorded in the categories of populated areas by 28,939 ha and wetlands by 574 ha, while decreased areas of other land (areas with sparse vegetation, burnt areas, rocks) by 12,980 ha, grasslands by 10,918 ha and forest land by 5,427 ha. Crop land, which includes areas under annual and perennial plantations, decreased by 188 ha (0.013%). All recognized threats to soil and degradation processes are present in Croatia: erosion, reduction of organic matter, soil pollution, soil salinization, soil compaction, soil and land overgrowing, loss of biodiversity, flooding, and landslides. However, data are not collected systematically, which makes it difficult to evaluate the situation and trends (HAZOP, 2019).

As shown in the figure below, land use change in the period between 1900-2015 is shown by a decrease of grassland and crop land areas, an increase of built-up areas and forest land and a decrease of other areas (HAZOP, 2019).

Figure 26: Land use changes 1900-2015




| | Forest land | Crop land | Grassland | Wetland | Built-up areas | Other |
|---|---|---|---|---|---|---|
| 1900. | 2316 | 1624 | 1210 | 72 | 204 | 233 |
| 2000. | 2318 | 1588 | 1231 | 74 | 215 | 233 |
| 2010. | 2337 | 1594 | 1192 | 74 | 257 | 205 |
| 2015. | 2370 | 1596 | 1188 | 74 | 267 | 167 |

Source: HAZOP, 2019

The charts show yearly land take and re-cultivation in proportion to the country's area ($m^2/km^2$) and for the most recent Corine Land Cover observation period (2012-2018). Recultivation values are shown with a negative sign to indicate that this is an inverse process compared with the process land take. In Croatia, land take value is 123.5 while recultivation indicates loss from (-)6.8 per year.

Figure 27: Yearly land take and re-cultivation in period 2012-2018


Source: HAZOP, 2019

### 6.3.2. Soil quality and soil pollution

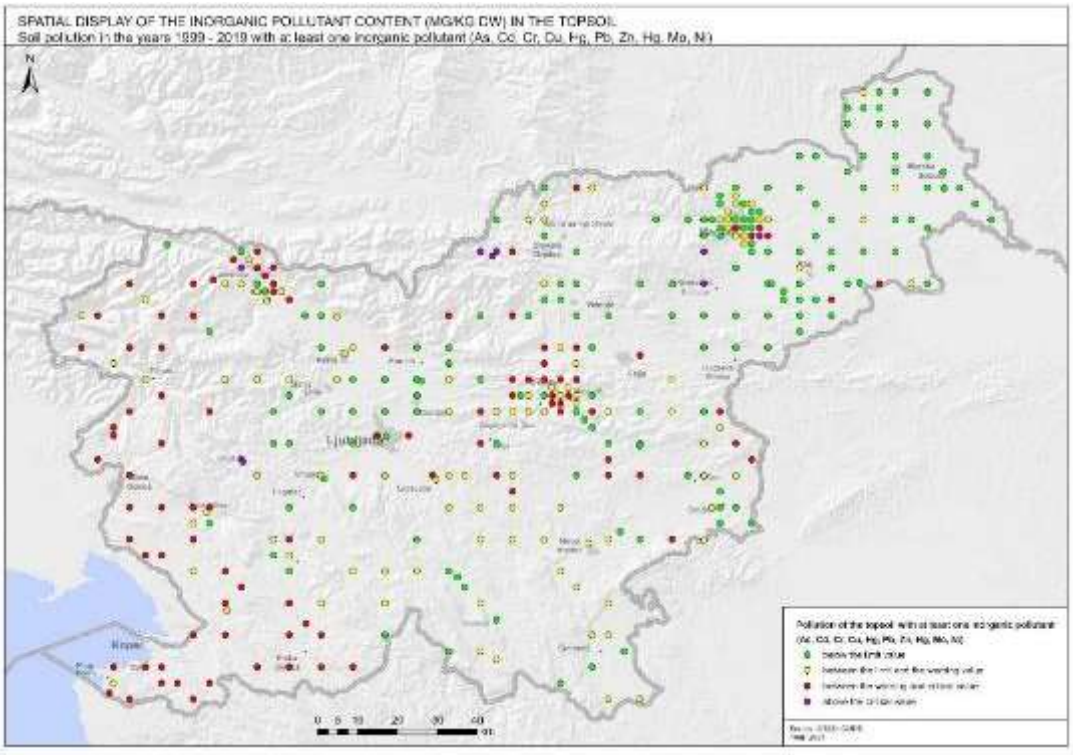
Current status in Slovenia

In general, soil in Slovenia is well supplied with organic matter. This is evident from soil map data, which indicate that 86.2% of agricultural land contains more than 2% of organic matter, and 30.9% of land contains more than 4%. The results of laboratory analyses of soil samples taken in 2005 present a similar picture: 88.6% of samples contained more than 2% of organic matter and 37.3% of samples contained more than 4% or organic matter.

This relatively good condition of soil is due to the fact that grassland is the prevailing element in the composition of agricultural land and that arable land and permanent crops are relatively abundantly fertilized with livestock manure. The goals concerning soil quality are of a descriptive nature, while quantitative goals are not defined (ARSO, 2021).

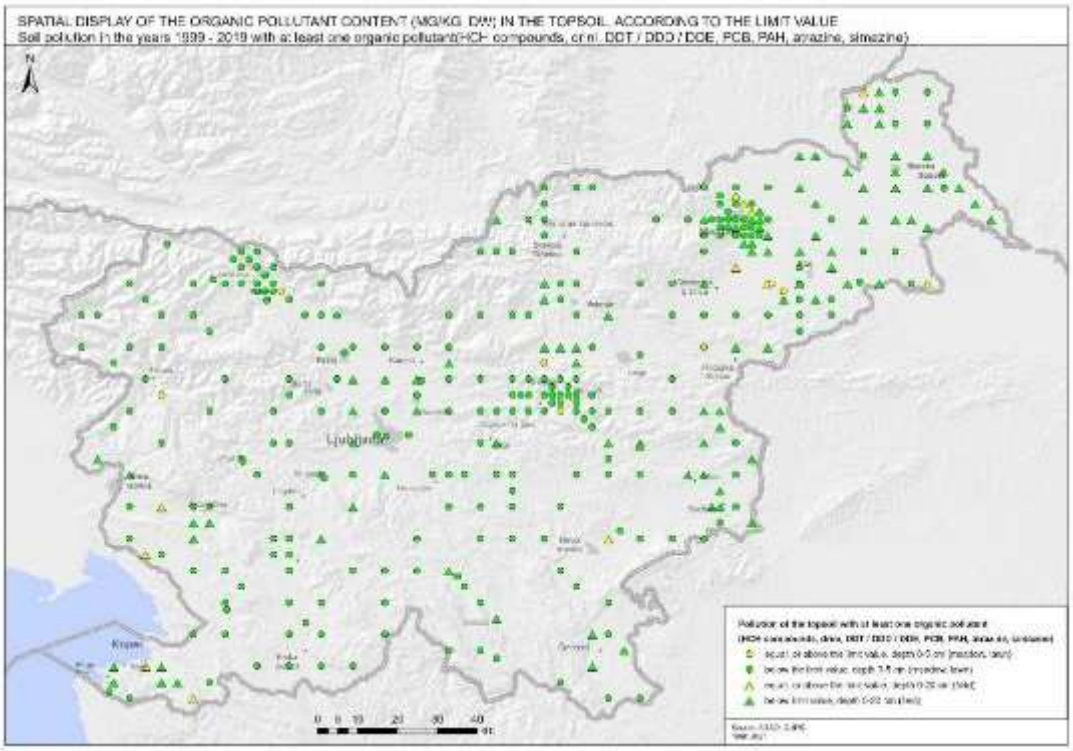
Systematic research on soil pollution shows that soils in Slovenia, with some exceptions, are not heavily polluted. In 42% of top soil samples taken in the period from 1999 to 2019, no exceedances of the limit values of dangerous substances into the soil were detected. In 56% of the samples the limit values of inorganic pollutants were exceeded and in 5% the limit values of organic pollutants. The most polluted areas with inorganic pollutants were Jesenice, Idrija, the Celje Basin and the Upper Mežica Valley (ARSO, 2021).

Figure 28: Soil pollution in the years 1999-2019 with at least one inorganic pollutant (As, Cd, Cr, Cu, Hg, Pb, Zn, Hg, Mo, Ni)




Source: ARSO, 2021

Figure 29: Soil pollution in the years 1999-2019 with at least one organic pollutant (HCH compounds, drini, DDT/DDD/DDE, PCB, PAH, atrazine, simazine)




Source: ARSO, 2021

Current status in Croatia

Determining changes in soil condition and monitoring damage and pollution caused by natural or anthropogenic sources is difficult due to the lack of systematic collection of data on soil condition and land use. Soil quality is most often assessed through the content of organic matter and organic carbon in the soil (SOC), where a high content means fertile soil with good production potential. The average share of organic carbon in Croatian soils is 2.5% in samples from 0 to 30 cm deep. More than 4% of SOC is contained in soils of coniferous forests, macchia and shrubs, while agricultural soils generally contain less than 2% of SOC. The nitrogen share in Croatian soils is within the average (0.25%). More than 0.3% of nitrogen is contained in soils of coniferous forests, macchia and shrubs, wetlands and other soils that also contain more organic matter. Soils of annual crops at a depth of 0-30 cm on average contain 0.17% nitrogen, and soils of perennial crops 0.2% nitrogen. In agricultural soils, the average nitrogen share does not indicate potential contamination of soil and water (HAZOP, 2019).

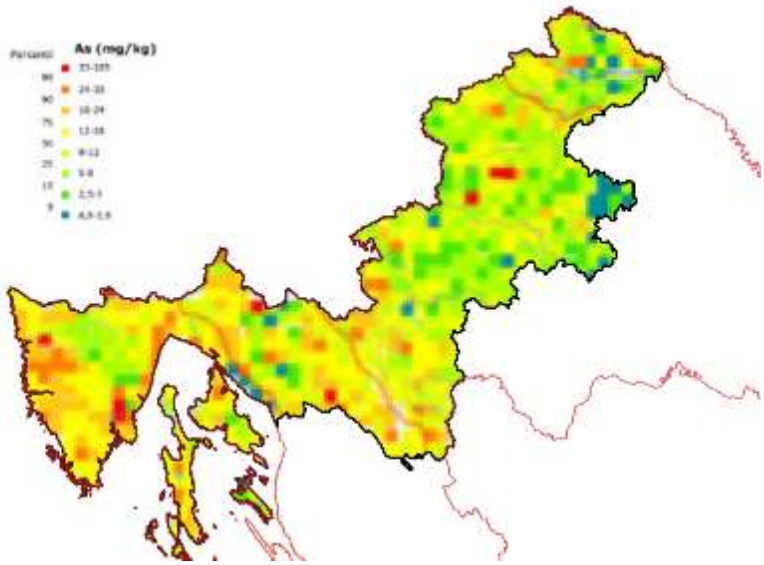
Inorganic pollutants in the soil consist of metals, metalloids, and a number of simple compounds such as phosphates and ammonia. Many pollutants can come from natural sources such as native rocks and minerals. Therefore, natural phenomena such as earthquakes, fires, volcanic eruptions, and weather disasters can be considered natural sources of soil and environmental pollution. However, the most significant and most dangerous sources of soil pollution are human activities that directly and indirectly affect the damage or loss of soil

functions. Anthropogenic sources of soil pollution are most often: industrial production (nuclear, chemical, mining, metallurgical, electronic, etc.), disposal of industrial (hazardous) waste, disposal of municipal waste, agriculture, accidents, military activities and more.

Locations contaminated with heavy metals most commonly contain arsenic, copper, zinc, cadmium, cobalt, chromium, mercury, nickel, and lead. Apart from arsenic, which is excluded, the maximum permitted concentrations in the agricultural soil of Croatia are defined by the ''Regulation on Protection of Agricultural Land from Pollution''. High concentrations of these metals endanger agricultural production, the environment, and human health.

In Croatia, the highest level of arsenic is measured in coastal region where concentrations of arsenic in the soil are between 2.5 and 105 mg/kg, average 18 mg/kg. Lower concentrations of arsenic in the soil are characteristic of soils lying on flysch (Istria) where they can be below 12 mg/kg.

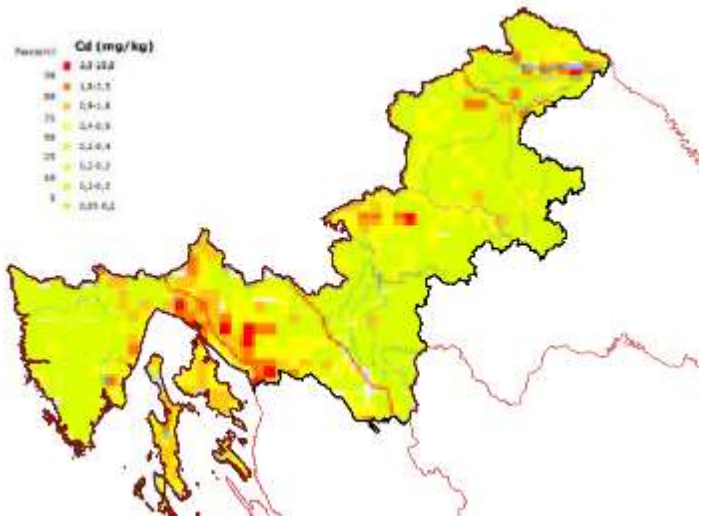
Figure 30: Arsenic level within programme area in Croatia




Source: HAZOP, 2019

Among heavy metals, cadmium is considered the most harmful and toxic. It accumulates rapidly in crops, especially in acidic soils. Sources of cadmium pollution could be zinc and lead mines, fertilizers, and pesticides. The range of cadmium concentrations in the soil of coastal Croatia is from 0.2 to 9.5 mg/kg. Low concentrations of cadmium, often lower than 0.4 mg/kg, are characteristic of almost the whole of Istria. Higher concentrations are sporadic and most likely caused by local pollution.

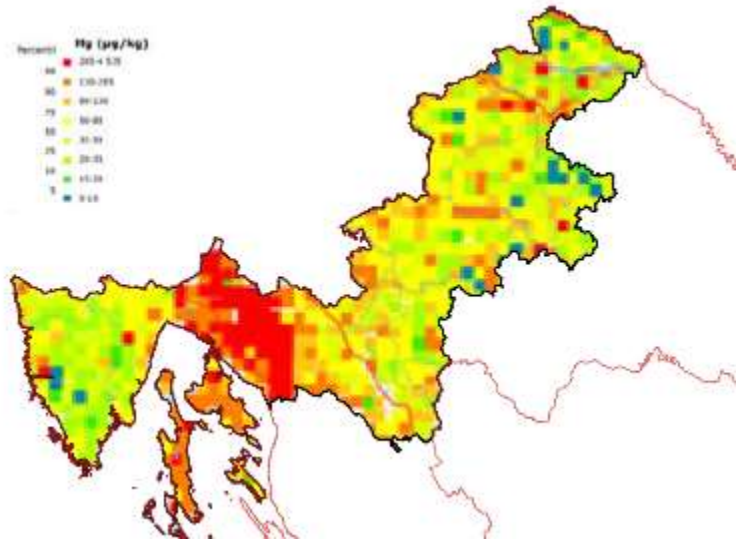
Figure 31: Cadmium level within programme area in Croatia




Source: HAZOP, 2019

The highest concentration of mercury in the soil (4.5 mg/kg) was recorded in central Croatia. High concentrations of mercury of geogenic origin were registered in the highest parts of Ivanščica and Kalnik. In mountainous Croatia, we find significantly higher values of mercury in the soil, compared to the rest of the country. The great part of Gorski Kotar contains more than 0.2 mg/kg Hg. This enrichment is associated with ores appearance.

Figure 32: Mercury level within programme area in Croatia

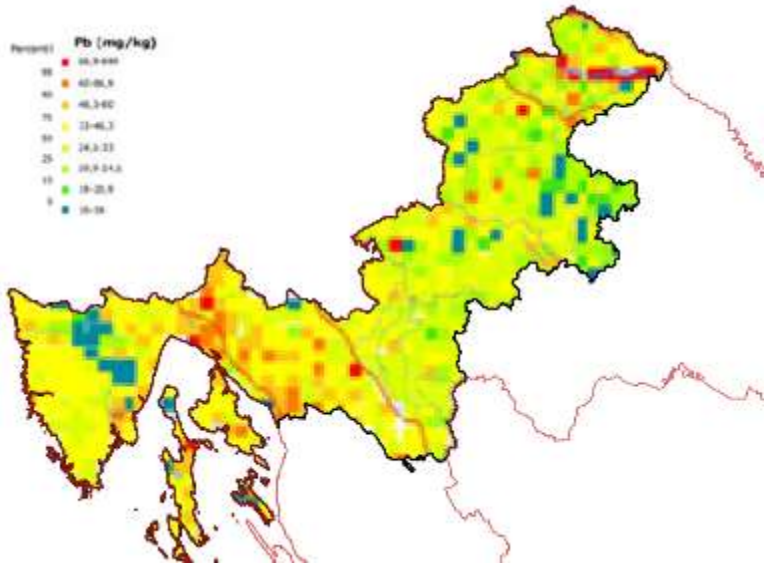



Source: HAZOP, 2019

The highest lead concentrations were measured in the Drava and Mura valleys as result of upstream anthropogenic impact from mining and industrial activities. Lead is concentrated in the top layer of the soil because it settles in a humus layer with decomposed organic residues.

Coastal Croatia, is spatially, the most loaded with lead in the soil with concentrations between 46 and 60 mg/kg, while the average value for the whole region is 48.7 mg/kg. The highest concentrations were measured in the sub-Velebit area, the Dalmatian hinterland and on the islands of Brač and Hvar. Furthermore, high concentrations of lead were recorded in the mountainous areas of Gorski kotar (Risnjak) and Lika (Velebit). The cause of these anomalies in coastal and mountainous Croatia is associated with the structure of red soil and atmospheric pollution.

Figure 33: Lead level within programme area in Croatia




Source: HAZOP, 2019

Table 18: Assessment of the development according to the zero alternative

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| Soil, land use | Land take | SI (ARSO, 2021): In period 2012-2018, built-up areas were predominantly spread to grasslands (47%), forests (21%) and permanent crops (13%). The total volume of built-up areas increased by 3,966 ha. Share of built-up areas in Slovenia in the year 2006 amounted 2.74% and increased to 3.52% until 2018. Slight increase in the number and total area of FDAs is recorded. | ↘ |

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| | | HR (HAZOP, 2019): According to the matrix of changes in land cover in the observed 22-year period, total volume of built-up areas increased by 28,939 ha at the expense of other categories of land use. Built-up areas and wetlands were predominantly spread to grasslands (37%), forests (18%), permanent crops (1%) and other land (44%). | ↘ |
| | Land use/cover change by categories | SI (ARSO, 2021): In 2018, more than half of Slovenia's land area was covered by forests (56% or 58% including shrubland), while other mostly natural vegetation accounted for 3%. Farmland occupied 34% of land area, while slightly less than 4% (70,908 ha) was artificial land, and less than 1% was water. There is characteristic trend of decrease of agricultural areas and increase of built-up areas in Slovenia. | ↘ |
| | | HR (HAZOP, 2019): Based on current Corine Land Cover (CLC) base, 54.9% (3,103,731 ha) of Croatia is covered by forest and semi-natural areas. Followed by agricultural land at 40.4% (2,285,749 ha), while artificial areas cover 3.4% of Croatia (194,134 ha). Inland waters and wetlands cover 1.3% (74,416 ha) of Croatia. There is trend of decrease of grassland and crop land areas and increase of built-up areas and forest land in Croatia. | ←↘ |
| | Quality of soil and soil pollution | SI (ARSO, 2021): Relatively good condition of soil is due to the fact that grassland is the prevailing element in the composition of agricultural land and that arable land and permanent crops are relatively abundantly fertilized with livestock manure. Systematic research on soil pollution shows that soils in Slovenia, with some exceptions, are not heavily polluted. | ←→ |

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| | | HR: All recognized threats to soil and degradation processes are present in Croatia to a greater or lesser extent: erosion, reduction of organic matter, soil pollution, soil salinization, soil compaction, soil and land cover, loss of biodiversity, land conversion, flooding, and landslides. However, data are not collected systematically and harmonized, which makes it difficult to assess the situation and trends. Within the programme area, the most common soil pollution with heavy metals appears in the Primorsko-goranska County, Gorski Kotar and the valleys of the Drava and Mura rivers. | ↘ |
| ↗ Improvement ←↗ Partial improvement ←→ No change ←↘ Partial deterioration ↘ Deterioration | | | |

## 6.4. Cultural heritage

Current status in Slovenia

The programme area is rich with tangible and intangible (living) cultural heritage. In total 22,340 units of tangible cultural heritage are present in Slovenian part of the programme area. Out of these 6,591 are protected as cultural monuments. (eVRD, 2021) More detailed data on number of units per type of cultural heritage is presented in the table below.

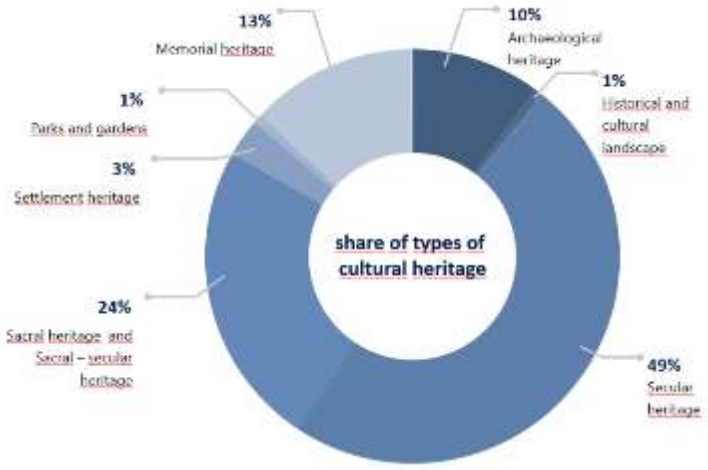
Table 19: Number of unites of cultural heritage by type within programme area in Slovenia

| Type of cultural heritage | Archaeological | Cultural | Historical | Secular heritage | Sacral heritage | Sacral – secular | Settlement | Parks and | Memorial | Other | SUM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of units of cultural heritage | 2,270 | 137 | 16 | 10,916 | 5,111 | 122 | 664 | 161 | 2,906 | 37 | 22,340 |

| Type of cultural heritage | Archaeological | Cultural | Historical | Secular heritage | Sacral heritage | Sacral – secular | Settlement | Parks and | Memorial | Other | SUM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Out of these – number of cultural monuments | 794 | 15 | 7 | 3,067 | 1,476 | 57 | 148 | 78 | 941 | 8 | 6,591 |

Source: eVRD, 2021

Figure 34: Share of types of cultural heritage within programme area in Slovenia

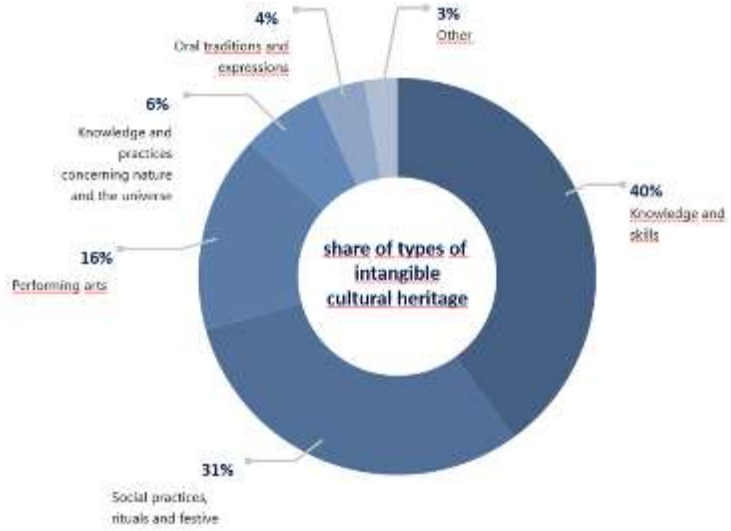



Source: eVRD, 2021

Buildings represent the majority of units of cultural heritage, followed by memorial and archaeological heritage. Despite small share of units of cultural landscapes (less than 1% of all cultural heritage units), they cover 59% of the area protected as cultural heritage (around 126,440 hectares). In total, areas under cultural heritage protection cover 15% of the programme area in Slovenia (eVRD, 2021).

The Register of the Intangible Cultural Heritage is a technical list of intangible cultural heritage. It includes elements connected with intangible cultural heritage and the bearers of that heritage. Proposals for inclusion in the Register are drawn up by the Coordinator for the Safeguarding of the Intangible Cultural Heritage, while the Register is maintained by the Ministry of Culture of the Republic of Slovenia. Considering the Register of the Intangible Cultural Heritage, 76 units of intangible heritage are present within Slovenian part of the programme area. Nearly half of them are represented within the type knowledge and skills. (Ministry of Culture, 2021).

Figure 35: Share of types of intangible cultural heritage within programme area in Slovenia




Source: Ministry of Culture, 2021

For these, 183 bearers of the heritage are inscribed in the register. 21 of them are bearers of shrovetide and costumes, 13 are bearers of mountain pasturing and dairying, 14 of them are registered as bearers of making paper flowers and there are 10 bearers of traditional production of the Carniolan sausages (Ministry of Culture, 2021).

Apart from the units of cultural heritage of national and local importance presented above, there are elements protected as UNESCO elements of cultural heritage; four sites protected as World Cultural Heritage: Škocjan Caves, Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe, Ancient and Prehistoric Pile Dwelling around the Alps, The works of Jože Plečnik in Ljubljana – Human Centred Urban Design, and Heritage of Mercury – Almaden and Idrija (UNESCO, 2021); and four being on the Representative List of the Intangible Cultural Heritage of Humanity: Art of dry stone walling, knowledge and techniques; Bobbin lacemaking in Slovenia; Door-to-door rounds of Kurenti and Škofja Loka passion play (UNESCO a, 2021).

Current status in Croatia

The program area, as well as the entire territory of the Republic of Croatia, is rich in tangible and intangible cultural heritage in the category of protected and preventively protected. A total of 2.342 units of tangible cultural heritage are present in the Croatian part of the programme area. Of these, 1.844 are protected as Individual cultural heritage (Register of Cultural Heritage of the Republic of Croatia, 2021). There are also numerous examples of recorded cultural heritage, mostly local values. They are listed in spatial planning documentation (on regional and local level). There is much more cultural heritage than it is listed in Register. The mentioned cultural heritage is protected by the provisions of the spatial planning documentation.

More detailed data on the number of (protected and preventively protected) units by type of cultural heritage are shown in the table below.

Table 20: Number of unites of cultural heritage by type within programme area in Croatia

| Type of cultural heritage | Individual cultural heritage | Cultural and historical entirety | Cultural landscape | Archaeology | Intangible heritage | Total | Out of these - UNESCO list |
|---|---|---|---|---|---|---|---|
| Protected heritage | 1,800 | 215 | 6 | 147 | 86 | **2 254** | 12 intangible and 1 tangible cultural heritage |
| Preventively protected heritage | 44 | 7 | - | 33 | 3 | **88** | - |
| Total number of protected and preventively protected cultural heritage | 1,844 | 222 | 6 | 180 | 89 | **2,342** | 12 intangible and 1 tangible cultural heritage |

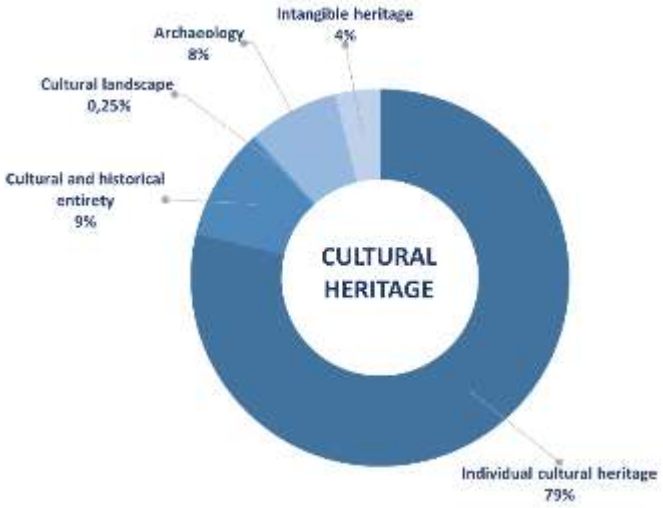
Source: Register of Cultural Heritage of the Republic of Croatia, 2021

Apart from the units of cultural heritage of national and local importance presented above, there are elements protected as UNESCO elements of cultural heritage. Within programme area, there are 12 elements of intangible:

- Lepoglava lace
- Gingerbread craft (Northwestern Croatia and Slavonia)
- The art of making traditional children's toys (Hrvatsko Zagorje)
- Two-voiced singing of narrow intervals (Istria and the coastal area)
- The art of building the batana (boat, Rovinj)
- Klapa (multipart) singing
- Ojkanje (musical expression)
- Zvončari - annual carnival procession (Kastav area)
- Rozganje (musical expression)
- Međimurska popevka (traditional song from Međimurje)
- Traditional fishing skills, customs and beliefs (Adriatic)
- The art of drywall construction

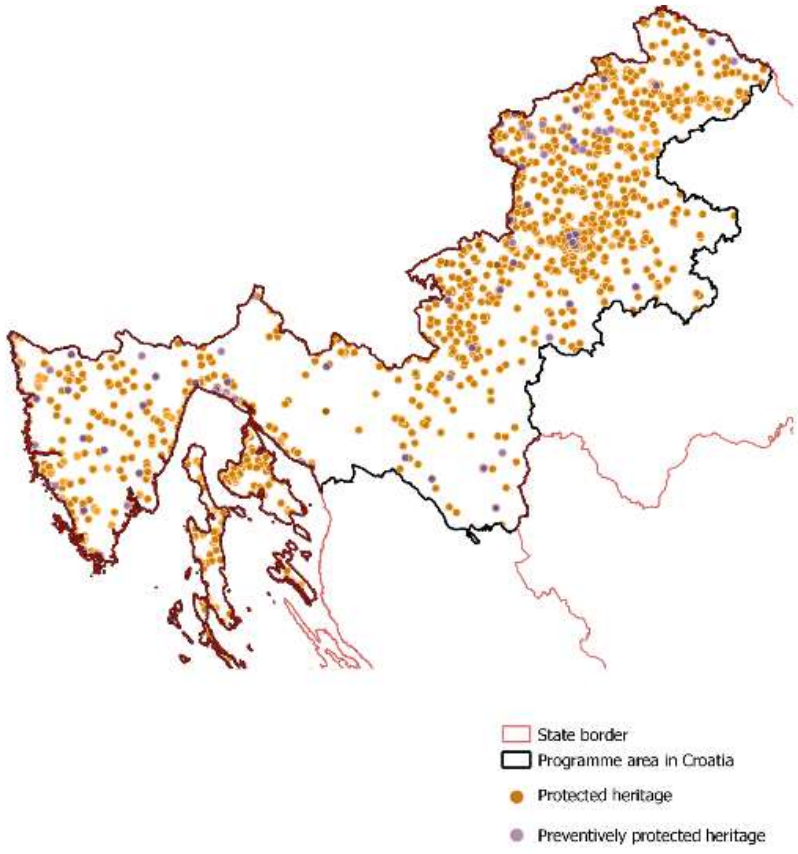
and one element of tangible cultural heritage – Episcopal Complex of the Euphrasian Basilica in the Historic Centre of Poreč - group of religious monuments in Poreč.

Figure 36: Share of types of cultural heritage within programme area in Croatia




Source: Register of Cultural Heritage of the Republic of Croatia, 2021

Figure 37: Position of protected and preventively protected heritage within programme area in Croatia




Source: National Spatial Data Infrastructure, 2021

According to the number of cultural elements in each county for the program area, a reference value has been determined. Reference value determines the degree of sensitivity for each type of cultural heritage. Figure below illustrates the sensitivity of the program area.

Table 21: Relation between cultural heritage and sensitivity level

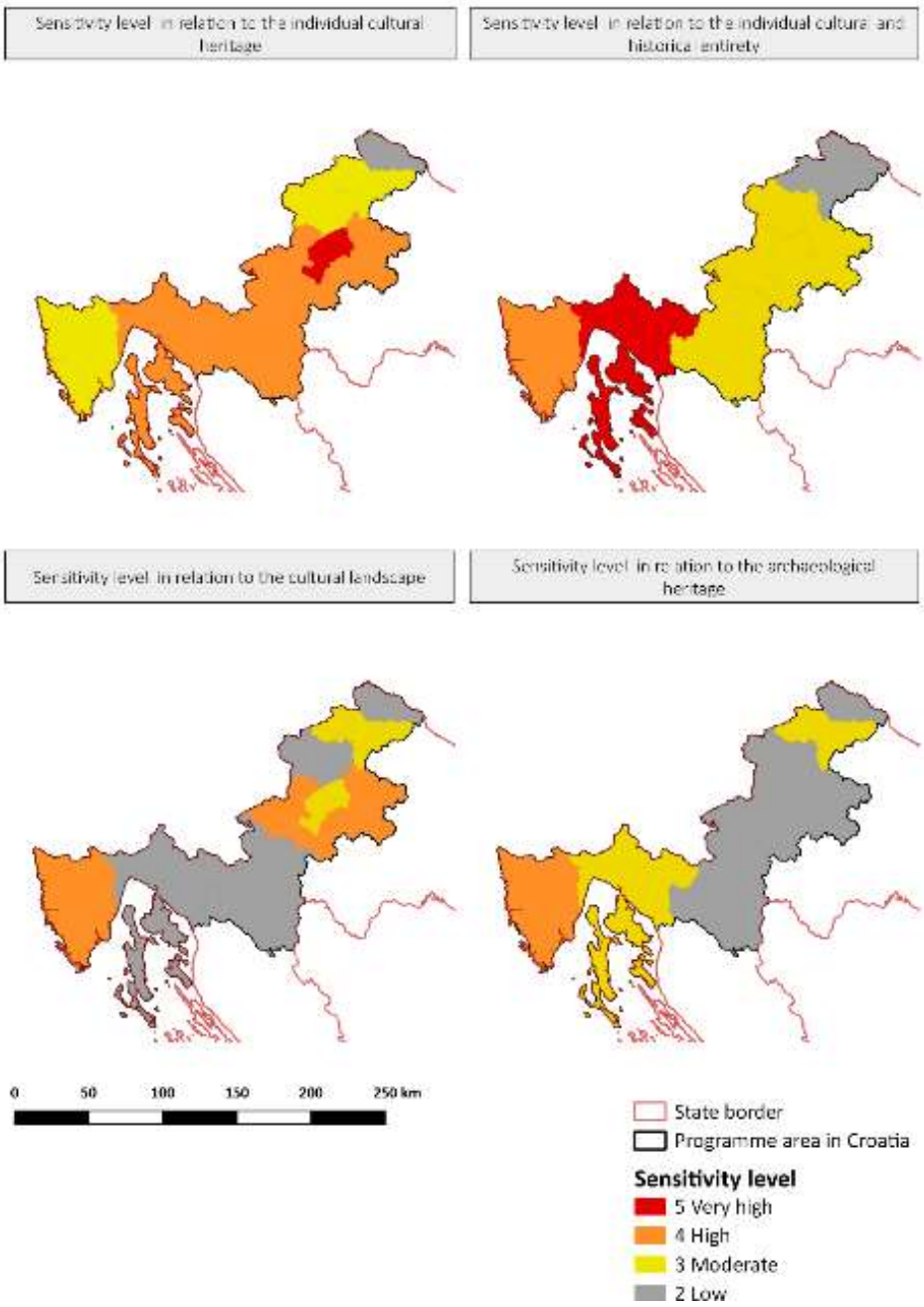
| Cultural heritage | Individual cultural | Sensitivity level | Cultural and historical | Sensitivity level | Archaeology | Sensitivity level | Cultural landscape | Sensitivity level |
|---|---|---|---|---|---|---|---|---|
| Reference value | 400-900 | 5 | 80-100 | 5 | 110-185 | 5 | 3 | 5 |
| Reference value | 200-399 | 4 | 50-79 | 4 | 60-109 | 4 | 2 | 4 |
| Reference value | 100-199 | 3 | 10-49 | 3 | 10-59 | 3 | 1 | 3 |
| Reference value | 0-99 | 2 | 0-9 | 2 | 0-9 | 2 | 0 | 2 |

In addition to protected and preventively protected cultural heritage, numerous examples of cultural heritage, mostly local values, are recorded in spatial planning documentation (on regional and local level). The mentioned cultural heritage is protected by the provisions of the spatial planning documentation. Within the programme area there are 1.497 recorded elements of cultural heritage proposed for protection.

According to the Croatian strategy of cultural heritage 2011-2015, especially vulnerable is tangible heritage. The main reasons are lack of maintenance and care, insufficient financial means, unresolved issues of ownership and a low level of awareness of the heritage value. The situation is critical in rural areas and small historical towns where some buildings do not have an actual use.

One of the reasons that intangible cultural heritage is vulnerable are globalization processes that lead to the abandonment of traditional customs and skills.

Figure 38: Sensitivity level within programme area in Croatia




Source of data: Register of Cultural Heritage of the Republic of Croatia, 2021

## 6.5. Landscape

Current status in Slovenia

The protection of landscape in Slovenia is not defined in a way that they would have special protection regime that would enable its management and preservation of landscape diversity. Moreover, the "landscape policy" is not shaped in Slovenia.

However, the need for landscape protection, management and preservation of its diversity is mentioned in several strategic documents on national as well as local level, but it is rather

neglected in the implementation phase. For example, the Spatial Development Strategy does define outstanding landscapes. However, management and preservation measures are poorly defined and incorporated in the following steps of spatial development.

The problem is that landscape does not have an environmental authority that would carry out control and prevent negative impacts on landscape. Despite the fact that management of landscape being directly or indirectly addressed within the development or protection of different sectors (agriculture, forestry, water management, tourism) since the landscape and its diversity plays an important part in each of them, the holistic view is not always provided. Neglecting the importance of holistic approach and lack of cross-sectoral coordination is often reflected in negative impacts on landscape and its diversity.

Landscape is, however, partially covered through protection regimes of nature protection and protection of cultural heritage. Management measures in some of these areas also have impact on the state of the landscape, mostly as a consequence of promotion of traditional land use and biodiversity protection measures. Large scale protected areas are national, regional and landscape parks while the small-scale protected areas are strict nature reserves, nature reserve and natural monument. The most important in this view, mainly due to their size and impact of the management measures on the landscape diversity, are the large-scale protected areas. Within the programme area in Slovenia there are 36 parks that are protected natural areas either on national or local level due to outstanding natural features, as well as cultural 1 national park, 1 regional park and 34 landscape parks, together covering an area of 203,680 ha. In recent years, the total surface area of protected areas has expanded, largely due to the designation of five larger parks (ARSO, 2021a). Moreover, nature values and Natura 2000 areas and management measures within them also contribute to good status of landscapes.

Besides the areas protected due to the natural values, special regime for landscape protection is defined for cultural landscapes protected by the Law on Cultural Heritage that also protects the areas being of extreme importance due to the traditional land use. It is important to highlight that this mechanism enable prevention of negative impacts due to new spatial interventions but does not provide measures or funding mechanism that would contribute to management of landscape.

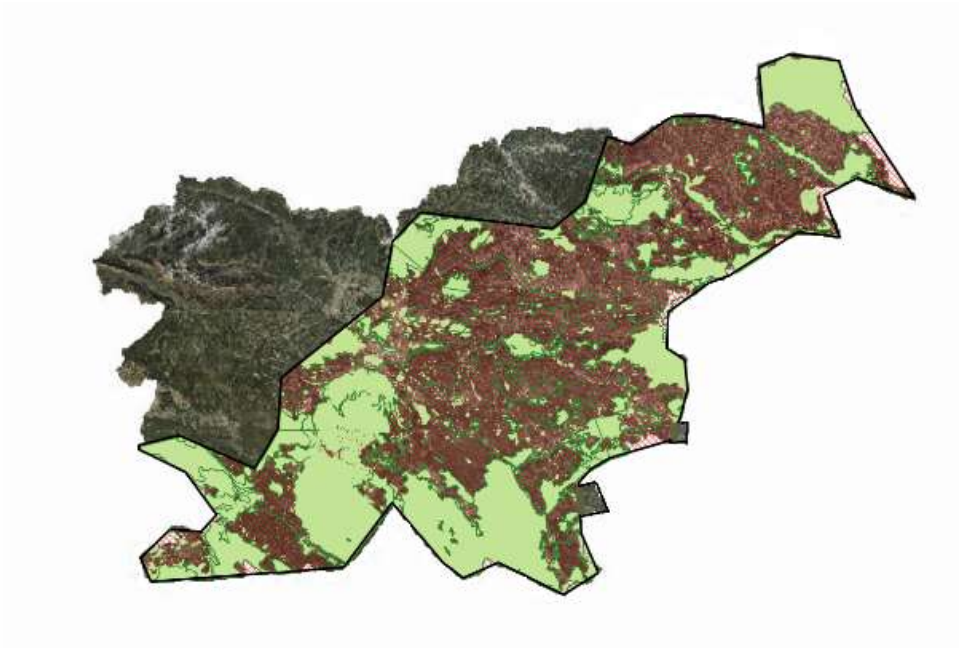
Table 22: Number and covered land (in ha) of nature conservation and cultural landscapes protection regimes in the Slovenian part of the IP area.

| Type of area protection | Number of units | Area (in ha)* | % of the programme area in Slovenia |
|---|---|---|---|
| Protected areas (large and small scale) | 358 | 155,457 | 11% |
| Natural values (areas) | 1,760 | 137,079 | 9% |
| Natural values (locations) | 1,704 | / | / |
| Natura 2000 area | 307 (273 SAC and 34 SPA areas) | 778,555 | 53% |
| Ecologically important areas | 277 | 907,005 | 62% |

Source: ARSO, 2021; eVRD, 2021
* The area represents the area of certain type of protection. If two (or more) units (e.g., protected areas) are covering the same are, the area is not included twice in this calculation.

The protection regimes listed in the table above intersect that to some extent contribute to good status of landscape represents smaller share of the programme area in Slovenia. Figure below represents these areas (coloured green). Within the rest of the programme area (red hatch) good status of landscape is addressed through spatial planning that often does not provide holistic approach toward good status of landscape and its diversity.

Figure 39: Areas of nature and cultural heritage protection that contribute to good status of landscape (coloured green)



Source: ARSO, 2021a; eVRD, 2021

Beside the types of area protection regimes listed above, the protective forests and forest reserves also have impact on the state of the landscape due to special management measures defined within them.

Table 23: Covered land (in ha) of protective forests and forest reserves within the programme area in Slovenia

| Type of area protection | Area (in ha)* | % of the programme area in Slovenia |
|---|---|---|
| Protective forests | 23,556 | 1,6% |
| Forest reserves | 5,130 | 0,4% |

Source: SFS, 2018

Agriculture could be defined as one of the main measures for landscape management and preservation of its diversity. Unfortunately, simulation (for the period 2015-2030) of agricultural land abandonment in Europe shows that agricultural land is under high potential risk of abandonment due to factors, related to biophysical land suitability, farm structure and agricultural viability, population and regional specifics. Competition for land with other land uses could also be identified as one of the drivers for agricultural land abandonment. (European Commission, 2018)

Landscape Fragmentation measures landscape fragmentation due to fragmentation geometry (transport infrastructure and sealed areas) and provides an insight into the functioning of landscape, strongly connected to ecological connectivity (JRC, 2014).

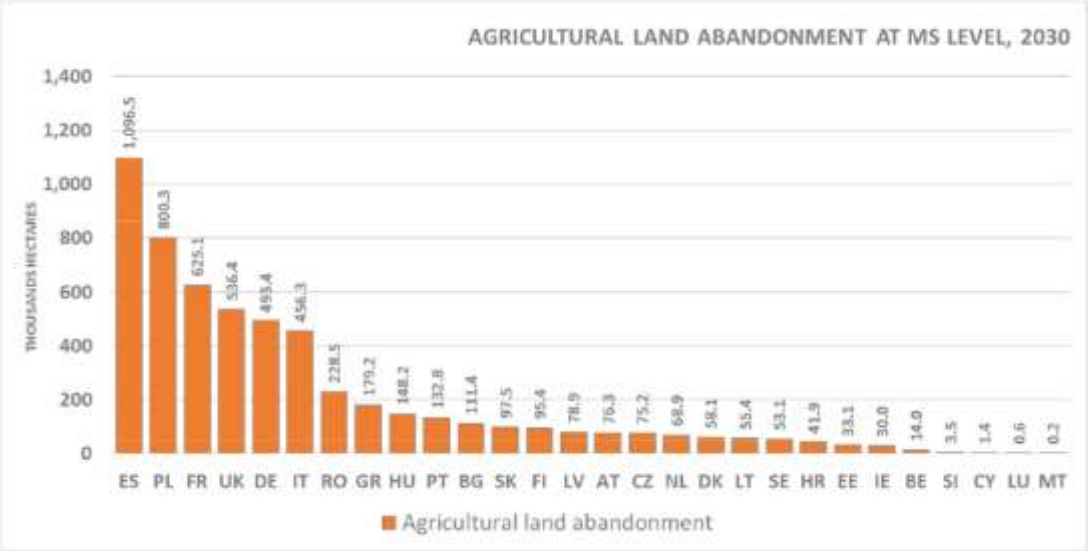
Table 24: Landscape fragmentation status and trends in Slovenia

| | 2009 | 2012 | 2015 |
|---|---|---|---|
| Average number of meshes per km2 | 1.57 | 1.6 | 1.61 |
| Area of strongly fragmented landscape (in % of country area) | 42.92 | 42.61 | 42.63 |

Source: EEA, 2020

In 2015, on average, there were around 1.5 fragmented landscape elements per $km^2$ in the European Union. Fragmentation represents slightly bigger pressure in Slovenia: 1.61.

Figure 40: Absolute agricultural land abandonment between 2015 and 2030 by EU Member States




Source: Perpiña et al, 2018

The figure above presents the absolute agricultural land abandonment between 2015 and 2030. Based on these predictions agricultural land abandonment on 3,500 ha in Slovenia might result in negative impacts on landscape and its diversity as well.

Current status in Croatia

The territory of the Republic of Croatia represents a wide range of landscape types because of rich natural, biological, and cultural diversity, which indicates the richness of Croatia. According to the landscape regionalization of Croatia, Croatia is divided into 16 landscape units: Lowland area of Northern Croatia, Pannonian Mountains, Bilogora-Moslavina area, North-western Croatia, Žumberak and Samobor Highlands, Kordun plateau, Gorski kotar, Lika, Upper belt of Velebit, Istria, Kvarner-Velebit area, North Dalmatian plateau, Zadar-Šibenik archipelago, Dalmatian Hinterland, Coastal area of Central and Southern Dalmatia and Lower Neretva Valley. This program includes eight Croatian NUTS 3 regions that belong to the following landscape units:

### Istria

The Istria landscape unit is characterized by three geological-morphological and landscape parts: mountain edge, Učka and Ćićarija mountains (white Istria), flysch relief of central Istria (Gray Istria), and limestone, reddish flat part of Western Istria (Red Istria). Gray and Red Istria are predominantly agricultural landscapes. The special value of this area, which unites all three types of Istria, is the typology of Istrian typical settlements: fortifications and position on high, landscape-dominant points. Except for the Lim and Raška bays, littoral values tend to micro-identity. The endangerment is manifested by the concentration of tourist infrastructure in the narrow coastal area, the decay of ancient urban units inside of Istria and erosive processes in the flysch part.

### Kvarner-Velebit area

The landscape unit of the Kvarner-Velebit area is characterized by large units of the Kvarner islands and a mountain frame from Učka to Velebit, which also represents the macro-identity of the area. The eastern sides of the islands are almost devoid of vegetation due to the bora wind and salt. Velebit coastal slope is also characterized by rocks, while the western sides are often green and wooded. The greatest value in this area is the mountain frame that allows unique and wide views. Endangerment is manifested through the unplanned construction of the coastal zone, the decay of ancient settlements and the degraded forest cover.

### Gorski kotar

The landscape unit of Gorski kotar is distinguished by a mountainous and forested area. The morphology is basically karst with smaller karst fields (these features also extend to part of Lika). The great values of this area are high, mixed coniferous and deciduous forests that cover over 60% of the area and form its macro-identity, while forest glades and open areas appear as elements of micro-identity. Vulnerability is manifested through forest overgrowth, major interventions in road construction and acid rain that threatens the structure of mountain forests.

### Kordun plateau

The landscape unit of the Kordun plateau is characterized by an area of "shallow" covered karst with an average height of 300 to 400 m above sea level, and karst depressions in the form of sinkholes, and smaller fields. Forests have been significantly cleared and degraded. Of particular value to the area are the picturesque canyon valleys of the four karst rivers Kupa, Dobra, Mrežnica and Korana with exceptional hydrological values. Vulnerability is manifested precisely through the pollution of rivers and valleys by hydropower interventions and the lack of quality high forests.

### Žumberak and Samobor Highlands

The landscape unit of Žumberak and Samobor Highlands is characterized by a rich mountain range with significant landscape differences compared to other Pannonian and Peripannonian mountains, since the settlements climb up to 800 m above sea level. For this reason, significant forest areas have been cleared. The special value of the area is the landscape diversity created by the change of forest and open spaces in the form of meadows and pastures, while the southern foothills are one of the most attractive vineyard landscapes. Vulnerability is manifested through depopulation and abandonment of agricultural areas overgrown with forest vegetation and inappropriate construction of cottages.

### Bilogora-Moslavina area

The landscape unit of the Bilogora-Moslavina area is characterized by an agrarian landscape on minor hills. Although the low mountains are up to 300 m above sea level, Bilogora is mostly a continuous forest belt. A special value of the area is the picturesque contact part of the agrarian

landscape and forests on gentle hills. The endangerment of this landscape unit is manifested through the geometric regulation of streams with the loss of forests and construction on landscape-exposed locations.

### North-western Croatia

The landscape unit of Northwestern Croatia is characterized by a landscape-diverse area with dominant hills "Prigorje" and "Zagorje" surrounded by forested Peripannonian hills Kalnik, Ivančica, Medvednica and others. The main element of the area's identity is mainly the cultivated picturesque "ribbed" relief, which contrasts with the wooded mountain massifs. The endangerment of this landscape unit is manifested through inadequate housing construction, geometric regulation of streams and lack of glades.

### Lowland area of Northern Croatia

The landscape unit is characterized by an agrarian landscape with oak forests and floodplains where the main elements of identity are forest edges, fluvial patterns, and wetland landscapes. The endangerment of this landscape unit is manifested in the occasional lack of forests, the disappearance of hedges in agro-ameliorative interventions, the geometric regulation of the streams and the disappearance of the characteristic fluvial relief.

The landscape protection in Croatia is not defined by special protection regime that would enable its management and preservation of landscape diversity. Landscape is, however, partially covered through regimes of nature protection, protection of cultural heritage and spatial planning documents.

By the Nature Protection Act (NN 80/13, 15/18, 14/19, 127/19), there are nine categories of protection in Croatia: strict nature reserve, national park, special nature reserve, nature park, regional park, natural monument, significant landscape, forest park and monument park (In situ protection, Strategy and action plan for the protection of biological and species diversity of the Republic of Croatia). National categories generally correspond to one of the internationally recognized IUCN protected area categories. Due to the same Act, there are 410 areas on total 821,327.25 ha, which is 9.3 % of the total territory of the Republic of Croatia (Bioportal, 2021).

Table 25: Number of protected sites in regime of nature protection in programme area

| County | Protected areas – all categories (ha) | Protected areas (% of county) | Number of protected areas |
|---|---|---|---|
| City of Zagreb | 10 419.24 | 16 % | 31 |
| Istarska County | 20 195.32 | 7 % | 36 |
| Karlovačka County | 14 235.02 | 3.9 % | 16 |

| | | | |
|---|---|---|---|
| Krapinsko-zagorska County | 6 017.6 | 4.8 % | 22 |
| Međimurska County | 51 444.79 | 43.1 % | 11 |
| Primorsko-goranska County | 26 123 | 7.2 % | 33 |
| Varaždinska County | 11 808.7 | 9.3 % | 26 |
| Zagrebačka County | 37 876.6 | 12.3 % | 34 |
| **Total number of protected sites in programme area** | 178 120.24 ha (10.5 %) of programme area | | |

Source: Bioportal, 2021

Table 26: Protected sites in regime of nature protection significant for the landscape in programme area

| County | Significant landscapes (number and area) | Forest Park (number and area) | Monument Park (number and area) | Total (number and area) |
|---|---|---|---|---|
| City of Zagreb | 3<br>823.55 ha | / | 18<br>384.58 ha | 21<br>1 208.13 ha* |
| Istarska County | 11<br>6 976.79 ha | 5<br>306.47 ha | 6<br>1.59 ha | 22<br>7 284.85 ha* |
| Karlovačka County | 5<br>3 673.34 ha | 1<br>4.92 | 3<br>15.43 ha | 9<br>3 693.69 ha* |
| Krapinsko-zagorska County | 4<br>406.87 ha | / | 10<br>62.86 ha | 14<br>469.73 ha* |
| Međimurska County | 1<br>14 437.47 ha | / | 7<br>13.87 ha | 8<br>14 451.34 ha* |

| | | | | |
|---|---|---|---|---|
| Primorsko-goranska County | 5<br>1 855.15 ha | 5<br>400.83 ha | 4<br>12.15 ha | 14<br>2 268.13 ha* |
| Varaždinska County | 1<br>1 261.97 ha | 2<br>572.93 ha | 17<br>157.27 ha | 20<br>1 992.17 ha* |
| Zagrebačka County | 4<br>4 604.74 ha | 3<br>338.34 ha | 9<br>46.91 ha | 16<br>4 989.99 ha* |
| **Total number of sites in programme area** | **34**<br>**34 039.88 ha (2%)** | **16**<br>**1 623.49 ha (0.09%)** | **74**<br>**694.66 ha (0.04%)** | **124**<br>**36 358.03 ha* (2.15%)** |

Source: Bioportal, 2021

**Possibility of minor overlapping of categories*

Beside protection through nature regime, there is also protection through cultural heritage in the category of cultural landscapes. **Cultural landscape** is a type of immovable cultural property that contains historically characteristic structures that testify man's presence in space, and represent a joint work of man and nature, illustrating the development of the community and its territory throughout history.

They differ by types: intentionally designed (parks, gardens, gardens, planned urban areas, industrial, tourist, recreational and similar), organically developed (rural, urban, marine…) and associative cultural landscapes. As a living environment, landscapes are changeable, often destroyed due to social and technological changes, urban sprawl and other forms of construction, but also neglect and inappropriate use.

There are 15 protected cultural landscapes in Croatia of which one of them is on UNESCO list, and 6 of them are located within programme area.

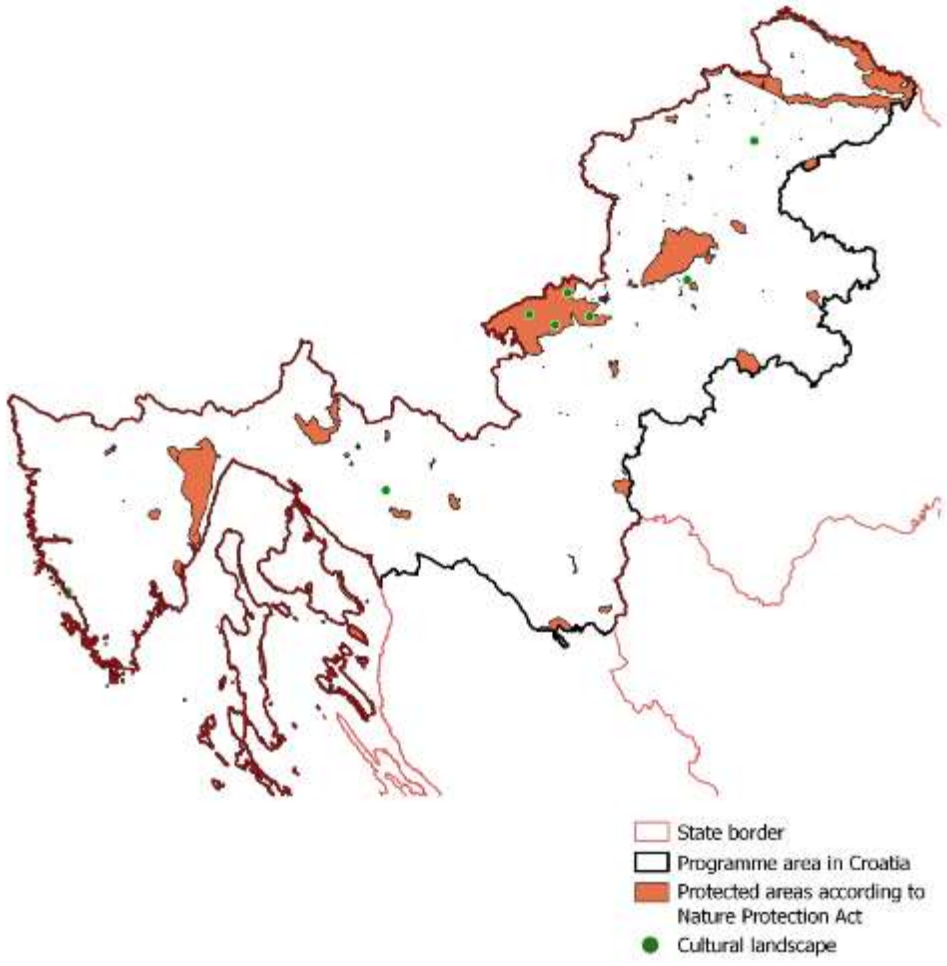
Table 27: Cultural landscapes within program area

| Cultural Landscape | County | Type of landscape |
|---|---|---|
| Cultivated landscape in the area of Bela I and Bela II castles | Varaždinska | Agrarian (organic) landscape |
| Cultural landscape of the Brijuni Islands | Istarska | planned landscape |

| | | |
|---|---|---|
| Architectural-landscape complex of the Paravia-Barbariga fortification system | Istarska | planned landscape |
| Agricultural landscape - the western slope of Donji Brezinščak Street | City of Zagreb | Agrarian (organic) landscape |
| Memorial landscape of Matić poljana | Primorsko-goranska | Associative (memorial) landscape |
| Cultural landscape Žumberak – Samobor Hills - Plešivičko prigorje | Zagrebačka | Agrarian (organic) landscape |

Source: Register of Cultural Heritage of the Republic of Croatia, 2021

Figure 41: Protected areas and cultural landscape within programme area




Sources: Bioportal and National Spatial Data Infrastructure, 2021

Landscape is also recognized and protected through spatial planning documents at the regional and local level. Often, these landscapes overlap with already recognized landscapes in the category of nature protection or cultural heritage. The following table lists the landscapes identified at the regional level within the program area which are not listed above. Each spatial plan defines landscape conservation measures.

Table 28: Landscapes recognized and protected by spatial plans

| County | Landscapes | Other documents |
|---|---|---|
| City of Zagreb | Macro units: Medvednica, Prigorje, Sava valley, Vukomeričke gorice<br>Parts of nature proposed for protection: valuable reserves (2), urban forest parks (25), valuable landscapes (7) and other individual parts of nature, valuable parks and tree lines. | Landscape basis for City of Zagreb |
| Istarska County | Istria is divided into 3 units (red, grey and white Istria) within there are: 43 units of landscape dominant points, 9 karst phenomena, 12 landscape significant areas and 5 significant cultivated landscapes | - |
| Karlovačka County | Significant landscapes Slunjčica and Klek.<br>Parts of nature recognized as special reserves (proposed for protection)<br>Two areas are proposed for protection at the nature park / regional park level: part of Bjelolasica and the Mrežnica river valley, while the Kupa, Korana and Dobra rivers are proposed in the category of significant landscapes along many others. | - |
| Krapinsko-zagorska County | The area of Maceljski gorje, Strahinjčica, Ivančica, Kuna Gora, Brezno Gora, Strogača and Medvednica belongs to a particularly valuable natural landscape. The plan identifies areas with the possibility of protection in the category of protected landscape: the wider area of Ivančica, Macelj, Strahinjčica, Strogača, Cesargradska gora, Brezno gora - Kuna gora and the area of Medvednica. | - |
| Međimurska County | Landscape units of Međimurje according to typological characteristics: urbanized landscape, cultivated landscape of Lower Međimurje, cultivated landscape | - |

| | | |
|---|---|---|
| | of Upper Međimurje, landscapes of Mura and Drava rivers.<br>In the evaluation of Međimurje landscape there is recognized valuable landscape of Upper Međimurje and Globetka – lowland which stretches from foothill to settlement edges of Nedelišće and Čakovec. | |
| Primorsko-goranska County | Micro units: Gorski kotar, coastal area and islands<br>Traditional rural landscape with fields and traditional terraced landscapes of Mošćenička and Lovranska Draga<br>Historical parks, Vinodol valley, Islands Cres-Lošinj, Krk and Rab<br>Cultural landscapes: dry-walled terraced vineyards, rocky pastures with unique dry-stone complexes, shepherd's dwellings and agricultural and shepherd's landscape of the island of Cres. | - |
| Varaždinska County | Drava Park, north from Varaždin, Kalnik area, Trakošćan area, Ivančica wider area, Goruševnjak - narrow part of Plitvica river (spring), forest part west from Varaždin Thermal Baths, forest part of wider Paka area and part of Visoko municipality, Segovina forest area, Zelendvor area, Lasno forest, natural stream of the river Plitvice | - |
| Zagrebačka County | Macro units: Medvednica, Žumberak and Samobor Highlands, Foothill of Medvednica and Southern part of Zagorje, Sava and Kupa Lowland Area<br>Protected by Spatial plan: Natural landscapes (14), agricultural landscapes (11), cultural landscapes (13 units in 4 categories) | Landscape study of Zagrebačka County |

One of the indicators of landscape degradation is landscape fragmentation. It is the physical disintegration of continuous ecosystems into smaller units, which is most often caused by urban or transport network expansion. Landscape Fragmentation provides an insight into the functioning of landscape, strongly connected to ecological connectivity (EEA, 2019).

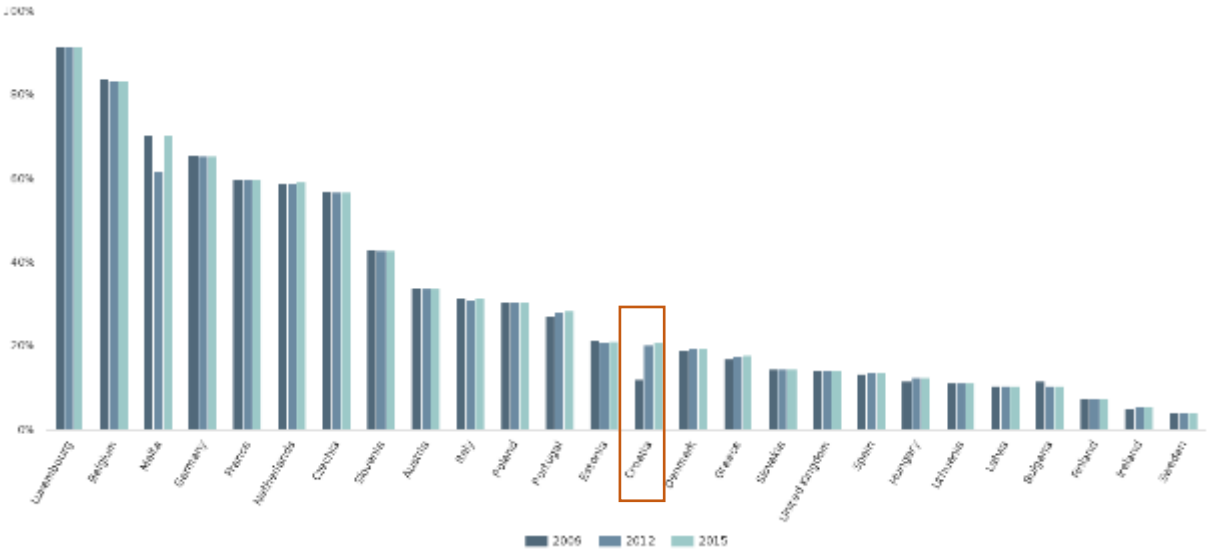
Table 29: Landscape fragmentation status and trends in Croatia

| | 2009 | 2012 | 2015 |
|---|---|---|---|
| Average number of meshes per km2 | 0,99 | 1,03 | 1,04 |
| Area of strongly fragmented landscape (in % of country area) | 11,87 | 20,04 | 20,78 |

Source: EEA, 2020

In the European Union (2015), on average, there were 1,5 fragmented landscape elements per km$^2$. Fragmentation represents slightly lower pressure in Croatia (1,04). In all observation years, on average, pastures and mosaic farmlands were most fragmented.

Figure 42: Average number of meshes per km2 – Landscape fragmentation status and trends

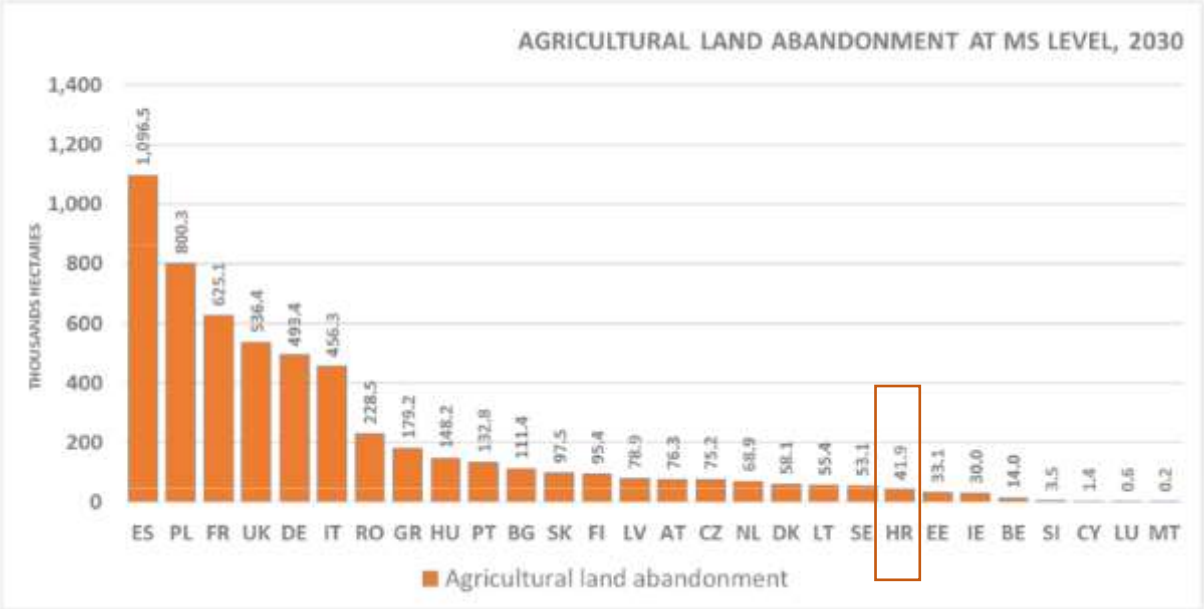



Source: EEA, 2020

Agriculture also could be defined as one of the measures for landscape management and preservation of its diversity. In the period 2015-2030 data shows that about 11% (more than 20 million ha) of agricultural land in the EU is under high potential risk of abandonment due to factors, related to biophysical land suitability, farm structure and agricultural viability, population and regional specifics (European Commission, 2018).

The figure below presents the absolute agricultural land abandonment between 2015 and 2030. Based on these predictions agricultural land abandonment on 41,900 ha in Croatia might result in negative impacts on landscape and its diversity.

Figure 43: Absolute agricultural land abandonment between 2015 and 2030 by EU Member States




Source: Perpiña Castillo C., Kavalov B., Diogo V., Jacobs-Crisioni C., Batista e Silva F., Lavalle C, JRC113718, European Commission 2018

Table 30: Assessment of the development according to the zero alternative

| Environmental aspects | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| Cultural heritage | Number of registered units of cultural heritage | SI (eVRD, 2021; UNESCO, 2021): At national/local level 22,340 units of cultural heritage are registered, out of these 6,591 protected as cultural monument. Two elements inscribed in UNESCO world heritage list are present. Especially vulnerable are material elements (buildings, settlements) due to insufficient financial means, unresolved issues of ownership and low level of awareness of the heritage value that reflect in lack of maintenance and care. | ←↘ |

| Environmental aspects | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| | | HR (Register of Cultural Heritage of the Republic of Croatia, 2021; UNESCO, 2021): At national level 6,370 units of cultural heritage are registered, out of these 4,616 are protected as cultural monument. Out of total number, 6,040 units are protected and 330 of them are preventively protected.<br>**On the program area** there are 2,342 units of cultural heritage of which 2,254 of them are protected and 88 of them are preventively protected. One unit of cultural monuments is on the UNESCO list.<br>According to the Croatian strategy of cultural heritage 2011-2015, the main reason for the vulnerability of cultural heritage is lack of maintenance, ownership issues and low level of awareness of the heritage value. The situation is critical in rural and historical areas where some buildings do not have actual use. | ←↘ |
| | Number of units of intangible cultural heritage | SI (Ministry of Culture, 2021; UNESCO a, 2021): At national level 76 units of intangible cultural heritage and 183 bearers of the heritage are listed in the register of intangible cultural heritage. Four elements inscribed in UNESCO intangible cultural heritage list are present. Globalization processes lead to the abandonment of traditional crafts, traditions and skills. | ←↘ |
| | | HR (Register of Cultural Heritage of the Republic of Croatia, 2021; UNESCO, 2021): Currently, the list of intangible cultural heritage includes 204 protected and preventively protected units, of which 16 of them are on the UNESCO list.<br>**On the program area** there are 89 elements of intangible cultural heritage.<br>One of the reasons intangible cultural heritage is vulnerable is the globalization processes that leads to the abandonment of traditional customs and skills. | ←↘ |

| Environmental aspects | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| Landscape diversity | Extent of protected landscapes | SI (ARSO, 2021a): The protection of landscapes in Slovenia is not defined in a way that they would have special protection regime that would enable their management and preservation of landscape diversity. Landscape is, however, partially covered through protection regimes of nature protection and protection of cultural heritage. In recent years, the total surface area of protected areas has expanded, largely due to the designation of five larger parks. | ←↗ |
| | | HR: The protection of landscape in Croatia is not defined in special protection regime that would enable their management and preservation of landscape diversity. Landscape is, however, partially covered through protection regimes of nature protection and protection of cultural heritage.<br>Comparing data on the number of protected areas (Bioportal, 2021), their number decreased compared to 2013 (from 419 to 410), but the total area increased (from 8.19% to 9.3% of the total territory of Croatia). | ←↗ |
| | Risk of agricultural land abandonment | SI (European Commission, 2018): Based on predictions agricultural land abandonment on 3,500 ha in Slovenia might result in negative impacts on landscape and its diversity as well. | ←↘ |
| | | HR (European Commission, 2018): Based on data, the area of abandoned agricultural land in Croatia is 41,900 ha. That might be a negative impact on landscape diversity. | ↘ |

| Environmental aspects | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| | Landscape fragmentation | SI (JRC, 2014): Slight increase of number of meshes per $km^2$ is noted in Slovenia: 1.57 (2009), 1.6 (2012), 1.61 (2015).<br>No significant trend in share of country area with strongly fragmented landscape is present: 42.92 (2009), 42.61 (2012), 42.63 (2015).<br>There are 1.61 fragmented landscape elements per $km^2$ in Slovenia. | ←↘ |
| | | HR (Joint Research Centre, 2020): Considering the area of the most fragmented landscapes during the period 2009-2012 in Europe, Croatia increased by almost 70 % (from 11.9 % to 20.1 % of the country's area) and from 6.627 $km^2$ to 11,192 $km^2$ in absolute amount. | ↘ |
| ↗ Improvement ←↗ Partial improvement ←→ No change ←↘ Partial deterioration ↘ Deterioration | | | |

## 6.6. Water

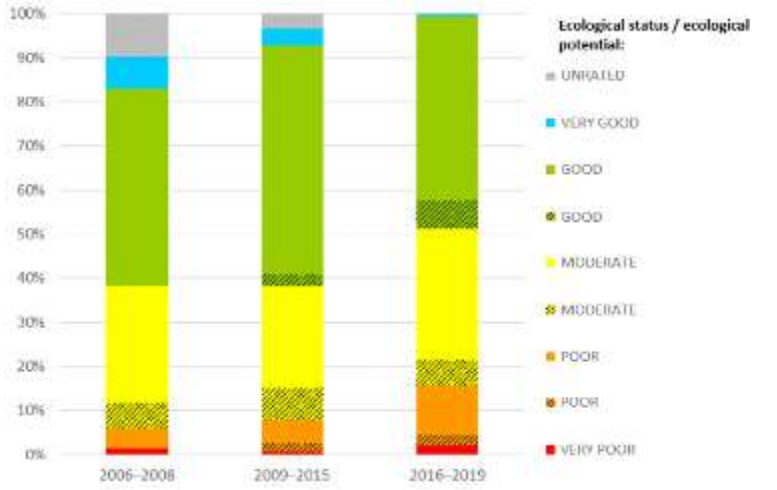
### 6.6.1. Surface water

Current status in Slovenia

In Slovenia, 98.7% of surface water bodies are in good chemical condition. The two water bodies are in poor chemical condition due to the excess of metals.

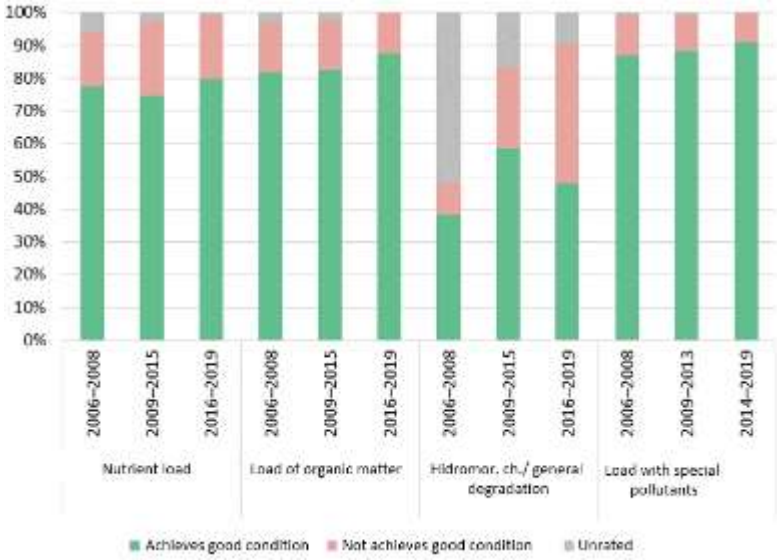
Good or better ecological status is estimated for 49% of surface water bodies. The main reasons for the moderate or poorer ecological status of surface waters are hydro morphological change and general degradation, which are evaluated on the basis of the status of benthic invertebrate and fish communities. Compared to the previous assessment period, good ecological status is achieved by 10% fewer water bodies (ARSO, 2021).

Figure 44: Shares of surface water bodies in individual classes of ecological status




Source: ARSO, 2021

Figure 45: Share of surface water bodies that achieve/do not achieve good ecological status according to individual loads




Source: ARSO, 2021

In Slovenia, nutrient overloading is still the basic problem concerning lakes and reservoirs, and from 2006 to 2019, no improvement is observed. In the assessment period 2016–2019, only 4 out of 11 lake water bodies were determined to be in good or very good trophic status. Overloading of lakes with phosphorus is usually a result of inadequate wastewater drainage and intensive agriculture in the watershed area (ARSO, 2021).

Inland bathing water quality in Slovenia is good and comparable with bathing water quality in other European countries (ARSO, 2021).

Considering the water runoff, the above-average years 2013 and 2014 were followed by average and below-average annual runoff. In the period 1961 – 2019, the driest years were

2011, 2007, 2003, 1983, and 1971. In the year 2019 annual runoff was average. The long-term downward trend of river runoff from the territory of Slovenian currently persists (ARSO, 2021).

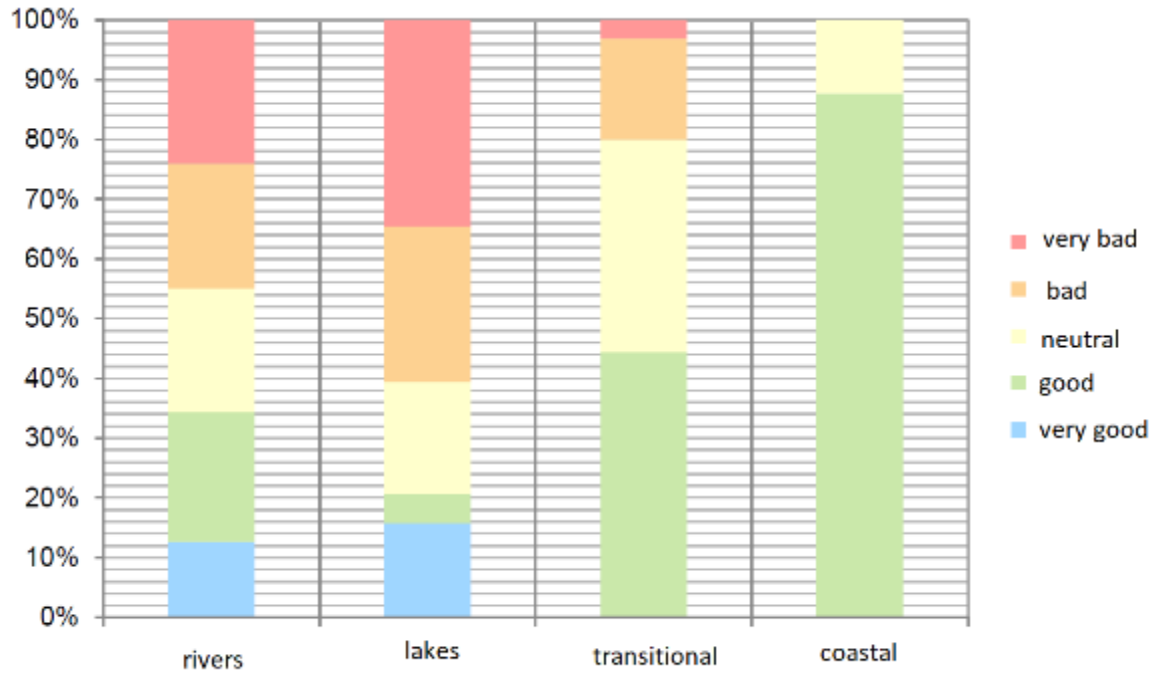
Current status in Croatia

Good chemical status was not achieved for 8% of surface water streams with watershed of minimum 10 $km^2$ (rivers), 15% of total transitional water bodies and 6% of total coastal bodies.

Figure 46: Share of surface water bodies that achieve/do not achieve good chemical status


According to the data good or better ecological status is present in 58% of surface water streams with watershed of minimum 10 $km^2$ (rivers), 54% of lakes, 55% of transitional water bodies and 12% of coastal water bodies.

Figure 47: Share of surface water bodies that achieve/do not achieve good ecological status




Considering provinces adjacent to Slovenia, poor ecological status is present in just one coastal water body located next to city of Rijeka, while only 2 coastal water bodies don't have good chemical status, located in the Bakar bay next to city of Rijeka and between isles Krk and Cres. All transitional water bodies show good or better ecological status, while 3 transitional water bodies have poor chemical status near city of Novigrad and Raša bay.

### 6.6.2. Ground water

Current status in Slovenia

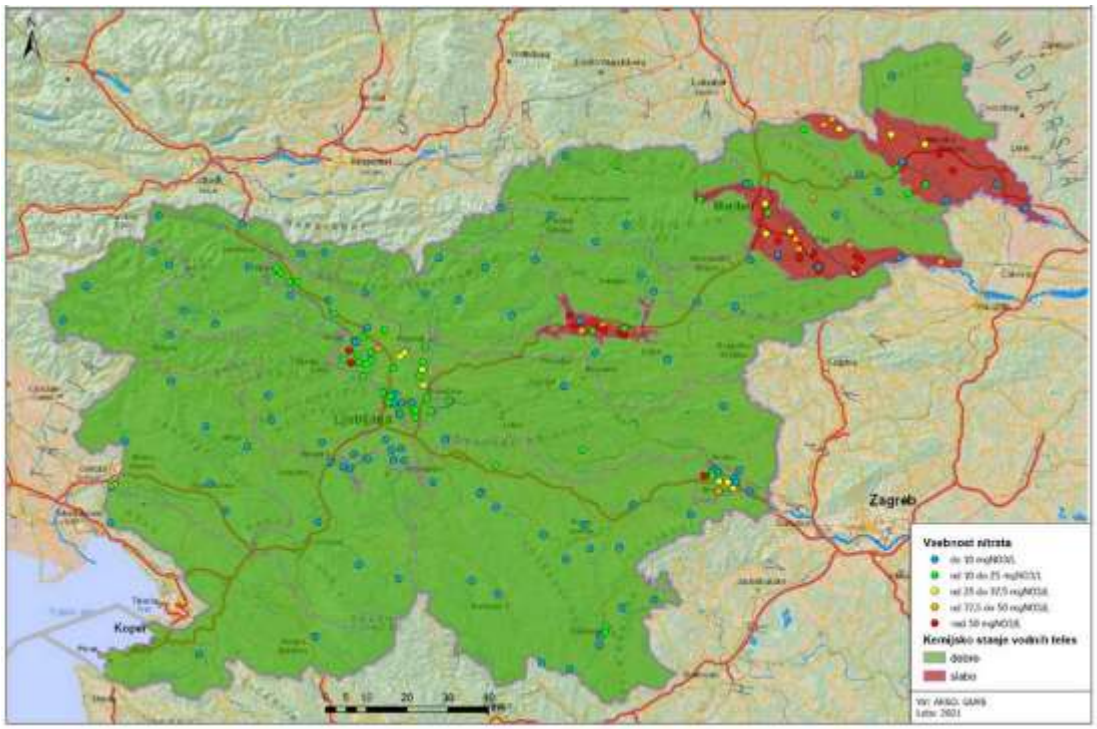
*Chemical status of groundwater bodies and drinking water quality*

Groundwater is most polluted in aquifers with intergranular porosity in the north-eastern part of Slovenia. In the third water management plan (NUV) for the period 2022-2027, poor chemical status is determined for water bodies composed of aquifers with intergranular porosity, namely the Savinjska, Drava and Mura basins. The level of confidence in the assessment of the chemical status for these water bodies is high. The cause of the poor chemical status of these water bodies is nitrate and, in the case of the Drava Basin, also atrazine. A statistically significant trend of decreasing nitrate content was found in all three water bodies. The content of atrazine in the Drava Basin also decreases statistically significantly (ARSO, 2021).

Groundwater in karst and fractured aquifers is less burdened with nitrates due to geographical conditions, low population density and less agricultural land. In the period 1998–2020, the

average annual levels of nitrates in water bodies in the Sava valley, Ljubljansko barje, Savinja, Drava and Mura basins show a statistically significant downward trend. In other water bodies, nitrate levels are not statistically significant (ARSO, 2021).

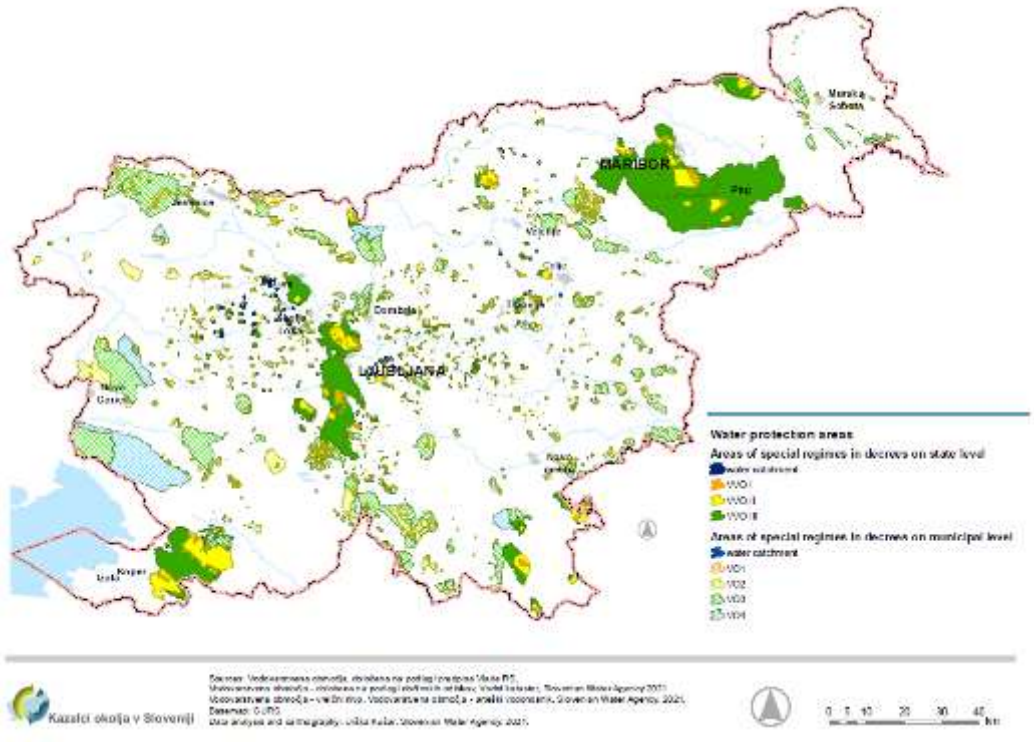
Figure 48: Chemical status and average annual values of nitrate in groundwater samples at the sampling points of the Slovenian national monitoring in 2020




Source: ARSO, 2021

Water protection areas cover 3,532 km$^2$ or 17,4% of Slovenia's land surface in 2021. This is a slight increase, compared to 2017, but the goal of protecting the areas of all water sources for public water supply with a regulation on national level, has not been reached yet(ARSO, 2021).

Figure 49: Water protection areas in Slovenia, 2021



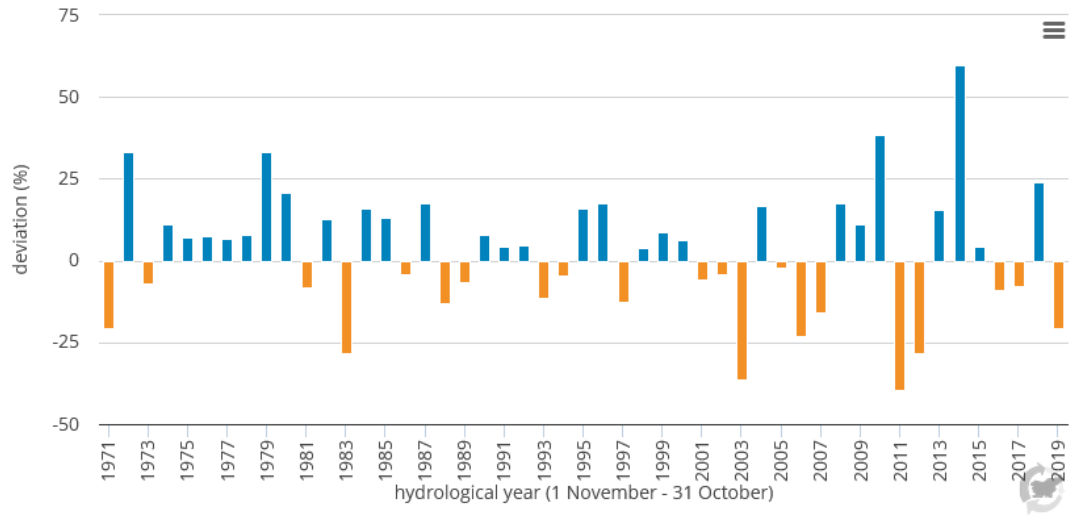

Source: ARSO, 2021

In 2019, drinking water monitoring was carried out in supply zones (water supply systems) that supply 50 or more persons (93% of the population). Large and medium supply zones that supply more than 1,000 (85%) of the population, generally have adequate drinking water quality. The smallest supply zones that supply 50-500 people are the least regulated, in comparison to larger due to the faecal contamination, as some with surface and karst water resources. The results of chemical analysis exceeded limit value of the pesticide desethyl-atrazine (1,130 people exposed), and indicator parameters: aluminium, manganese and iron. In addition, audit monitoring for chemical parameters were not carried out for 96,518 residents on supply zones with 50-500 residents. In the period 2004-2019, the quality of drinking water has improved, mainly due to the nitrates and pesticides (ARSO, 2021).

*Quantitative status of groundwater bodies*

The total renewable amount of groundwater in shallow aquifers in Slovenia in the hydrological year 2019 was below the average of the comparative hydrological water balance period 1981-2010 (ARSO, 2021). However, annual averages fluctuate and no characteristic trend can be defined.

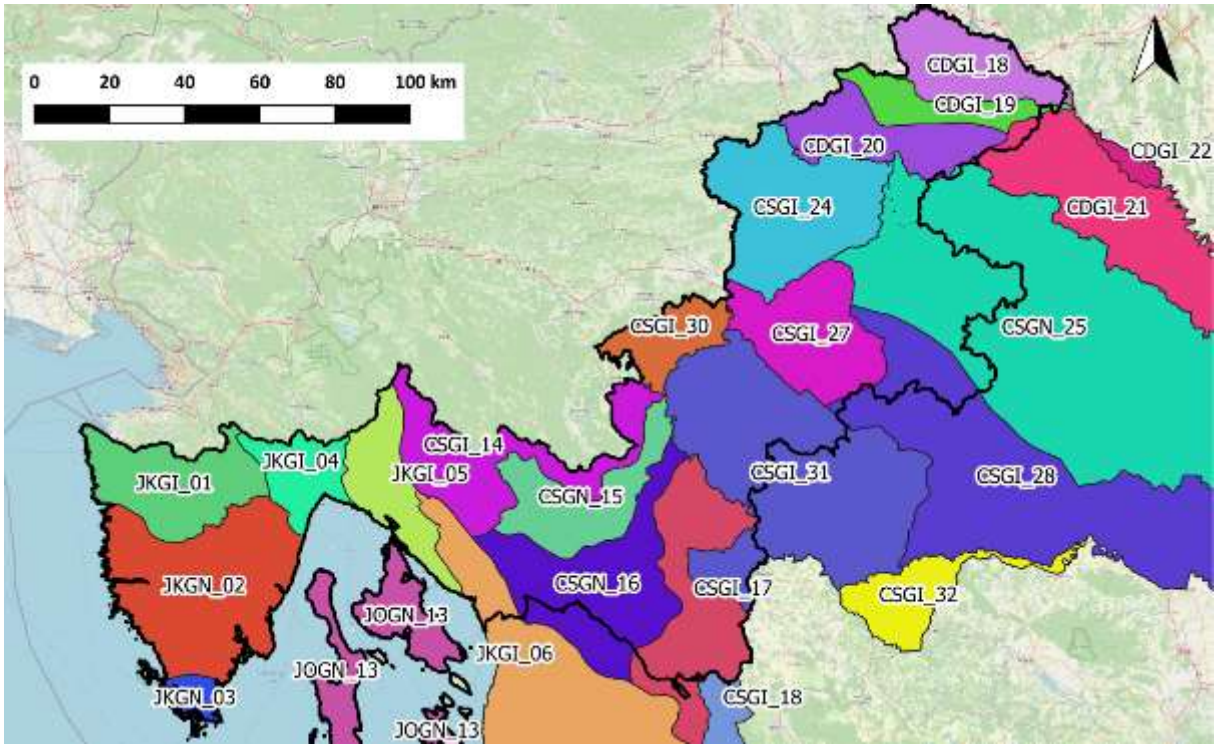
Figure 50: Deviation of quantitative groundwater recharge in shallow aquifers of Slovenia by individual hydrological years from the average of the hydrological water balance period 1981-2010




Source: ARSO, 2021

## Current status in Croatia

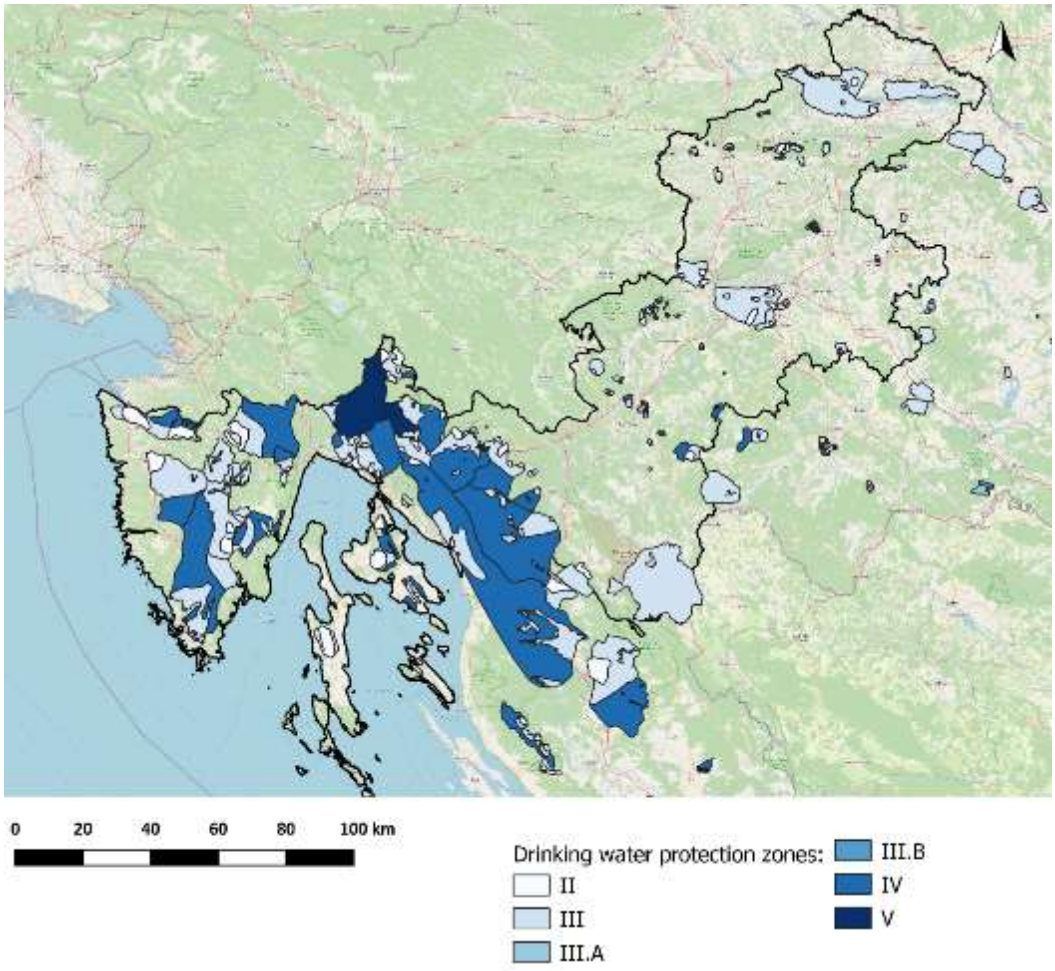
Figure 51: Map of groundwater bodies in Croatia.



*Chemical status of groundwater bodies and drinking water quality*

Only two groundwater bodies in provinces adjacent to Slovenia shows poor chemical status: CDGI_19 Varaždinsko područje and JKGN_03 - South Istria. The two water bodies have recorded overstepping the limits of nitrates on many monitoring locations. The high nitrate concentrations are usually connected to intense agricultural industry. Corresponding to groundwater body quality is drinking water quality for which the groundwater bodies also show high nitrate concentrations and there for is considered to be in poor state.

Figure 52: Drinking water protection areas in Croatia, 2021




*Quantitative status of groundwater bodies*

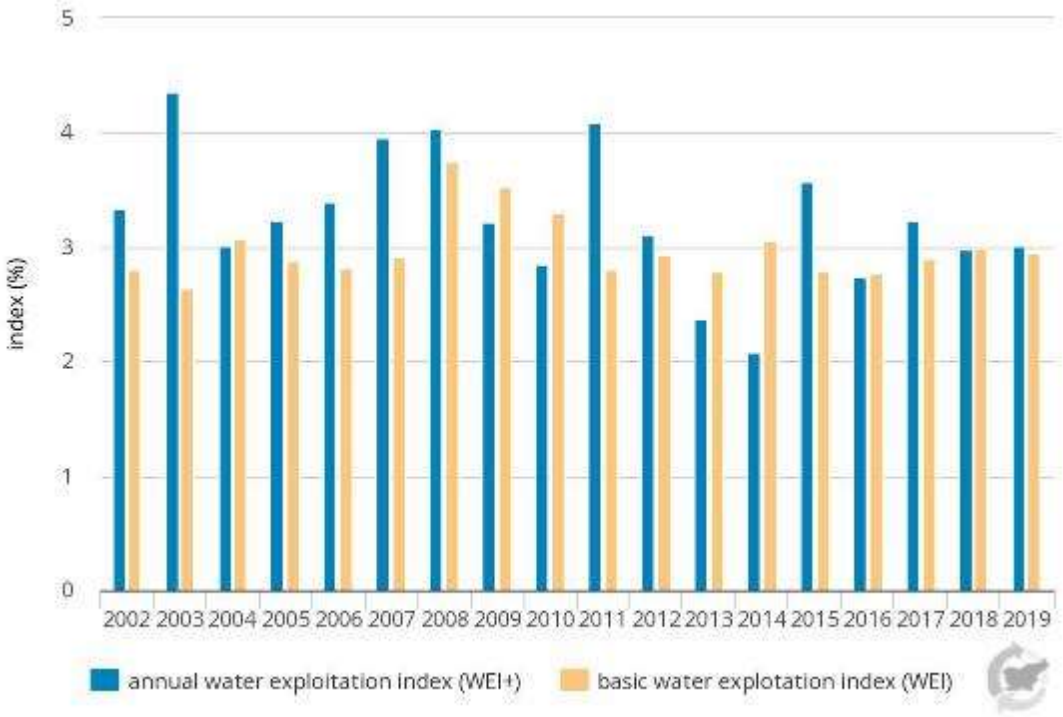
All adjacent groundwater bodies in Croatia are in good quantitative state. Water bodies cover areas from 144 to 5,188 km$^2$ and have renewable yearly storage from 32*10$^6$ to 2,87*10$^8$ m$^3$/year.

### 6.6.3. Sustainable water use

Current status in Slovenia

Water consumption in Slovenia represents a relatively small proportion of the annual gross water outflow from the country. In 2019, the annual Water Exploitation Index was around 3%, and same 3% compared to the periodic average of water availability. The Long-term Annual Average Water Exploitation Index shows a slight decrease, but the trend is not statistically significant (ARSO, 2021).

Figure 53: Water Exploitation Index, Slovenia, 2002-2019

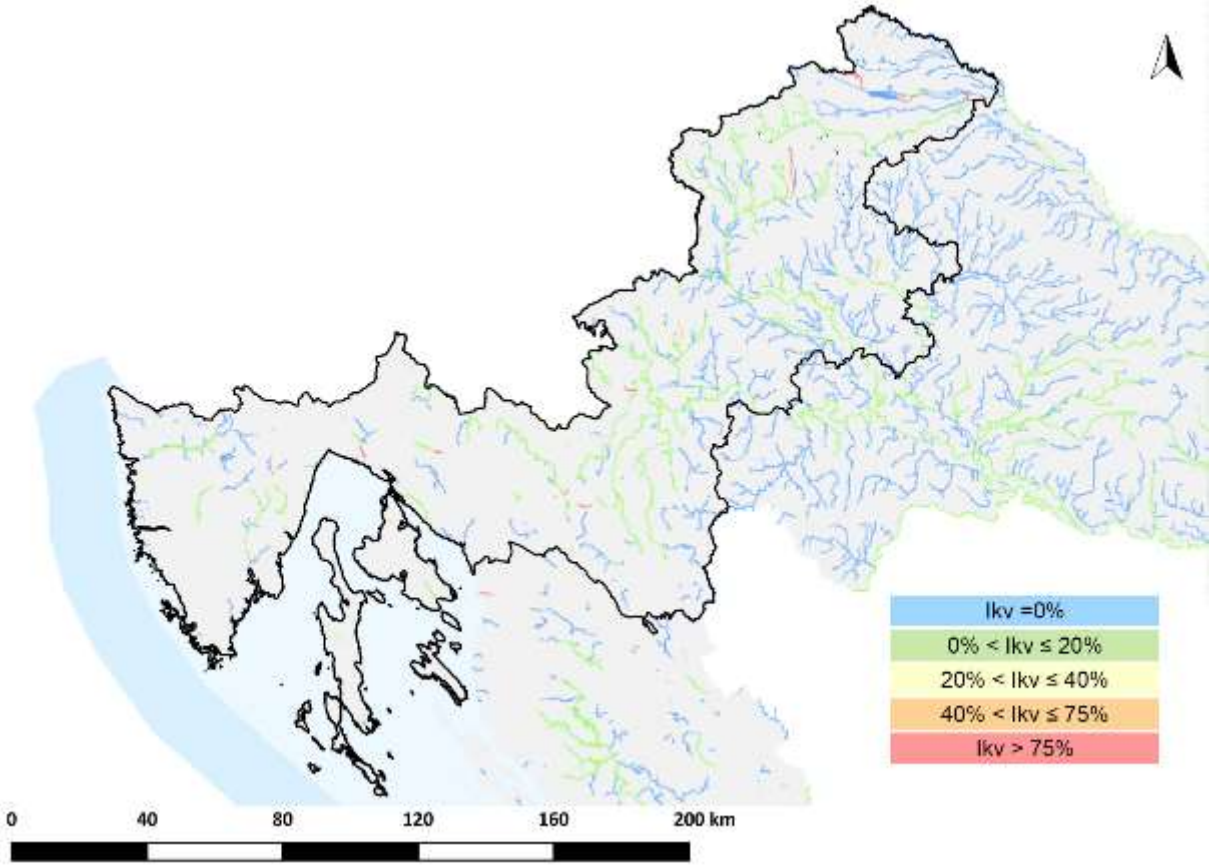



Source: ARSO, 2021 Assessment of the development according to the zero alternative

Current status in Croatia

Most of the surface water bodies are in good state considering the exploitation index (IKV *hr. indeks korištenja voda*).

Figure 54: Water Exploitation Index (IKV), Croatia




Considering the fact that there is no planed increase in ground water body exploitation and the continental ground water bodies (intergranular porosity) are in good quantitative state we can conclude that there is no risk in water exploitation in continental part of Croatia.

Possible problems occur in Adriatic part of Croatia (karst) where ground water wells are directly linked to ecosystems and because of which water exploitation can cause negative impact on ground karst ecosystems. Average annual water exploitation is generally much lower than average annual water body yield so we can conclude that the ecosystems are not in danger.

Another problem arises during the summer season when water body yields decrease but number of consumers (tourist) grows and almost all the water well yield is consumed. That can potentially damage the ground karst ecosystem but so far there are no direct implications of such matters so we can conclude that the ground water body is not in risk but with small reliability.

### 6.6.4. Effective water and risk management

Current status in Slovenia

*Flood damage in Slovenia over the last 25 years*

Various parts of Slovenia have been flooded frequently over the last 25 years. In addition to the loss of life as a result of flooding, the direct damage (excluding VAT) is estimated:

- after the 1990 floods amounted to approximately EUR 580 million,

- after the 1998 floods amounted to approx. 180 million EUR,

- after the 2007 floods: approx. 200 million EUR,

- after the floods of 2009: approx. EUR 25 million,

- after the 2010 floods, approx. EUR 190 million,

- after the floods of 2012, approximately EUR 310 million, and

- after the 2014 floods, approx. EUR 255 million.

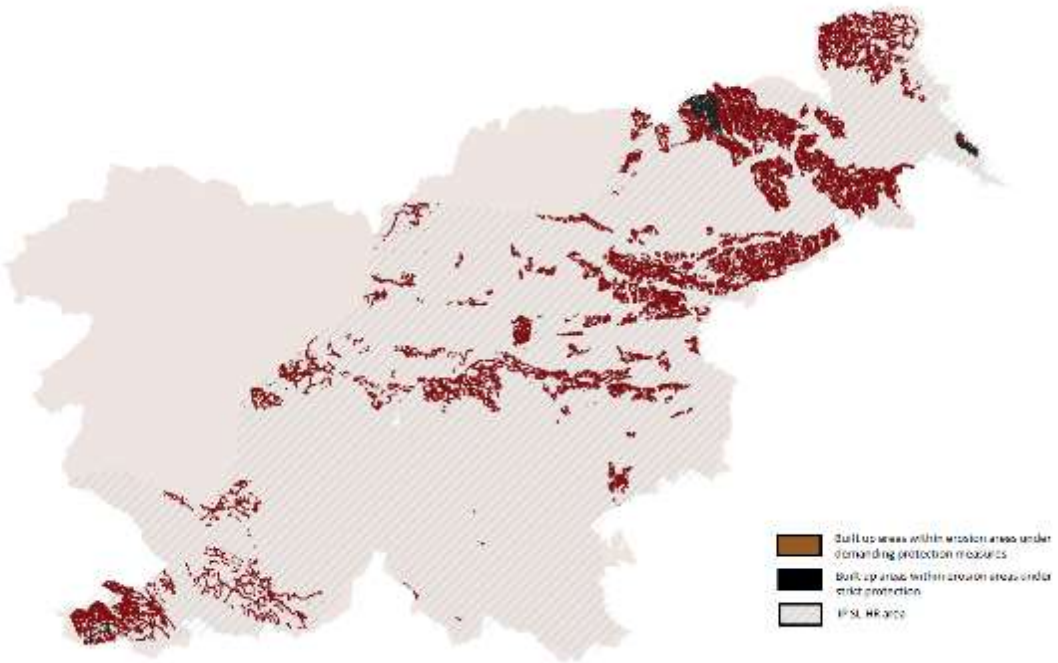
Over the last 25 years, major flood events in Slovenia have caused damage of approximately EUR 1.800 million (approximately EUR 2.100 million).

In the last 10 years, Slovenia has therefore faced approx. EUR 120 million in direct damage as a result of floods, but if we estimate additional indirect damage (loss of income of economic operators, collapse of businesses, disrupted infrastructure and communication links, long-term consequences, etc.), we can roughly estimate that Slovenia faces approximately EUR 150 million in annual damages as a result of as a result of flooding (Flood risk reduction plan of Slovenia, 2017).

*Built-up areas in areas with higher risk of erosion*

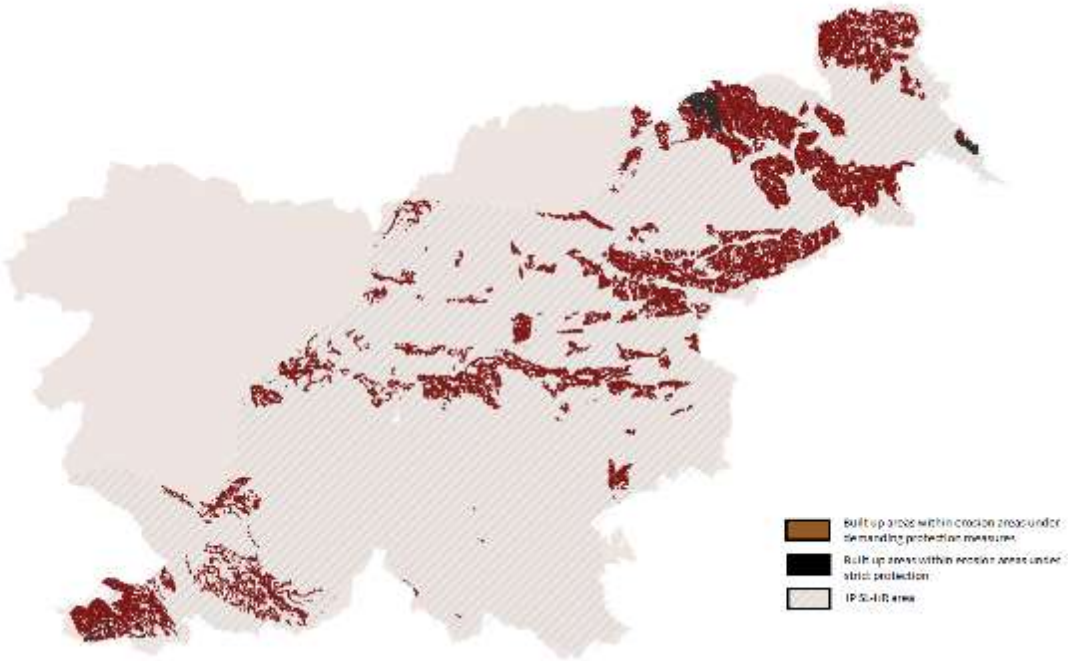
An erosion zone is defined as land that is permanently or intermittently affected by surface, deep or lateral water erosion. The designation of erosion zones is used to assess the hazard situation in a given area, to plan risk reduction measures (construction and non-construction measures), to plan land use (preparation of national and municipal spatial plans), to plan protection and rescue measures, to raise public awareness and to implement international obligations. In 2002, 700 ha of built-up area located within the IP area overlaps areas with strict protection status regarding erosion when 16.156 ha of built-up area overlaps areas with demanding protection measures (Evode.gov.si 2020, RABA2002, MKGP). In 2021, 696 ha of built-up area located within the IP area overlaps areas with strict protection status regarding erosion when 15.492 ha of built-up area overlaps areas with demanding protection measures (Evode.gov.si 2020, RABA2021, MKGP). As a result, the situation has improved slightly over the last 20 years, as fewer built-up areas are exposed to erosion risks.

Figure 55: Built-up areas within areas with higher risk of erosion in 2002



Sources: http://www.evode.gov.si (2020), MKPG 2002

Figure 56: Built-up areas within areas with higher risk of erosion in 2021

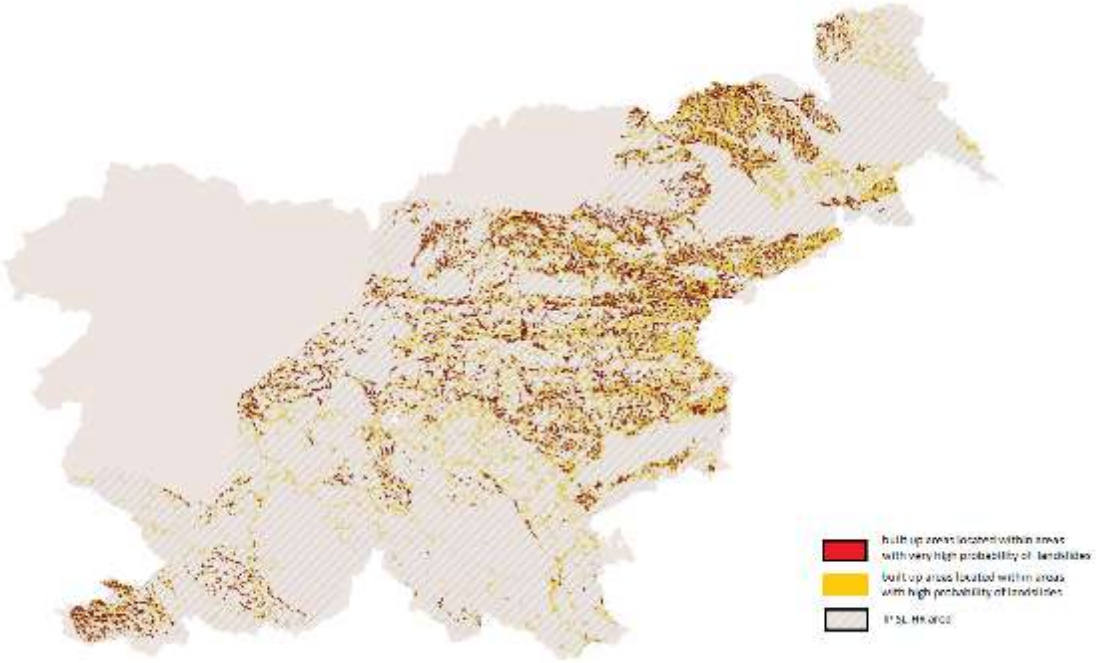


Sources: http://www.evode.gov.si (2020), MKPG 2021

*Built-up areas in areas with higher risk of landslides*

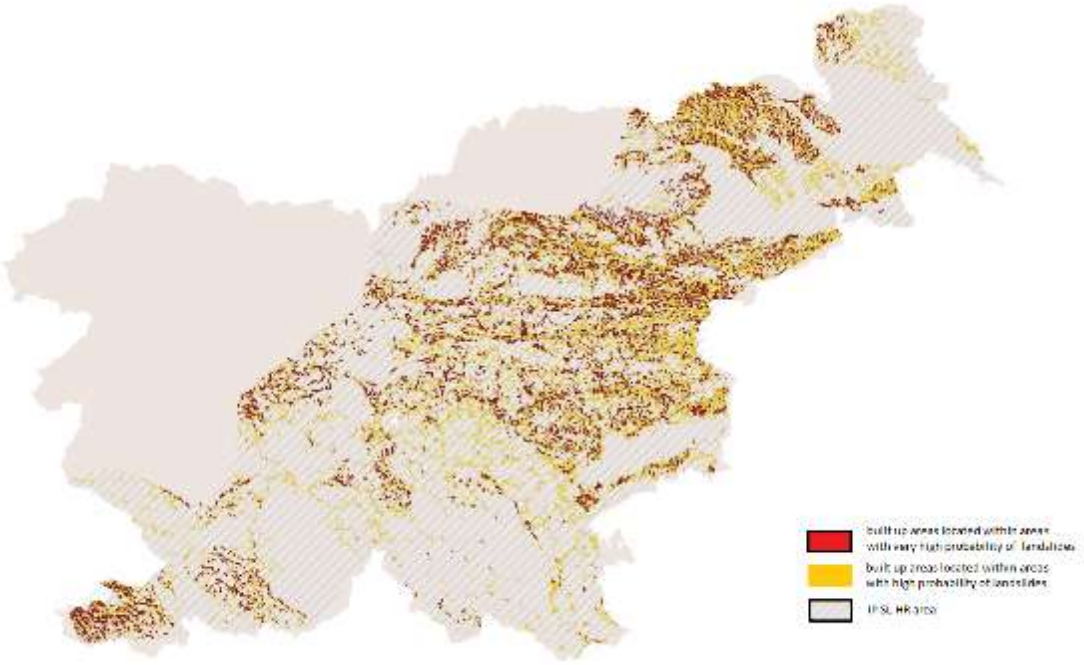
Landslide areas are identified by the Ministry of environment and spatial planning in order to assess the hazard situation in a given area, plan risk reduction measures (construction and non-construction measures), plan land use (preparation of national and municipal spatial plans), plan protection and rescue measures, raise public awareness and implement international obligations. In 2002, 2.264 ha of built-up areas in the IP boundaries overlap with areas of very high probability of landslide risk, while 5,321 ha are located in areas of high probability of risk (Evode.gov.si, 2020, MKGP 2002). In 2021, 2,047 ha of built-up areas in the IP boundaries overlap with areas of very high probability of landslide risk, while 4,907 ha are located in areas of high probability of risk (Evode.gov.si, 2020, MKGP 2021). As a result, the situation has improved slightly over the last 20 years, as fewer built-up areas are exposed to high and very high probability landslide risks.

Figure 57: Built-up areas in areas with higher risk of landslides in 2002



Sources: http://www.evode.gov.si (2020), MKGP 2002

Figure 58: Built-up areas in areas with higher risk of landslides in 2021



Sources: http://www.evode.gov.si (2020), MKGP 2021

Current status in Croatia

No data on erosion and landslides is available for Croatia, since there is no protective regime set and no systematic monitoring provided.

Table 31: Assessment of the development according to the zero alternative

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| Water (ground and surface water) | Ecological and chemical status of surface water bodies | SI (ARSO, 2021): 98.7% of surface water bodies are in good chemical condition. Good or better ecological status is estimated for 49% of surface water bodies. Compared to the previous assessment period, good ecological status is achieved by 10% fewer water bodies.<br>Nutrient overloading is still the basic problem concerning lakes and reservoirs. In the period 2016–2019 no improvement is observed since only 4 out of 11 lake water bodies were determined to be in good or very good trophic status. | ←↘ |
| | | HR: All surface water bodies have shown improvement in ecological and chemical status from 2013. | ↗ |

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| | Chemical and quantitative status of groundwater bodies | SI (ARSO, 2021): Poor chemical status is determined for water bodies composed of aquifers with intergranular porosity, namely the Savinjska, Drava and Mura basin due to nitrate and atrazine. A statistically significant trend of decreasing the content of both. | ←↗ |
| | | HR: All groundwater bodies have shown improvement in chemical and quantitative status from 2013. | ←↗ |
| | Sustainable water use and preservation of good quantity status of water bodies | SI (ARSO, 2021): WEI+ index was around 3% in 2019. The Long-term Annual Average Water Exploitation Index shows a slight decrease, but the trend is not statistically significant. | ←↗ |
| | | HR: There is no change in water use. During summer coastal water bodies are endangered because of lower yields and higher usage (tourism) | ←→ |
| | Effective water and risk management | SI Over the last 25 years, major flood events in Slovenia have caused damage of approximately EUR 1 800 million (approximately EUR 2 100 million).<br>In 20 years, the situation has improved slightly as there are less built-up areas exposed to erosion risk and fewer built-up areas are exposed to high and very high probability landslide risks. | ←↗ |
| | | HR: From 2000 to 2008 floods caused damage to agricultural crops of approximately EUR 42 000 000. No trend is established. | / |
| ↗ Improvement ←↗ Partial improvement ←→ No change ←↘ Partial deterioration ↘ Deterioration | | | |

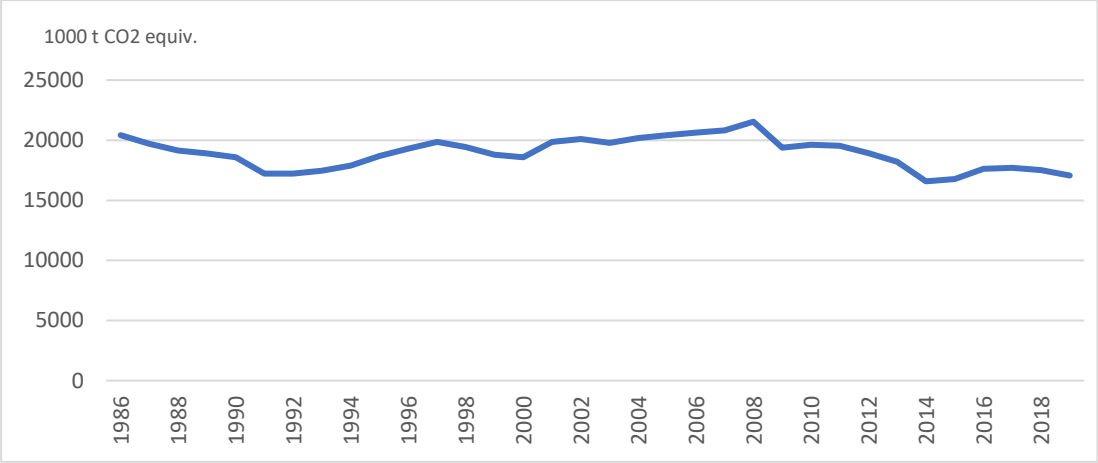
## 6.7. Climate and energy

### 6.7.1. GHG-Emissions

Current status in Slovenia

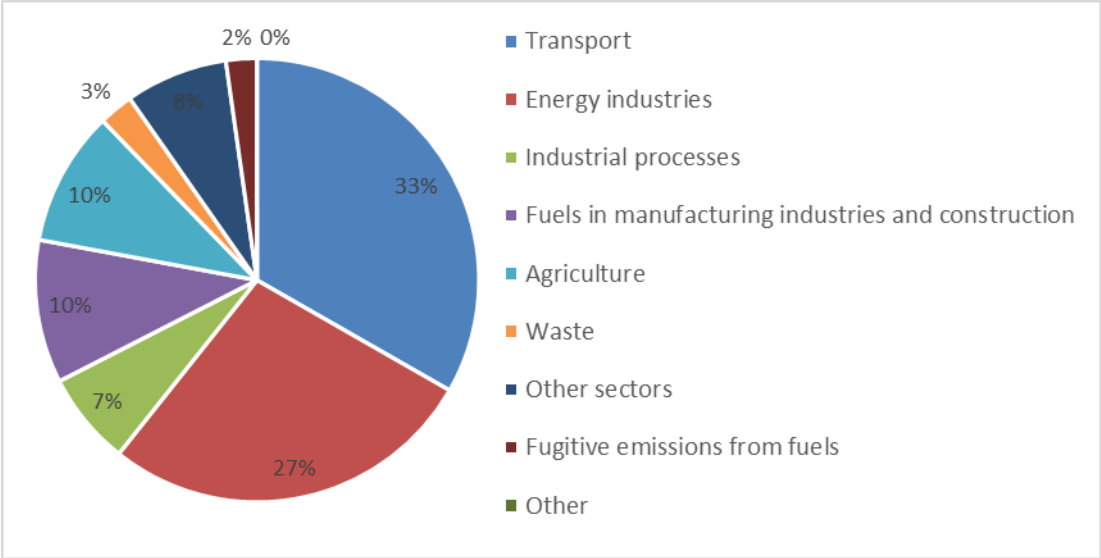
In Slovenia total GHG emissions in 2019 amounted 17 million tons of $CO_2$-eq, 8.2 tonnes per capita, which is 91.8% of emissions in base year 1990 and 83.5% of emissions in base year 2005. Majority of the emissions originate in transport and energy industries (ARSO, 2021).

Figure 59: GHG emissions in Slovenia, 1986-2019




Source: ARSO, 2021

Figure 60: GHG emissions in Slovenia by sectors in 2018

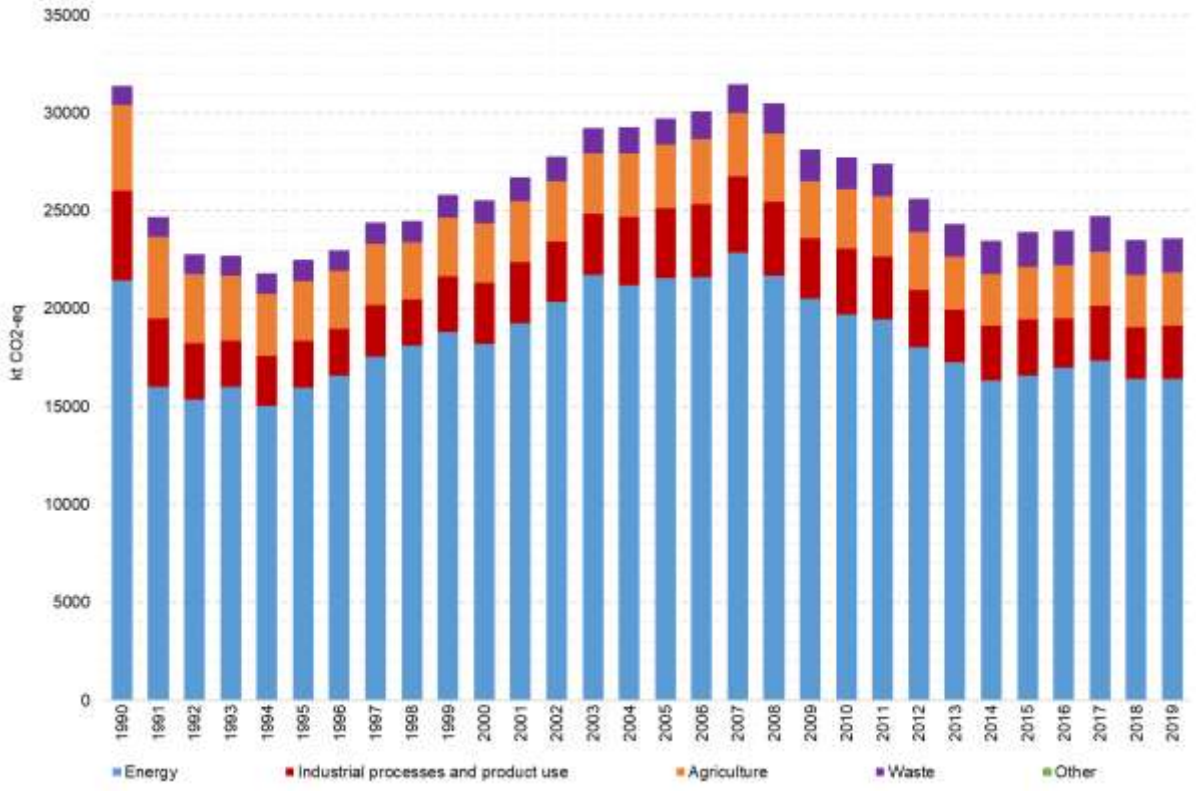



Source: ARSO, 2021

Current status in Croatia

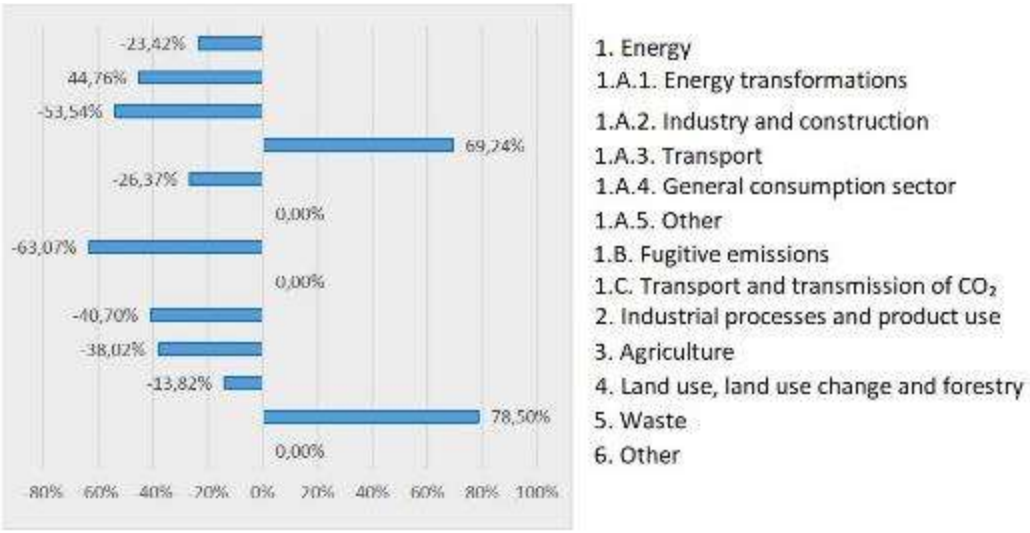
In Croatia total GHG emissions in 2019 were 18 million tons of $CO_2$-eq which is about 4.43 tons per capita. Total emissions have reduced to approximately 72% in 2019 compared to the 1990 total emissions. Majority of emissions originate from the energy sector (energy production and transport) while industry and agriculture have smaller contributions. The ratio of these top three contributions remained mostly the same from 1990 to 2019, while the emissions share from the waste sector have steadily increased.

Figure 61: Greenhouse gas emissions by sectors from 1990 to 2019.




Source: Croatian greenhouse gas inventory for the period 1990 – 2019 (National Inventory Report 2021); Zagreb, April 2021.

Figure 62: Emissions changes in 2019 compared to 1990 by sector




Source: Croatian greenhouse gas inventory for the period 1990 – 2019 (National Inventory Report 2021) - summary

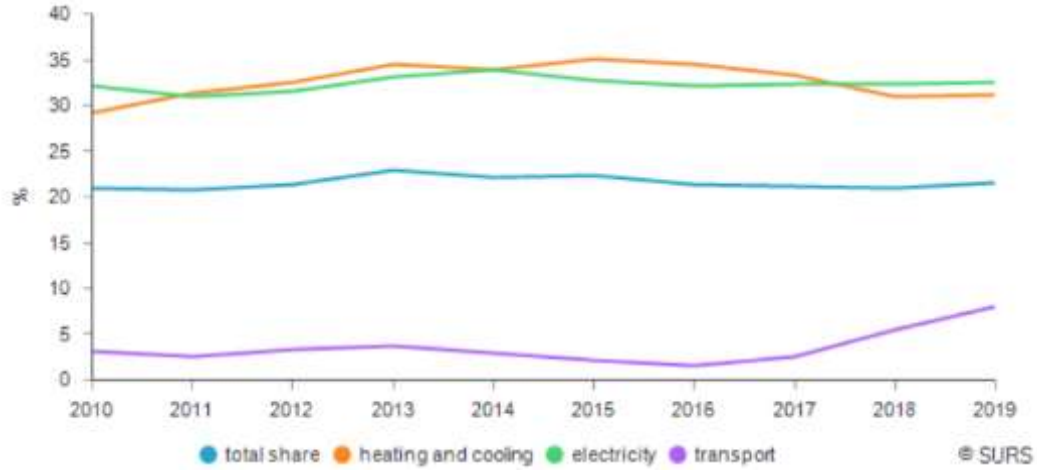
### 6.7.2. Renewable energy in gross final energy consumption

Current status in Slovenia

In 2019 the share of energy from renewable sources in gross final energy consumption was 21.7%, which is 0.8 of a percentage point higher than in the previous year. The share should be increased by a further 5.3 percentage points to achieve the national target of 27% by 2030. (ARSO, 2021; SURS, 2021)

In the heating and cooling sector, the share increased by 0.1 of a percentage point to 31.2%, in the electricity sector it increased by 0.3 of a percentage point to 32.6% and in the transport sector, it increased by 2.5 percentage points to 8%. The most important renewable energy source on a national level is hydropower (65%), followed by liquid biofuels (16%) and geothermal energy (9%) (ARSO, 2021; SURS, 2021).

Figure 63: The share of energy from renewable sources in gross final energy consumption in Slovenia

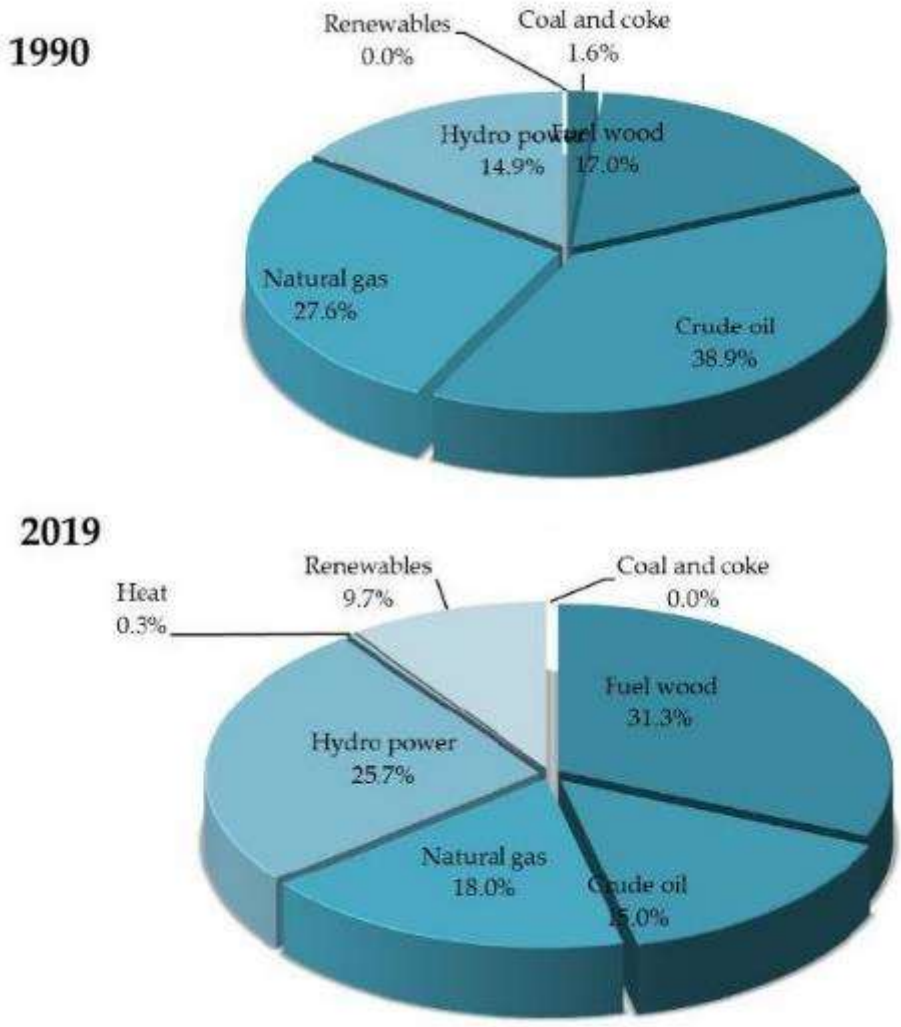



Source: SURS, 2021

Current status in Croatia

Renewable energy sources in 1990 accounted for 14.9% of total energy production in 1990 with all of it produced by hydro power. In 2019 this share has increased significantly reaching 25.7% while the rest of renewables account for 9.7 %. Fuel wood share has also increased significantly, from 17.0% to 31.3% while the rest of the fossil fuels had decreased significantly. Most important is the use of coal and coke that is reduced to 0% and a significant decrease of crude oil.

Figure 64: Share of individual energy forms in the total production for the 1990 and 2019.



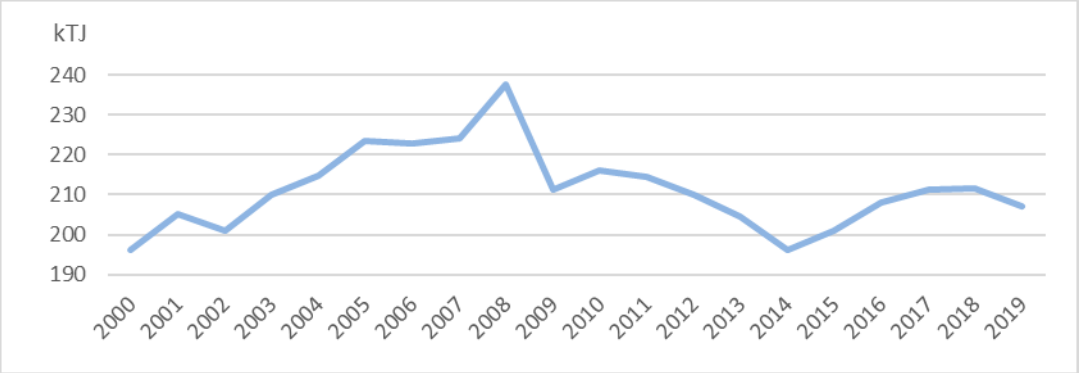

Source: Croatian greenhouse gas inventory for the period 1990 – 2019 (National Inventory Report 2021); Zagreb, April 2021.

### 6.7.3. Final energy consumption

Current status in Slovenia

In 2019 final energy consumption amounted to 4,944,391 toe (207,012 TJ), and after four years of growth, it decreased by 2% compared to the previous year. There was a decrease in all sectors except industry. In the period 2000–2019, final energy consumption increased by 7.6%. Most energy, 40%, is consumed in transport, followed by industry (27%), households (21%) and other uses. The final energy consumption in 2019 was 4.5% lower than the target for 2020 (5,118 ktoe). Final energy consumption per capita in 2019 was 2.33 toe, which is 7% higher than the EU-28 average (ARSO, 2021; SURS, 2021).

Figure 65:Total final energy consumption (1,000 TJ)

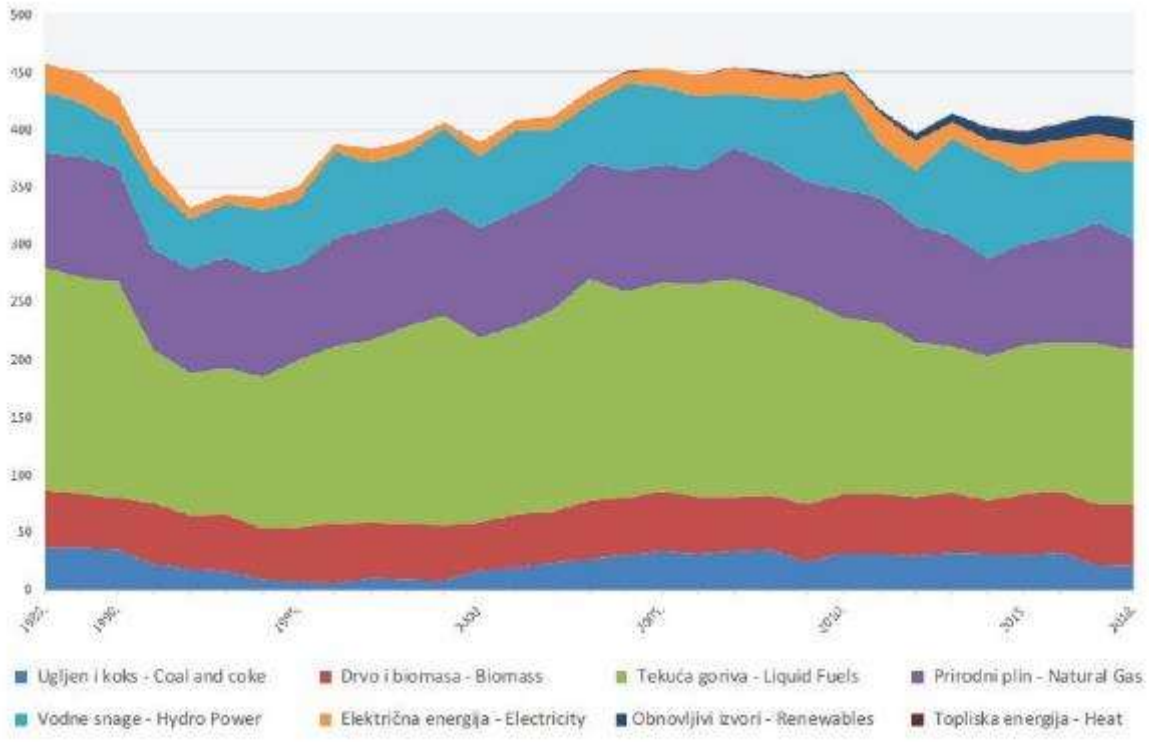



Source: SURS, 2021

Current status in Croatia

Energy consumption in Croatia in 2018 was at 408.85 PJ and it has not changed significantly from 2010 to 2018. In the period from 2005 to 2010 the energy consumption was around 450 PJ per year. Liquid fuels account for the greatest share in the total energy produced, followed by natural gas, biomass, and hydro power. Comparing to other EU countries, Croatia is significantly below the EU average with 31.6% less consumption in 2018.

Figure 66: Total energy consumption in Croatia from 1988 to 2018.



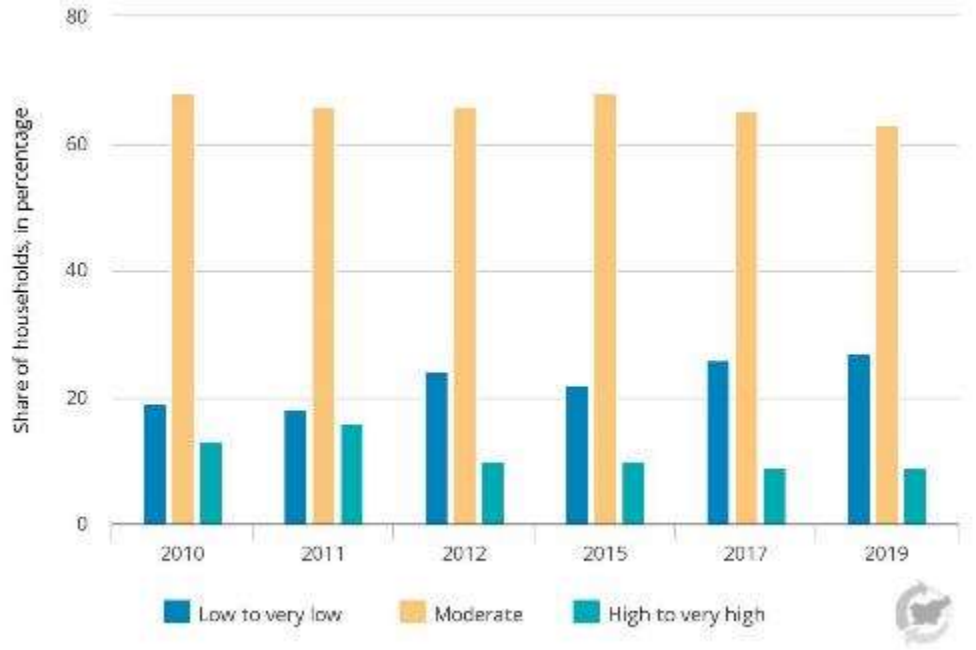

Source: Annual energy report energy in Croatia in 2018.

### 6.7.4. Public attitude towards energy consumption

Current status in Slovenia

Data for the period 2010-2019 show a positive trend in the estimated final energy consumption in households. The share of households that estimated their energy consumption as low or very low increased by 8 percentage points from 2010 to 2019. From 2011 to 2019, the share of households considering more efficient energy consumption also increased. The indicator also shows a significant potential for reductions in final energy consumption in households – less than three quarters of households estimated energy consumption in their home in 2019 as moderate, or high to very high. The biggest share of this households is in Pomurska, Zasavska and Goriška region (ARSO-OP05, 2019).

Figure 67: Estimation of the energy consumption in a household, Slovenia, 2010-2019




Source: ARSO, 2021, Survey on Energy Efficiency in Slovenia, Informa Echo d.o.o (26th Feb, 2019)

Current status in Croatia

Total household energy consumption is steadily decreasing from 2010 to 2018. Most energy consumption in households comes from biomass, electricity and natural gas. Shares of each energy source has changed slightly in the period. District heat, natural gas and liquid fuels shares have decreased slightly and shares of biomass and electricity has increased.

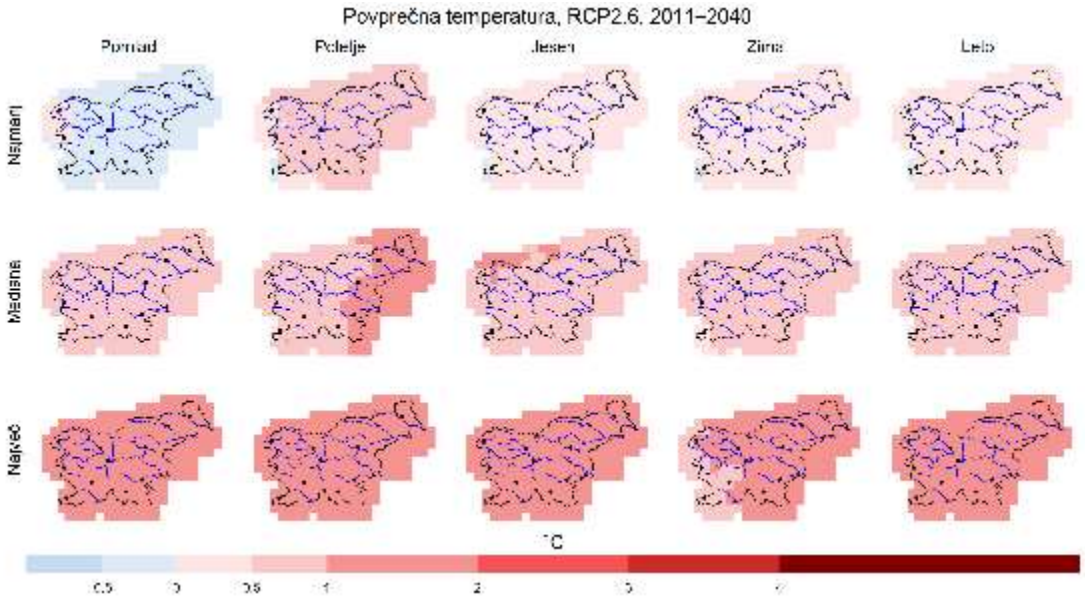
Figure 68: Household energy consumption (thousand tons of oil equivalent); EIHP


### 6.7.5. Vulnerability of climate change

Current status in Slovenia

The Slovenian Environmental Agency published in 2018 a report called "Climate Change Assessments in Slovenia by the end of the 21st century". Based on historical trends in terms of climate variability in Slovenia, the expert assessment was able to develop climate change predictions for the future (ARSO Vreme, 2018).

Figure 69: Assessing climate change by the end of the 21st century- Atlas of climate projections: average temperature prediction by season.




Source: http://meteo.arso.gov.si

Climate change causes significant pressure on existing environmental, economic and social challenges already present in Slovenia. With regard to environment, climate change poses additional threat to biodiversity, generates more frequent natural disasters due to storms, floods and other weather extremes, as well as it impacts sectors that are most exposed, such as agriculture, forestry and tourism. Among other, warm winters are more common which has an already observed impact on biodiversity such as disturbed hibernation patterns, expansion of thermophilic species, etc. In economic terms, warm winters also mean less days in ski season. The regions that are already suffering due to difficult economic situation were assessed as being more vulnerable to climate change impacts in the Expert basis for risk and vulnerability assessment. There are large disparities between regions in indicators such as growing number of people older than 65 contributing to their vulnerability (CLIMATE-ADAPT, 2021).

In the backdrop of climate change, the National Disaster Risk Assessment is ranking the risks according to their impact on human being. The list of disasters is enlarged in order to have more comprehensive assessment: earthquake, flood, hazards of biological, chemical, environmental or unknown origin to human health, highly contagious animal diseases, nuclear or radiological accident, railway accident, aircraft accident, drought, large wildfire, terrorism, ice storm, accidents involving dangerous substances outbreak of highly contagious animal diseases and risk assessment for the hazards of biological, chemical, Environmental or unknown origin to human health, diseases and pests affecting Forest trees.

The highest risk in the Republic of Slovenia due to the combination of the impact levels and the likelihood of their occurrence, are floods, the only one at a very high-risk level. In terms of

their likelihood and frequency of occurrence, large wildfires and cyber risks represent a greater risk than floods. However, their impacts are much lower than those of the disasters with the highest impacts at least with regard to representative risk scenarios. Risk assessments for disasters are constantly being amended (CLIMATE-ADAPT, 2021).

The workshops with experts carried out in preparation of the Expert basis for risk and vulnerability assessment in Slovenia (2014) demonstrated large differences in experts' assessment of climate change impacts on different sectors. For example, in forestry sector before 2014 there was no agreement on whether forest fires and sanitary felling are to be considered important. In the following years, after 2014, sanitary felling has proved to have a major impact on the state of forests due to the various natural disturbances. In water sector, changing patterns in water flows and floods were assessed as important, while for health impacts of heat waves and new diseases were deemed important alongside the changing quality of drinking water. In energy, disturbances in energy transmission and higher demand for cooling in summer months are identified. Infrastructure was deemed vulnerable due to already existing pressures on public finances resulting from the diversity of risk that require investment for prevention. (CLIMATE-ADAPT, 2021).

In 2014, an assessment of the vulnerability of Slovenian regions to climate change was performed. Based on the analysis of more detailed indicators, the potential impact of climate change and, on the other hand, the existing adaptability of individual regions were taken into account. Among the most exposed Slovenian regions are Pomurska, Podravska, Posavska and Osrednjeslovenska (see picture below left). The first two mainly due to drought and estimated damage due to natural disasters, while the other two due to flood risk, risk due to landslides or drought. In terms of adaptability, the Pomurje region is again the most problematic, as are the Podravska and Koroška regions. The Zasavje region is also classified as less adaptable, although it is among the better regions in terms of current expenditures for environmental protection, but it has poor socio-economic indicators (see the picture below right) (Kajfež Bogataj L., et. al., 2014).

Figure 70: The assessment of exposure (left) and adaptability (right) of the regions to climate change (Kajfež Bogataj L., et. al., 2014)

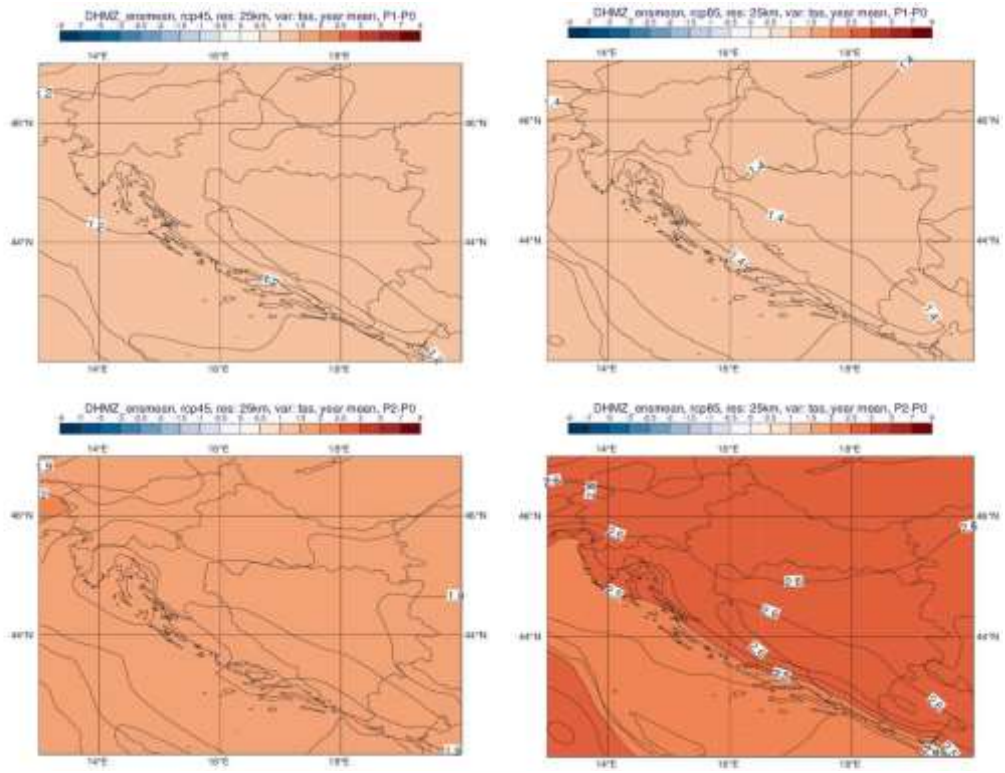
Based on joint estimates of exposure to impacts and adaptability, we can summarize the assessment of the vulnerability of Slovenian regions to climate change (see figure below). As the figure shows, the most exposed are the Pomurje and Podravska regions, and at least three southern regions of Slovenia: SE Slovenia, the Notranjsko-kraška and the coastal-karst region (Kajfež Bogataj L., et. al., 2014).

Figure 71: Overall assessment of the vulnerability of the regions (Kajfež Bogataj L., et. al., 2014)


Current status in Croatia

Climate change effects on Croatia have been assessed in "Strategy for adaptation to climate change in the Republic of Croatia for the period until 2040 with a view to 2070". As a part of the document a numerical model was made to predict possible future outcomes based on IPCC scenarios RCP4.5 and RCP8.5. Several meteorological parameters were modelled including temperature, precipitation, wind, sea levels, and others. Projections were made for two periods: first one for period 2011 – 2040 and the second one for 2041 – 2070. Results of projections were compared to the referent period 1971 – 2000. Average air temperature is projected to increase by as much as 2.6 °C compared to the referent period. This increase in temperature could cause increased likelihood of droughts, forest fires, increased energy costs required for temperature regulation and many other side-effects, especially in the summer months.

Figure 72: Average air temperature change for two periods compared to the referent period and for two scenarios. Top: period 2011 – 2040, bottom: period 2041 – 2070, left: RCP4.5 scenario, right: RCP8.5 scenario



Precipitation predictions are not so consistent. Depending on the observed area, time period or scenario, the predictions range from increase in total yearly precipitation of 5 % to a decrease of 20 %. Generally, increase or slight decrease is projected for continental regions while a decrease is expected on coastal regions, especially on the islands far from land and southern regions. Precipitation changes have significant negative impact on agriculture and native species, it can have negative effects on biodiversity and endanger species that depend on existing precipitation patterns. Additionally, with rapid climate changes, more extreme weather events are expected. During these events a significant amount of precipitation can be released causing floods, torrents and cause landslides and erosion.

Projections do not show a significant change in average wind speeds, and neither does the maximum wind speed. During extreme weather events it is possible that high winds cause damage to buildings, infrastructure, plants and animals, but these events cannot be precisely predicted.

Croatia has a rugged coastline with lots of islands. This makes Croatia especially vulnerable to sea level rise. The most vulnerable regions are settlements right on the edge of water and beaches.

Croatia's vulnerability on climate change has been assessed in a Report on assessed impacts and vulnerabilities to climate change by sector, published by the Ministry of Environmental

Protection and Energy in 2017. The analysis was made for ten sectors that have been assessed as most vulnerable to climate change. Results of vulnerability for each sector is given in a table below (MZOE, 2017).

Table 32: Vulnerability assessment by sector for Croatia *(MZOE, 2017)*

| Sector | Vulnerability assessment |
|---|---|
| Hydrology, water, and marine resources management | Deterioration of hydrological conditions is expected due to changes in weather patterns and extreme weather conditions. Reduction of minimum yearly flows and an increase in maximum yearly flows is expected to have a negative impact on water temperatures and consequently negative impacts on aquatic ecosystems and biodiversity. |
| Agriculture | Agriculture sector is expected to suffer the biggest damages due to climate change. Total harvests by 2050 are expected to reduce by 3 to 8 % due to changes in temperature and precipitation patterns. A possibly positive side-effect of climate change is the ability to grow different crops that are more suited for the new climate conditions. |
| Forestry | Forestry sector was assessed as one of the most vulnerable sectors due to shifts in phenological phases of forest trees, less productive forest ecosystems, greater severity and frequency of forest fires, and possible introductions of invasive species and pests. |
| Fishing | Changes in sea temperature and pH levels will have a negative impact on fishing sector. Fish are expected to migrate into deeper waters and towards the north of the Adriatic Sea. Another potential vulnerability is the introduction of invasive species and pests that can significantly harm the existing ecosystem. |
| Natural ecosystems and biodiversity | Natural ecosystems are in a delicate balance and with the predicted climate changes this balance is expected to be disrupted causing significant harm. Some of the more significant impacts recognised are immersion of coastal habitats, salinization of terrestrial and freshwater habitats by the sea, drying of wet terrestrial habitats, increase in arid areas… |

| | |
|---|---|
| Energy | Global warming has resulted in a milder winters and hotter summers in Croatia. The consequence of this temperature change is a reduction of energy need for heating in the winter and an increase of cooling energy needed in the summer. Energy sector is vulnerable to the predicted extreme weather that can cause significant harm to the energy infrastructure and cause energy shortages which can then lead to several significant consequences. |
| Tourism | Tourism sector is the least vulnerable to climate change. Tourism in Croatia is centred around the coastal areas and the current climate predictions will increase the duration of tourist season. |
| Health care | Quantification of the climate change effect on health care is difficult to make due to complex relations between the environment and the human health. A significant vulnerability of the health care sector was recognised in the extreme weather events. |
| Spatial planning and coastal zone management | Recognised climate change effects important for spatial planning sector are sea level rise, extreme temperature events and floods. Because of these effects, additional analysis and consideration needs to be made in every spatial planning procedure. |
| Risk management | The risk management sector is directly linked to the extreme weather events and therefore is vulnerable to the changes in weather patterns and especially changes in extreme weather events that are predicted to be more intense and prolonged in the future. |

Table 33: Assessment of the development according to the zero alternative

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| Climate and energy | Greenhouse gas emissions | SI (ARSO, 2021; SURS, 2021): total GHG emissions in 2019 amounted 17 million t of $CO_2$-eq, 8.2 t/capita (Target value for 2030: 20% decrease compared to 2005 for Slovenia)<br>Amount of GHG emissions in 2019 present 91.8% of emissions in base year 1990 and 83.5% of emissions in base year 2005. | ↗ |
| | | HR (National Inventory Report 2021): Total GHG emissions were 18 million tons of $CO_2$-eq, about 4.43 tons per capita.<br>Comparing 2019 emissions to 1990 there is a clear decreasing trend with 28% reduction. | ↗ |
| | Share of renewable energy in gross final energy consumption | SI (ARSO, 2021; SURS, 2021): 22% (2019) (Target value for 2030: 27%)<br>In 2019, the share was 2.2 percentage points higher than in 2005. | ←↗ |
| | | HR (National Inventory Report 2021): In 1990 the share of hydropower was at 14.9% while other renewables were not used. In 2019 the share for hydropower increased to 25.7% and the renewables sector has emerged with 9.7%. | ↗ |
| | Final energy consumption | SI (ARSO, 2021; SURS, 2021): 207,012 TJ/year or 4,944 ktoe/year, 2.3 toe/year/capita (2019) (Target value for 2030: final energy consumption must not exceed 4,717 ktoe)<br>In 20<br>19 final energy consumption decreased by 2% compared to the previous year, after four years of growth. | ←↗ |

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| | | HR (Annual energy report energy in Croatia in 2018): Energy consumption was highest from 2005 to 2010. In the years since 2010 there was a significant decrease and after that no significant changes. | ←→ |
| Improvement of energy efficiency | Public attitude towards energy consumption | SI: Data for the period 2010-2019 show a positive trend in the estimated final energy consumption in households (ARSO, 2021). | ←↗ |
| | | HR (EIHP): Slight decrease of energy consumption between 2010 and 2018. | ←↗ |
| Climate resilience | Vulnerability of climate change | SL: Climate change poses significant pressure on existing environmental, economic and social challenges. The highest risk in the Republic of Slovenia due to the combination of the impact levels and the likelihood of their occurrence, are floods. The regions that are already suffering due to difficult economic situation were assessed as being more vulnerable to climate change (2014) | ↘ |
| | | HR: Main sectors that are impacted by climate change are: water resources, agriculture, forestry, fishing, biodiversity, energetics, tourism, and health. Climate change effects are already noticeable and cause significant damage every year. With the current GHG emission reductions and climate change adaptation the projections show that even more significant impacts can occur. | ↘ |
| ↗ Improvement ←↗ Partial improvement ←→ No change ←↘ Partial deterioration ↘ Deterioration | | | |

## 6.8. Material assets, raw material resources

Material assets in the broader sense include all resources, such as raw materials (ores, wood, oil and gas, sands and gravel etc.) but also materials for further processing and use. Against the background of the finite nature of (non-renewable) resources, a resource-saving economic

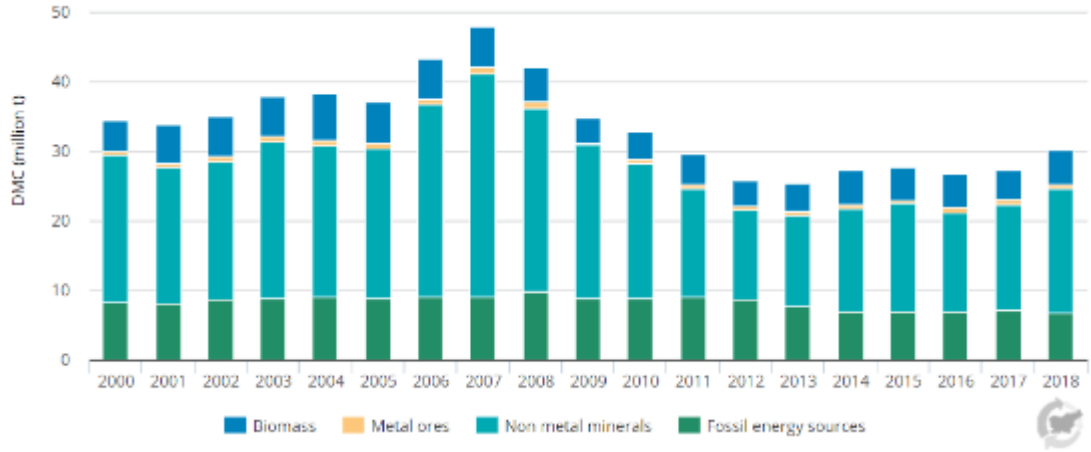
system and lifestyle and a reduction in the consumption of resources is to be strived for in accordance with the principle of the circular economy. Waste production and treatment is one of the most important aspects of this, as e.g. landfilled waste is a major GHG source.

### 6.8.1. Material consumption and resource productivity

Current status in Slovenia

Domestic material consumption (DMC) amounted to more than 28million tonnes (13.5 tonnes per capita) in 2019 and was 4% higher than in 2014 and 19% lower than in 2009. Majority of DMC is represented by non-metallic minerals (53%) and the rest by fossil energy materials/carriers (25%) and biomass (20%). The amount of biomass utilized increased by 53% compared to 2009, while the amount of non-metallic mineral resources decreased by 88%, fossil energy used decreased by 31% compared to 2009. In 2019, the import to Slovenia was almost 4 million tons higher than the export. (ARSO, 2021; SURS, 2021)

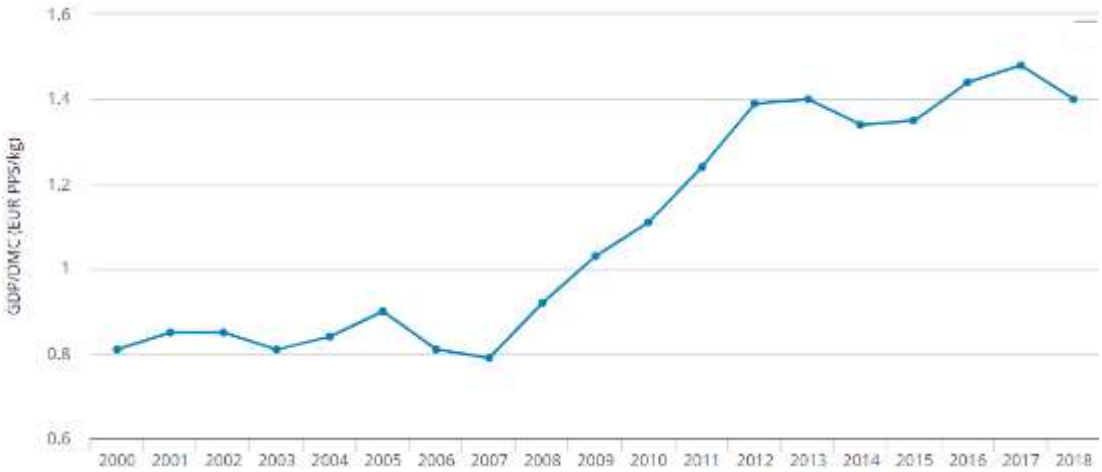
Figure 73: Domestic Material Consumption Structure in Slovenia, 2000–2018




Source: ARSO, 2021 [OD06]; SURS, 2021

Due to lower construction activity, resource productivity in Slovenia increased faster than the EU average in the period 2007–2012. In 2019 it amounted to 2.1 purchasing power standards (PPS) per kg, but the target of 3.5 PPS per kg by 2030, with the revival of construction activity, will be difficult to achieve. Therefore, much more attention needs to be paid to measures for the transition to a circular economy (ARSO, 2021; SURS, 2021).

Figure 74: Resource productivity (PPS/kg) in Slovenia, 2000–2018

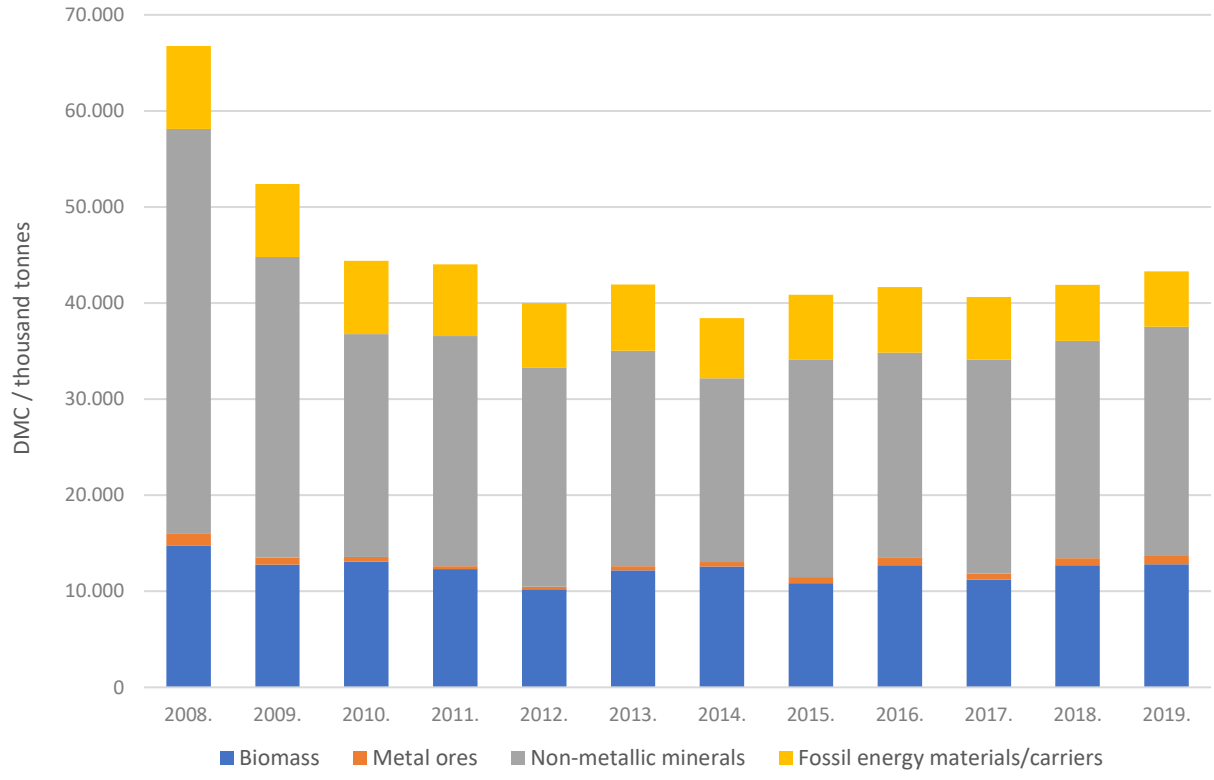



Source: ARSO, 2021 [OD18]; SURS, 2021

## Current status in Croatia

Domestic material consumption in 2019 was more than 44 million tonnes, which was 3.4% more than in 2018 although 34% less than in 2008. Majority of DMC is represented by non-metallic minerals (54%) and the rest by fossil energy materials/carriers (15%) and biomass (28%).

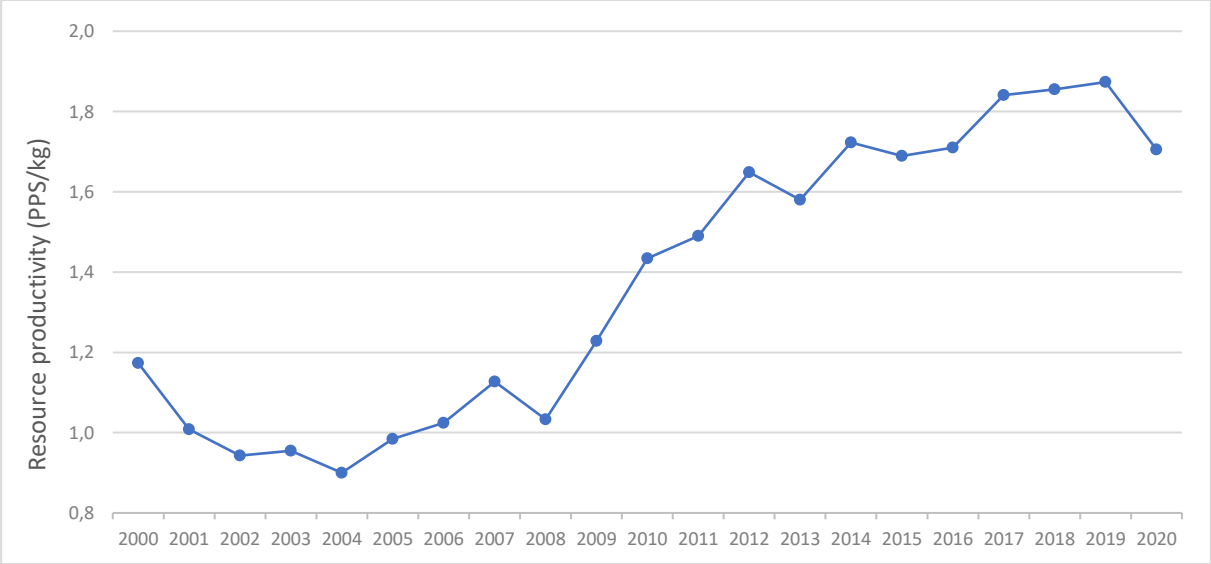
Figure 75: Domestic Material Consumption Structure in Croatia, 2008–2019




Source: Državni zavod za statistiku RH, www.dzs.hr, 2021

On resource productivity, i.e., how efficiently the economy uses material resources to produce wealth (GDP divided by domestic material consumption), after the economic crisis in 2008 the significant increase in resource productivity was caused mostly by the decrease of DMC in the same period. Croatia performs below the EU average, purchasing power standard (PPS) per kilogram 1,87 in 2019, against the EU average of 2,36 PPS/kg. Currently, there is no comprehensive circular economy framework or strategy in Croatia.

Figure 76: Resource productivity (PPS/kg) in Croatia, 2000–2020




Source: Eurostat, https://ec.europa.eu/eurostat/databrowser/bookmark/5c97e395-9b02-41bd-a7d9-e3e83c85f279?lang=en

### 6.8.2. Waste volume

Current status in Slovenia

In 2019 more than 8.4 million tons of waste was generated in Slovenia, which amounts to 4 tons per capita respectively around 11 kg per capita per day. The volume almost doubled since 2014 when a little bit more than 4.6million tons of waste (2,3 tons per capita) was generated. The amount of all generated waste increased the most in 2018 due to increased amounts of generated construction waste in all activities and in all statistical regions (ARSO, 2021; SURS, 2021).

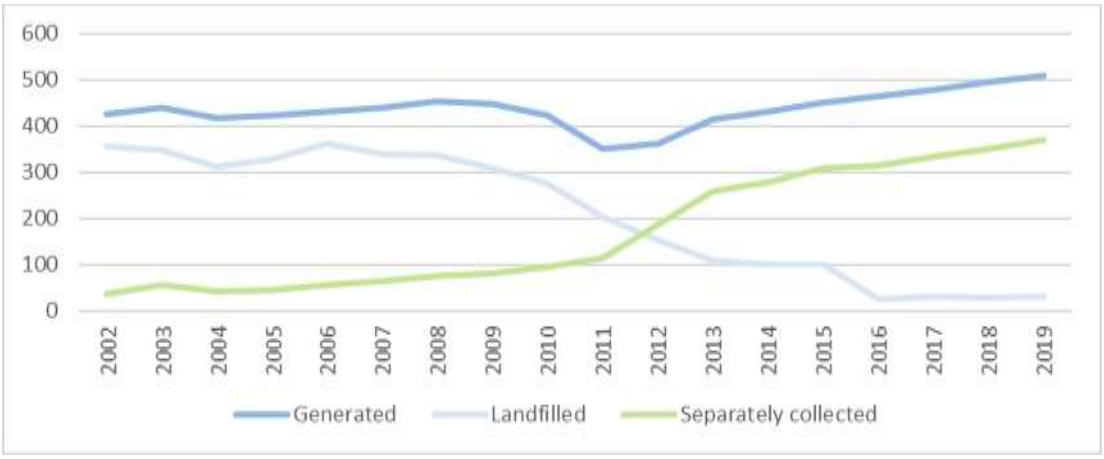
Less than half (41%) of generated waste was recycled in 2019 and only 2% (169,049 tons per year) were deposited. Both shares are decreasing compared to data from 2009 – recycling from 66% and deposition from 20%. On the other hand, other waste recovery (other final waste recovery operations such as backfilling and the use of waste as a cover) increased from 1% in 2009 to 40% in 2014 and 45% in 2019, and export of waste increased from 3% in 2009 to 14% in 2014 (13% in 2019) (ARSO, 2021; SURS, 2021).

In Slovenia in 2019 a little more than a million tons (13% of generated waste) of municipal waste was generated, which amounts to 509 kilograms per capita per year respectively around 1.4 kg

per capita per day. The volume increased 1.2 times compared to 2014 when a little bit less than 0.9 million tons of waste (433 kg per capita per year) was generated (ARSO, 2021; SURS, 2021).

In the past most municipal waste ended up in landfills (82% of municipal waste in 2009). With the change of the legislation, policy instruments and the establishment of municipal waste management centres, the trend of great decline was established due to greater share of separately collected waste. Therefore, in 2014 only 29% municipal waste has ended up in landfills and in 2019 only 15%. On the other hand, 73% of municipal waste was collected separately in 2019, the share increased from 18% in 2009 and 65% in 2014. Also, municipal waste recycling rate increased in the same period, from 22% in 2010 to 36% in 2014 and 59% in 2019 (ARSO, 2021; SURS, 2021).

Figure 77: Municipal waste in Slovenia, 2002–2019



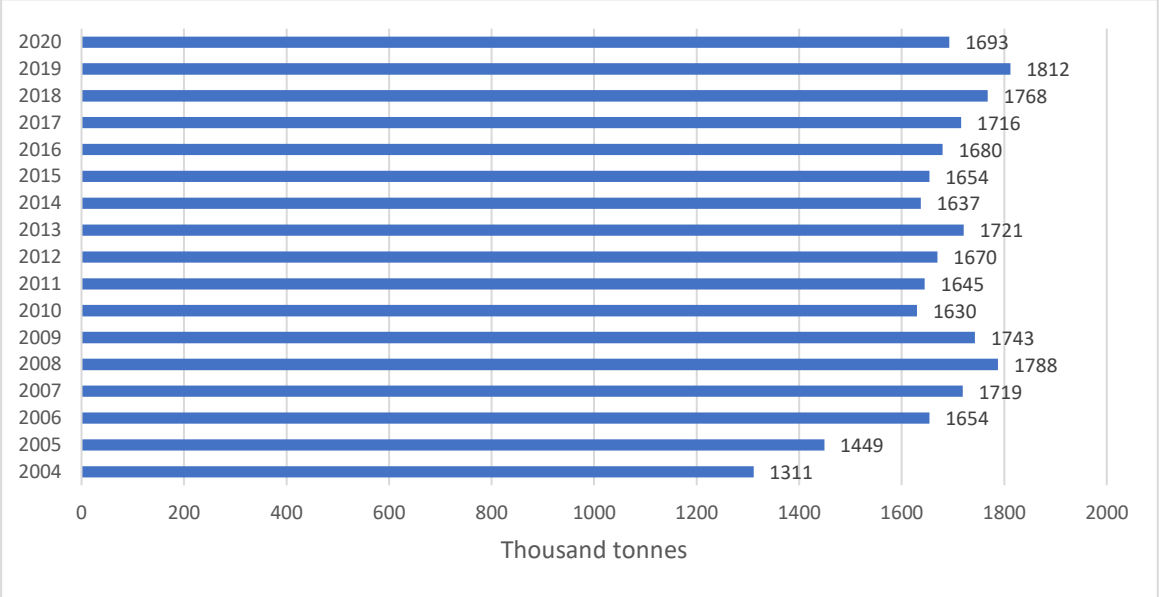

Source: SURS, 2021

Current status in Croatia

Total waste generated by economic activity in Croatia during 2018 was more than 5.5 million tons which was an increase of 48 % since 2014 due to the increase of the construction waste generated.

In 2020, more than 1.6 million tons of municipal waste was generated in Croatia which is a decrease of 6.5% from 2019. The annual amount of municipal waste per capita was 418 kg.

Figure 78: Municipal waste in Croatia, 2004–2020

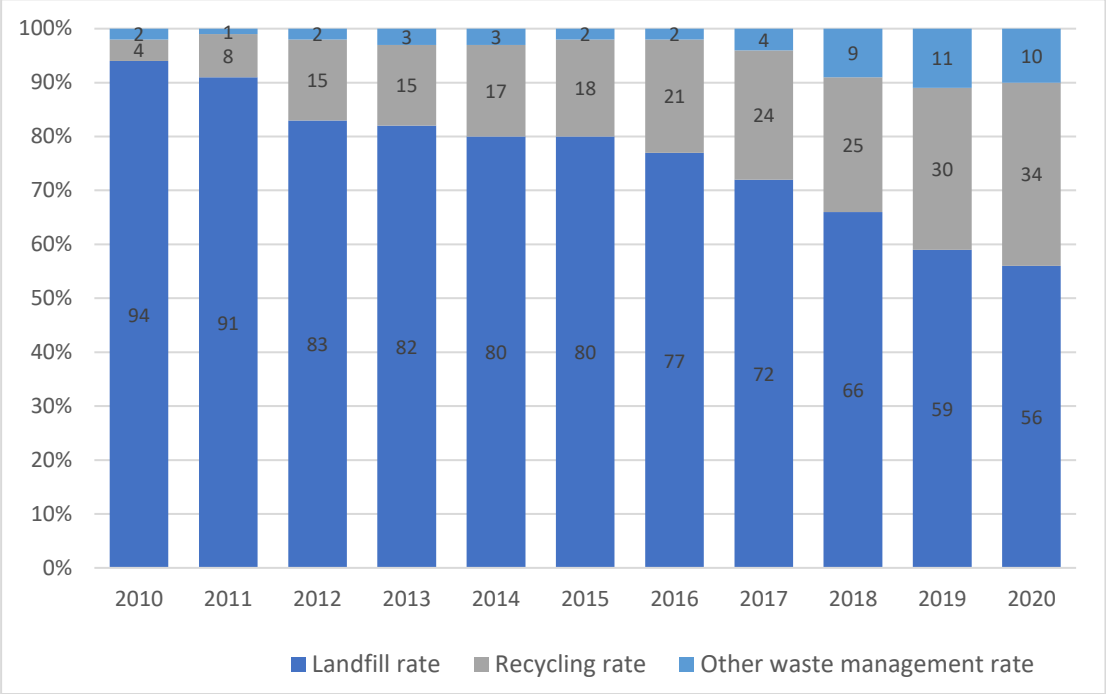



Source: Ministry of Economy and Sustainable Development, Department of Environmental and Nature Protection, Eurostat, https://ec.europa.eu/eurostat/databrowser/bookmark/5c97e395-9b02-41bd-a7d9-e3e83c85f279?lang=en

The decline in the total amount of municipal waste is explained by the COVID-19 pandemic, which reduced the work of the service sector in 2020 contributed by consistent implementation of activities to raise citizens' awareness of their role in creating and preventing waste, as well as the implemented reforms such as investments made in infrastructure for waste separation, such as containers for separate collection on households' doorsteps, the construction of recycling yards, installation of containers for separate collection in public areas, procurement of vehicles for separate collection, equipping sorting facilities.

Out of the total municipal waste in 2020, 56% was sent to landfills, 34% to recovery (which includes recycling), and 9% to the mechanical-biological waste treatment plants. In 2020, Croatia also recorded an increase in the waste separation of municipal waste, of four percentage points to 34 percent.

Figure 79: Recylcing rate in Croatia, 2010–2020

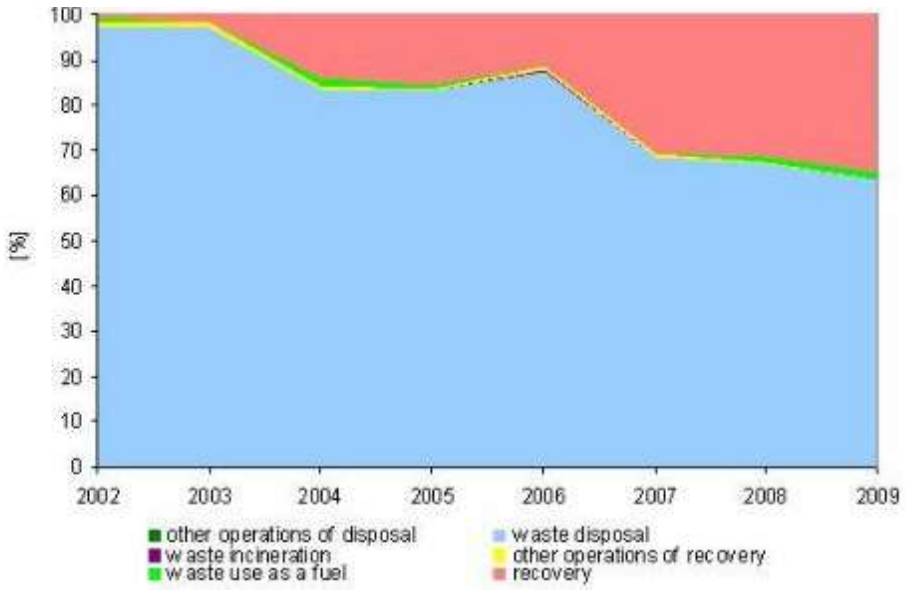



Source: Ministry of Economy and Sustainable Development, Department of Environmental an Nature Protection, Eurostat, https://ec.europa.eu/eurostat/databrowser/bookmark/5c97e395-9b02-41bd-a7d9-e3e83c85f279?lang=en

### 6.8.3. Recycling waste

Recycling of municipal waste is increasing in Slovenia. In 2012, almost 40 per cent of municipal waste was recycled. Disposal of waste has declined over the years, 42 per cent of municipal waste was landfilled in 2012. Incineration remains minimal, at slightly above one per cent (ARSO, 2021).

Figure 80: The rate of recycling and other treatment types of municipal waste




Source: EUROSTAT - ARSO ODO1, 2021

Current status in Croatia

Recycling of municipal waste is increasing in Croatia. In 2012, 15 per cent of municipal waste was recycled and increases to 34 % in 2020. In the same period disposal of waste has declined over the years; from 83% in 2012 to 56% in 2020 (MZOIE, EUROSTAT 2021).

Table 34: Assessment of the development according to the zero alternative

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| Reduction and efficient recycling of waste | Resource consumption per capita (in t/ year) | SI (ARSO, 2021; SURS, 2021): Domestic Material Consumption (DMC) amounted 28,260 million t/year or 13.5 t/capita/year in 2019.<br>DMC was 4% higher in 2019 than in 2014 and 19% lower than in 2009.<br>SI (ARSO, 2021; SURS, 2021): Purchasing Power Standard amounted to EUR 2.1 PPS/kg/year in 2019. (Target value for 2030: EUR 3.5 PPS/kg/year)<br>Due to lower construction activity, resource productivity in Slovenia increased faster than the EU average in the period 2007–2012. | ↗ |
| | | HR (DZS RH, 2021): DMC amounted 44,017 thousands of tonnes or 10.3 t/capita/year in 2019.<br>DMC was 3.4% higher in 2018 and 34% lower than in 2008.<br>HR (Eurostat, 2021): Between 2000 and 2016 resource productivity in Croatia increased by 2.5%. Expressed in GDP in PPS over DMC, the resource productivity amounts to 2.36 PPS/kg for the EU-28 and 1.87 PPS/kg for Croatia in 2019. | ←↗ |

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| Promotion of recycling and the circular economy | Generated and deposited waste per capita (in kg/year). | SI (ARSO, 2021; SURS, 2021): Generated waste volume amounted to 4.0 t/capita/year, 11.0 kg/capita/day in 2019.<br>The volume almost doubled since 2014, and increased the most in 2018 due to increased amounts of generated construction waste in all activities and in all statistical regions.<br>SI (ARSO, 2021; SURS, 2021): Deposited waste volume amounted to 81 kg/capita/year, 0.2 kg/capita/day in 2019.<br>Only 2% of generated waste is deposited. Share is decreasing from 20% in 2009. | ←↘ |
| | | HR (Eurostat, 2021): Generated waste by economic activity volume amounted to 3 t/capita/year, 7kg/capita/day in 2018 which was an increase of 65 % since 2014 due to the increase of the construction waste generated.<br>Deposited waste volume amounted to 0.387 t/capita/year, 0.1 kg/capita/day in 2018 which accounted a decrease of 6 % from amount deposited in 2014 ( 0.414 t/capita). | ←↘ |
| | The recycling rate of municipal waste (% of total municipal waste generated) | SI (ARSO, 2021; SURS, 2021): In 2012, almost40 per cent of municipal waste was recycled. Generated municipal waste volume amounted to 509 kg/capita/year, 1.4 kg/capita/day in 2019.<br>The volume increased 1.2 times since 2014 when a little bit less than 0.9 million tons of waste (433 kg per capita per year) was generated.<br>SI (ARSO, 2021; SURS, 2021): Deposited municipal waste volume amounted to 32 kg/capita/year, 0.1 kg/capita/day in 2019.<br>In the past most municipal waste ended up in landfills (82% of municipal waste in 2009), in 2014 only 29% municipal waste has ended up in landfills and in 2019 only 15%. | ←↗ |

| Environmental aspect | Indicators | Last available data and description of trend | ZA |
|---|---|---|---|
| | | HR (Eurostat, 2021): Generated municipal waste amounted to 418 kg/capita/year, 1.1 kg/capita/day in 2020. The volume decreased by 6.5 % from 2019.<br>Deposited municipal waste volume amounted to 233 kg/capita/year, 0.6 kg/capita/day in 2020.<br>56% of total municipal waste was sent to landfills in 2020 which was a decrease of 3% from 2019. Deposited municipal waste volume in Croatia has decreased over time from 2010 to 2020.<br>Recycling of municipal waste is increasing in Croatia. In 2012, 15 per cent of municipal waste was recycled and increases to 34 % in 2020. In the same period disposal of waste has declined over the years; from 83% in 2012 to 56% in 2020. | ←↗ |
| ↗ Improvement ←↗ Partial improvement ←→ No change ←↘ Partial deterioration ↘ Deterioration | | | |

# 7. POTENTIAL SIGNIFICANT IMPACTS ON THE ENVIRONMENT, MEASURES TO PREVENT OR REDUCE NEGATIVE IMPACTS, ALTERNATIVES

## 7.1. Assessment of potential environmental impacts

### 7.1.1. Priority 1 - A green and adaptive region

*Specific objective 1.1 – Promoting climate change adaptation, risk prevention and disaster resilience, from an ecosystem approach*

The aim of this specific objective is to enhance the preparedness of local communities and responsiveness of rescue response units by joint trainings and unified equipment, the establishment of joint protocols (concrete and comprehensive plans), and co-ordination mechanisms, so that units from both countries will be able to jointly respond to the same disaster and adapt to different climate change-related and other shared risks along the entire cross-border area, including the capacity building of different target groups to protect against shared risks. The activities must be aligned with responsible authorities for provision and co-ordination of protection, rescue, and relief in case of natural and other disasters from both countries.

Additional support will be provided to local communities in the cross-border territories by identification and increasing awareness on required responsiveness and solutions for effective climate adaptation needs. Activities will boost joint cross-border cooperation on multidisciplinary climate change adaptation measures for an integrated approach towards climate adaptation measures. Possible cooperation actions under *Type of actions 1 Strengthening of risk preparedness and response capacities in the cross-border area* can include exchange and harmonisation of data, risk mapping, joint protocols, establishment of information flows, development of cross-border response units (including rescue plans, protocols, and mechanisms of civil protection), development and enhancement of early warning and response systems, awareness-raising and education of inhabitants on climate risk adaptation on how to act during different climate change-related and other disasters, training, capacity building and equipping of disaster response units and organisations and supporting cross-border capacity building, establishment of cross border tools for the target groups in the cross-border area (particularly youth and children) for protection against shared threats.

Under *Type of actions, 2: Increasing the resilience to climate change effects in the programme area* possible actions are: preparing and coordinating cross-sectoral integrated cross-border climate adaptation action plans, pilot and/or demonstration activities focused on strengthening the resilience of the cross-border area, supporting the elaboration of inclusive (interdisciplinary) cross-border spatial planning background documents responding to identified climate threats; capacity building focused on sustainable implementation of defined action plans on regional/local level and introduction and development of nature-based

solutions for integrated water management by considering ecosystem restoration, natural water retention measures and other green (or blue) infrastructure measures that reduce flood risk threats.

### Potential impacts on the environment

The programme will support mostly "soft actions" that do not have a significant direct impact on the environment. However, by providing new knowledge, tools and improvement of the response units' capacities, long-term positive effects on risk preparedness and response capacities will be assured which means considerable positive long-term effect on environmental aspects regarding human health and well-being and climate and energy. Improved resilience of society to climate change (and consequently positive impacts on aspects human health & well-being and climate & energy) will be achieved also by better spatial and adaptation planning.

Croatia regulations require every new project to be in line with the goals of Low Carbon Strategy (Strategija niskougljičnog razvoja Republike Hrvatske do 2030. s pogledom na 2050.godinu, NN63/21). There are four main goals of the Strategy:

- achieving sustainable knowledge-based development and a competitive low-carbon economy and resource efficiency,
- increasing security of energy supply, sustainability of energy supply, increasing energy availability and reducing energy dependence,
- solidarity by fulfilling the obligations of the Republic of Croatia under international agreements, within the framework of EU policy, as part of our historical responsibility and contribution to global goals,
- reduction of air pollution and the impact on the health and quality of life of citizens.

Specific objective 1.1 is directly in line with the first goal set by the Strategy and indirectly this SO will contribute to the other three goals. The Strategy ensures the completion of these goals through approximately 100 measures. During the EIA of any new project these measures should be considered and implemented to ensure that the project is in line with the Low Carbon Strategy.

The projects should be also in line with Climate change adaptation strategy in the Republic of Croatia for the period up to 2040 with a view to 2070 (OG 046/2020).

Similarly, Slovenia defines its long-term objectives regarding the climate change mitigation and adaptation in the Resolution on the Slovenian climate long-term strategy 2050 (Uradni list RS, št. 119/21) and in the Strategic framework for adaptation to climate change (MESP, 2016). The relevant objectives of these strategies are also reflected in the environmental objectives for climate and energy (see Chapter 7). Specific objective 1.1 is in line with the goals set by these strategies as it will predominantly support to increase the resilience to climate-change effects in the programme area.

Positive effects or neutral effects on all remaining environmental aspects are also possible (flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity; soil and land use, cultural heritage and landscape, water bodies status; air, material assets, raw materials, and resources) as a consequence of better protection against climate threats. For instance, green infrastructure prevents heat islands and at the same time mitigates noise and air pollution. The level of significance of these positive impacts on individual environmental aspects is dependent on the type of supported interventions. If only interventions focusing on protecting human safety are to be supported, the impacts on other segments of the environment will be mostly indirect. If the supported interventions will also include measures for the protection of other segments of the environment (e.g. the adoption and spatial plans and new risk mapping protocols include measures for the protection and adaptation of agricultural land (crops), forests (wood), urban areas (green infrastructure preventing heat islands and at the same time mitigating noise and air pollution), cultural heritage and landscape sites, as well as nature protection areas, water bodies etc.), the positive effects on these segments will be direct and of a somewhat larger scale.

In case supported actions will also include small-scale infrastructure and the acquisition of necessary equipment and tools for implementation of pilot actions (i.e., under the implementation of cross-border pilot actions focused on strengthening resilience), these actions could have a local direct negative impact on certain aspects of the environment (flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity; soil and land use, cultural heritage and landscape, water bodies status; air, material assets, raw materials, and resources, human health and well-being) in the implementation phase (due to needed construction works). Besides, risk prevention may prioritise reducing the vulnerability of human settlements to environmental hazards. Measures may therefore be partial to the detriment of the environment in some areas to achieve this human protection level or resilient objective in some areas rather than improving the ecosystem.

Nevertheless, the SO takes into account the ecosystem approach, which means that the preservation of the environment and people's health from potential harm or permanent damage is already to some extent embedded in the specific objective. All actions also must comply with environmental as well as spatial legislation – taking into account spatial plans for which a SEA was already carried out. Given the envisaged scope of these interventions (pilot projects) and the mandatory compliance with environmental legal and spatial frameworks, less significant negative impacts can be expected during implementation.

No large-scale construction with potential significant negative impacts is foreseen in the context of the programme.

Table 35: Potential impacts related to the specific environmental aspect

| Environmental aspects | Indicators | ZA | IP |
|---|---|---|---|
| Human health and well-being | Number of people exposed to excessive noise levels | ←↗ (SI)<br>↗ (HR) | +/- |
| | Average and maximum emission levels of the main air pollutants ($NO_x$, $PM_{10}$, $PM_{2,5}$, $O_3$, $SO_2$) | ↗ (SI)<br>←↗ (HR) | +/- |
| | Number of people exposed to air pollution | ←↗ (SI)<br>←↗ (HR) | +/- |
| | Number of people affected by flood risk | ↘ (SI)<br>↗ (HR) | + |
| | Degree of light pollution – radiance (nW/sr cm2) | ←↗ (SI)<br>←↘ (HR) | - |
| Flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity | Development of nature protected areas (by categories) | ←↗(SI & HR) | 0 |
| | Favourable condition of species of European interest | ↘ (SI)<br>←↘ (HR) | +/- |
| | Favourable condition of habitats of European interest | ←↘ (SI)<br>↘ (HR) | +/- |
| | Number of natural values in favourable condition | ←↗ (SI)<br>n/a (HR) | 0 |
| | Continuum Suitability Index (CSI) to assess ecological connectivity | ←↘(SI & HR) | +/- |
| | Presence of Invasive alien species of Union concern | ↘ (SI & HR) | 0 |
| | Number of geological phaenomena designated as natural value | ↗ (SI)<br>←→ (HR) | 0 |
| Soil, land use | Land take | ↘(SI & HR) | - |

| Environmental aspects | Indicators | ZA | IP |
|---|---|---|---|
| | Land use/cover change by categories | ↘ (SI)<br>←↘ (HR) | -<br>+/- |
| | Quality of soil and soil pollution | ←→ (SI)<br>↘ (HR) | +/- |
| Cultural heritage | Change in the number of registered units of cultural heritage | ←↘(SI & HR) | +/- |
| | Number of units of intangible cultural heritage | ←↘(SI & HR) | 0 |
| Landscape diversity | Extent (number and size) of protected landscapes | ←↗ (SI)<br>←↗ (HR) | 0 |
| | Risk of agricultural land abandonment | ←↘ (SI)<br>↘ (HR) | 0 |
| | Landscape fragmentation | ←↘ (SI)<br>↘ (HR) | +/- |
| Water (ground and surface water) | Chemical and quantitative status of groundwater bodies | ←↗ (SI & HR) | + |
| | Ecological and chemical status of surface water bodies | ←↘ (SI)<br>↗ (HR) | + |
| | Sustainable water use and preservation of good quantity status of water bodies | ←↗ (SI)<br>←→ (HR) | + |
| | Effective water and risk management | ←↗ (SI)<br>n/a (HR) | + |
| Climate and energy | Greenhouse gas emissions | ↗ (SI)<br>↗ (HR) | + |
| | Share of renewable energy in gross final energy consumption | ←↗ (SI)<br>↗ (HR) | 0 |

| Environmental aspects | Indicators | ZA | IP |
|---|---|---|---|
| | Final energy consumption | ←↗ (SI)<br>←→ (HR) | + |
| | Public attitude towards energy consumption | ←↗(SI & HR) | 0 |
| | Vulnerability to climate change | ↘ (SI & HR) | + |
| Material assets, raw material resource | Resource consumption per capita (in t/year) | ↗ (SI)<br>←↗ (HR) | 0 |
| | Generated and deposited waste per capita (in kg/year) | ←↘ (SI)<br>←↘ (HR) | 0 |
| | Recycling rate of municipal waste [% of total municipal waste generated] | ←↗ (SI)<br>←↗ (HR) | 0 |
| Zero Alternative (ZA) foreseen development:<br>↗ improvement; ←↗ partial improvement; ←→ no change; ←↘ partial deterioration; ↘ deterioration<br>Assessment of the Interreg Programme (IP) in Comparison to the ZA:<br>**+** potential improvement; **0** no relevant change; – potential deterioration; **x** no assessment possible at this stage<br>Significance: **!** potentially significant impact | | | |

Positive impacts (direct and indirect) on SEA environmental aspects listed in the table above may be expected only if projects will address these environmental aspects, as the listed fields of action are numerous and broad, and it is unlikely that every single one will be covered by projects. Due to the nature of the expected projects, being mostly related to strategies, action plans and improvement of knowledge and skills, most impacts will likely not be measurable in the individual indicator monitoring, but will contribute to a general improvement to the state of the indicator.

Expected negative impacts are generally minor due to the nature of small-scale construction activities (if any) to be implemented. They are mostly connected to construction activities themselves as well as soil sealing related to that. Depending on the actual site impacts on landscape or protected species are possible as well. However, for all interventions within

protected areas including natural values environmental permits have to be obtained therefore no significant negative impacts on the environment are expected.

Alternatives, enhancement and mitigation measures, recommendations

Possible enhancement measures for improved positive impacts on nature and biodiversity:

- Under *Type of action 2: Increasing the resilience to climate-change effects in the programme area* nature and biodiversity protection goals should be taken into account in parallel to protection of society. Actions for fostering the resilience of habitats to climate-change effects should be awarded through the project selection criteria (contributes to a positive evaluation). Actions for the enhanced resilience of society should not have negative impacts on nature and biodiversity.
- Supported interventions should include measures for protection of other segments of the environment, especially soil and agricultural land to make the direct positive effect on a larger scale.

*Specific objective 1.2 – Enhancing protection and preservation of nature, biodiversity, green infrastructure, including in the urban areas, and reducing all forms of pollution*

The aim of the specific objective is to enhance, develop, or introduce green infrastructure as strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services, particularly addressing the biodiversity loss as a key environmental threat in the programme area. Cross-border cooperation for improved protection, restoration, and management of the environment will be boosted (incl. Natura 2000 and other protected areas and areas of ecological importance). Actions will be focused to mitigation of impacting threats (e.g., pollution, climate change, invasive species, biodiversity loss, habitat fragmentation) and good cross-border landscape management as the key to improving biodiversity in the programe area. *Type of action 1 Strategically planned green infrastructure for the provision of environmental and socio-economic benefits* aims to develop, promote, and introduce green infrastructure solutions. Possible actions include:

- enhancing cross-border cooperation and knowledge exchange for inclusive and holistic spatial planning by fostering participative process, for integration of green infrastructure on a regional scale, relying on (but not limiting to) Natura 2000 network as its backbone, aiming to support habitat connectivity, prevent degradation and support delivery of ecosystem services.
- supporting cross-border pilot activities for introducing and managing green infrastructure, and enhancing and raising awareness on provision of multiple ecosystem services in the cross-border area (e.g., establishment of pilot green infrastructure, promotion of environmental education, sustainable resource management, etc).

*Type of action 2 Improved protection and preservation of endangered habitats, species, and landscapes in the programme area*s shall ensure:

- Sustainable joint cross-border actions for better management of natural areas for improving the conservation status of species and habitat types in poor or declining condition. Actions shall include knowledge exchange and coordination of relevant stakeholders, cross-border pilot actions to demonstrate possible solutions and engagement and education of citizens and local organisations from different sectors.
- Joint actions for planning and managing of natural landscapes across border, particularly involving (but not limiting to) Natura 2000 and other protected areas.
- Cross-border actions to improve protection, management, and implementation of joint measures against invasive species.
- Coordinated cross-border actions for protection of the threatened communities within ecosystems that support ecosystem services in the programme area (e.g., pollinators, large carnivores and other, having special role in the community of species).

### Potential impacts on the environment

The main positive impact of the SO implementation can be expected in the environmental aspect of flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity. Due to indirect impacts and additional SO's focus on the urban environment and reducing all forms of pollution and enhancement of green infrastructure, we can also expect a significant positive impact on human health and well-being. In case pilot actions will be supported, the impacts are expected to be direct, in the case of soft measures (awareness-raising, knowledge improvement, acceleration of behavioural changes) the impacts will be indirect but in the long run just as important.

Positive effects on all remaining environmental aspects are also possible (soil and land use, cultural heritage and landscape, water; air, climate, material assets, raw materials, and resources). They will be mostly indirect, such as the positive impact on soil and land use, landscape, water, air, climate due to improved protection and conservation of nature and biodiversity and improved green infrastructure.

Specific objective 2.1 is in line with first and fourth goal of the Low Carbon Strategy of Republic of Croatia, with Climate change adaptation strategy in the Republic of Croatia for the period up to 2040 with a view to 2070 (OG 046/2020), with Slovenian climate long-term strategy and with Strategic framework for adaptation to climate change - mainly through the improvement of the green infrastructure. A more detail analysis will be made for each project in EIA procedures to better quantify the impact on a project basis.

In case of cross-border management of nature related actions will also include small-scale pilot actions which require earth or other invasive works, these actions could have a potential local

and small scale direct negative impact on all aspects of the environment in the implementation phase.

Table 36: Potential impacts related to the specific environmental aspect

| Environmental aspects | Indicators | ZA | IP |
|---|---|---|---|
| Human health and well-being | Number of people exposed to excessive noise levels | ←↗ (SI)<br>↗ (HR) | +/- |
| | Average and maximum emission levels of the main air pollutants ($NO_x$, $PM_{10}$, $PM_{2,5}$, $O_3$, $SO_2$) | ↗ (SI)<br>←↗ (HR) | +/- |
| | Number of people exposed to air pollution | ←↗ (SI)<br>←↗ (HR) | +/- |
| | Number of people affected by flood risk | ↘ (SI)<br>↗ (HR) | + |
| | Degree of light pollution – radiance (nW/sr cm2) | ←↗ (SI)<br>←↘ (HR) | 0 |
| Flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity | Development of nature protected areas (by categories) | ←↗ (SI)←↗ (HR) | + |
| | Favourable condition of species of European interest | ↘ (SI)<br>←↘ (HR) | +/- |
| | Favourable condition of habitats of European interest | ←↘ (SI)<br>↘ (HR | +/- |
| | Number of natural values in favourable condition | ←↗ (SI)<br>n/a (HR) | +/- |
| | Continuum Suitability Index (CSI) to assess ecological connectivity | ←↘ (SI & HR) | + |
| | Presence of Invasive alien species of Union concern | ↘(SI & HR) | + |
| | Number of geological phaenomena designated as natural value | ↗ (SI)<br>←→ (HR) | 0 |

| Environmental aspects | Indicators | ZA | IP |
|---|---|---|---|
| Soil, land use | Land take | ↘ (SI)<br>↘ (HR) | + |
| | Land use/cover change by categories | ↘ (SI)<br>←↘ (HR) | +<br>+/- |
| | Quality of soil and soil pollution | ←→ (SI)<br>↘ (HR) | +/- |
| Cultural heritage | Change in the number of registered units of cultural heritage | ←↘ (SI)<br>←↘ (HR) | +/- |
| | Number of units of intangible cultural heritage | ←↘ (SI)<br>←↘ (HR) | 0 |
| Landscape diversity | Extent (number and size) of protected landscapes | ←↗ (SI)<br>←↗ (HR) | + |
| | Risk of agricultural land abandonment | ←↘ (SI)<br>↘ (HR) | 0 |
| | Landscape fragmentation | ←↘ (SI)<br>↘ (HR) | + |
| Water (ground and surface water) | Chemical and quantitative status of groundwater bodies | ←↗ (SI &HR) | + |
| | Ecological and chemical status of surface water bodies | ←↘ (SI)<br>↗ (HR) | +/- |
| | Sustainable water use and preservation of good quantity status of water bodies | ←↗ (SI)<br>←→ (HR ) | + |
| | Effective water and risk management | ←↗ (SI)<br>n/a (HR) | + |

| Environmental aspects | Indicators | ZA | IP |
|---|---|---|---|
| Climate and energy | Greenhouse gas emissions | ↗ (SI)<br>↗ (HR) | +/- |
| | Share of renewable energy in gross final energy consumption | ←↗ (SI)<br>↗ (HR) | +/- |
| | Final energy consumption | ←↗ (SI)<br>←→ (HR) | +/- |
| | Public attitude towards energy consumption | ←↗ (SI)<br>←↗ (HR) | 0 |
| | Vulnerability to climate change | ↘ (SI)<br>↘ (HR) | + |
| Material assets, raw material resource | Resource consumption per capita (in t/year) | ↗ (SI)<br>←↗ (HR) | 0 |
| | Generated and deposited waste per capita (in kg/year) | ←↘ (SI)<br>←↘ (HR) | 0 |
| | Recycling rate of municipal waste [% of total municipal waste generated] | ←↗ (SI)<br>←↗ (HR) | 0 |
| Zero Alternative (ZA) foreseen development:<br>↗ improvement; ←↗ partial improvement; ←→ no change; ←↘ partial deterioration; ↘ deterioration<br>Assessment of the Interreg Programme (IP) in Comparison to the ZA:<br>**+** potential improvement; **0** no relevant change; – potential deterioration; **x** no assessment possible at this stage<br>Significance: **!** potentially significant impact | | | |

Direct positive impacts on SEA environmental aspects listed in the table above may be expected mainly in the aspects of flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity. Consequently, an indirect positive impact is expected in most of other environmental aspects. These positive impacts will be most likely achieved through potential improvement of state of environmental aspect but will not necessarily reflect in improvement of indicators listed in the table below.

Expected negative impacts are generally minor. All actions also must comply with environmental as well as spatial legislation - taking into account spatial plans for which a SEA was already carried out. Given the envisaged scope of these interventions and the mandatory compliance with environmental legal and spatial frameworks, less significant negative impacts can be expected during implementation.

**Alternatives, enhancement and mitigation measures, recommendations**

Since there are no significant direct or indirect negative impacts on the environmental aspects, no mitigation measures, enhancement measures or additional proposals of alternatives are necessary.

### 7.1.2. Priority 2 - Resilient and sustainable region

*Specific objective 2.1 – Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovation*

The aim of the specific objective to facilitate the recovery of tourism and culture in the Programme area by greening of tourism, supporting shift from quantity towards quality, increasing diversify cultural tourism products, and supporting cultural tourism entrepreneurship and innovation. Special attention will be given to rural border areas to unlock their hidden potentials and abilities to offer demand-driven products and services, while conserving their cultural uniqueness and protecting the natural environment. All the actions supported by this priority will contribute to strengthening communities, increasing competitiveness, and job creation in the Programme area. Two types of actions are targeted:

*Type of action 1 Supporting sustainable tourism and green transition of public and private organizations through pilot and demonstration actions, collaborative learning and awareness-raising of tourists and all stakeholders in tourism, and culture:* The indicative activities include development of joint pilot and demonstration actions to support green transition of public and private stakeholders in tourism and culture and development of new or "greening" of existing cross-border products, services or solutions that contribute to the sustainability and accessibility of touristic products and services. Cross-border awareness and collaboration would be performed for supporting environmentally and socially responsible tourism and culture, tourists and visitors. Joint cross-border collaboration platforms and joint learning actions for supporting environmentally and socially responsible tourism, culture, and creative industries will be also supported. Cross-border trainings of public and private organisations for integrated sustainable destinations management by enhancing knowledge and skills supporting transition to resilient tourism destinations will be supported. Digital skills may be involved to enhance transition for circular business models.

*Type of action 3.2 Enhancing resilience and recovery of tourism by development and upgrade of joint cross-border tourism products and services for enhancing resilience:*

The indicative activities include increasing diversity of cross-border tourism in accordance with newly arising COVID-19 circumstances, adjusting tourism and cultural organisations to demands of the modern visitors by preventing mass tourism, supporting cross-border demand driven digitalisation, development of cross-border tourism regions/destinations and increasing the quality of offer, upgrading of joint cross-border tourism products by supporting valorisation and interpretation of cultural and natural heritage, developing joint tourism products by leveraging existing infrastructure for tourism purposes in rural destinations, joint cross-border pilot actions for development, enhancing and promotion of health tourism, oenological and gastronomical offer for development of agrotourism and farm to fork schemes, joint cross-border actions for supporting social innovations and cultural and creative industries, and creativity in tourism and culture

Potential impacts on the environment

The programme will presumably support mostly “soft actions” that do not have a significant direct impact on the environment.

Based on the outline of SO which focuses on increasing environmental and social responsibility of public and social responsibility of organizations in culture and tourism sectors, there is a possibility for less significant positive impact on all environmental aspects (human health and well-being, flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity, soil and land use, cultural heritage, landscape, water, air, climate and energy, material assets, raw materials and resources).

Specific objective 2.1 is in line with the first goal of the Low Carbon Strategy of Republic of Croatia, with Climate change adaptation strategy in the Republic of Croatia for the period up to 2040 with a view to 2070 (OG 046/2020), Slovenian climate long-term strategy and Strategic framework for adaptation to climate change through investments in a sustainable tourism and economic development. Sustainable tourism is directly in line with the resource efficiency goal, while the economic development is usually followed by a more efficient and less polluting technologies that can have a positive impact on climate change. The implementation of the program could also mean the implementation of individual projects that cause new greenhouse gas emissions, but the level of emissions at this level is impossible to estimate (number, locations and exact descriptions of such project are not yet defined; they will however have to comply with environmental legislation and were/will be -according to scope and size- subjects of SEA, EIA and environmental permitting procedures). Besides, a small number of investments in the field (pilot projects) are expected, since the program mostly encourages the implementation of soft activities. The program also does not plan major infrastructure that would need to be adopted to climate change.

Additional positive impacts one flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity,

cultural heritage and landscape are possible as a consequence of upgrading of joint cross-border tourism products by supporting valorisation and interpretation of cultural and natural heritage. Indirect positive impacts on human health and well-being, air, climate and energy are possible through pilot actions promoting farm to fork schemes. The implementation of these positive impacts on individual environmental aspects is dependent on the type and scope of supported interventions.

Apart from the positive effects of cooperation actions, all actions that increase the number of visitors in the cooperation area will be linked to some negative effects. These effects result from additional waste and wastewater, increased pressure on the natural environment, additional trips (especially by car) to the area, additional light pollution etc. Furthermore, additional infrastructure (e.g. for accessibility) is necessary to manage a larger amount of visits. These actions can be financed by the programme or linked to the implementation of the programme even though financed from other sources. This can lead to negative impacts on environmental aspects regarding human health and well-being; flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity; soil, land use; water; air; and climate and energy. Main negative impacts could be connected to development of outdoor tourism that could exceed carrying capacity of a certain area (e.g., nature, social, infrastructure).

The programme will promote sustainable tourism within the programme area. However, the Slovenia/Croatia cross-border region is an area of high tourist transit. More than 80% of foreign travellers who left Slovenia in summer via road border crossings with Croatia are in Slovenia in transit. Although this issue is beyond the scope of the programme, it is important that the implementation of the programme does not worsen the situation. One of the guiding principles of the SO 2.1 that contributes to this is facilitating slow tourism by increasing the quality of fewer and more meaningful experiences by fostering sustainable mobility solutions. Further concrete recommendations for reducing the negative effects of traffic are presented bellow in the section *Alternatives, enhancement and mitigation measures, recommendations.*

Table 37: Potential impacts related to the specific environmental aspect

| Environmental aspects | Indicators | ZA | IP |
|---|---|---|---|
| Human health and well-being | Number of people exposed to excessive noise levels | ←↗ (SI)<br>↗ (HR) | +/- |
| | Average and maximum emission levels of the main air pollutants ($NO_x$, $PM_{10}$, $PM_{2,5}$, $O_3$, $SO_2$) | ↗ (SI)<br>←↗ (HR) | +/- |

| Environmental aspects | Indicators | ZA | IP |
|---|---|---|---|
| | Number of people exposed to air pollution | ←↗ (SI)<br>←↗ (HR) | +/- |
| | Number of people affected by flood risk | ↘ (SI)<br>↗ (HR) | +/- |
| | Degree of light pollution – radiance (nW/sr cm2) | ←↗ (SI)<br>←↘ (HR) | - |
| Flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity | Development of nature protected areas (by categories) | ←↗(SI & HR) | +/- |
| | Favourable condition of species of European interest | ↘ (SI)<br>←↘ (HR) | |
| | Favourable condition of habitats of European interest | ←↘ (SI)<br>↘ (HR | +/- |
| | Number of natural values in favourable condition | ←↗ (SI)<br>n/a (HR) | +/- |
| | Continuum Suitability Index (CSI) to assess ecological connectivity | ←↘ (SI & HR) | +/- |
| | Presence of Invasive alien species of Union concern | ←↘(SI & HR) | 0 |
| | Number of geological phaenomena designated as natural value | ↗ (SI)<br>←→ (HR) | 0 |
| Soil, land use | Land take | ↘(SI & HR) | - |
| | Land use/cover change by categories | ↘(SI)<br>←↘ (HR) | - |
| | Quality of soil and soil pollution | ←→ (SI)<br>↘ (HR) | +/- |

| Environmental aspects | Indicators | ZA | IP |
|---|---|---|---|
| Cultural heritage | Change in the number of registered units of cultural heritage | ←↘ (SI)<br>←↘ (HR) | +/-<br>+ |
| | Number of units of intangible cultural heritage | ←↘(SI & HR) | + |
| Landscape diversity | Extent (number and size) of protected landscapes | ←↗ (SI & HR) | +/- |
| | Risk of agricultural land abandonment | ←↘ (SI)<br>↘ (HR) | +/- |
| | Landscape fragmentation | ←↘ (SI)<br>↘ (HR) | +/- |
| Water (ground and surface water) | Chemical and quantitative status of groundwater bodies | ←↗ (SI & HR)) | + |
| | Ecological and chemical status of surface water bodies | ←↘ (SI)<br>↗ (HR) | +/- |
| | Sustainable water use and preservation of good quantity status of water bodies | ←↗ (SI)<br>←→ (HR) | +/- |
| | Effective water and risk management | ←↗ (SI)<br>n/a (HR) | +/- |
| Climate and energy | Greenhouse gas emissions | ↗ (SI)<br>↗ (HR) | +/- |
| | Share of renewable energy in gross final energy consumption | ←↗ (SI)<br>↗ (HR) | +/- |
| | Final energy consumption | ←↗ (SI)<br>←→ (HR) | +/- |
| | Public attitude towards energy consumption | ←↗ (SI)<br>←↗ (HR) | +/- |

| Environmental aspects | Indicators | ZA | IP |
|---|---|---|---|
| | Vulnerability to climate change | ↘ (SI & HR) | +/- |
| Material assets, raw material resource | Resource consumption per capita (in t/year) | ↗ (SI)<br>←↗ ( HR) | +/- |
| | Generated and deposited waste per capita (in kg/year) | ←↘ (SI)<br>←↘ (HR) | +/- |
| | Recycling rate of municipal waste [% of total municipal waste generated] | ←↗ (SI)<br>←↗ (HR) | +/- |
| Zero Alternative (ZA) foreseen development:<br>↗ improvement; ←↗ partial improvement; ←→ no change; ←↘ partial deterioration; ↘ deterioration<br>Assessment of the Interreg Programme (IP) in Comparison to the ZA:<br>**+** potential improvement; **0** no relevant change; – potential deterioration; **x** no assessment possible at this stage<br>Significance: **!** potentially significant impact | | | |

The implementation of positive impacts on individual environmental aspects is dependent on the type of supported interventions. These positive impacts will be most likely achieved through decrease of pressures and potential improvement of state of environmental aspect but will not necessarily reflect in improvement of indicators listed in the table below.

All actions that increase the number of visitors in the cooperation area will be linked to some negative effects. Locations and technical characteristics of potentially selected projects are not defined in the IP. However, since all interventions have to be implemented according to environmental legislation and protection regimes no significant negative impacts on the environment are expected. These negative impacts will reflect in increased pressures but will not necessarily reflect in deterioration of indicators listed in the table above.

#### Alternatives, enhancement and mitigation measures, recommendations

The review of indicators highlights potential negative and positive impacts due to the development aspect and the increasing frequency of visitors expected by intervention logic in favour of sustainable tourism. Those significant impacts involve partly human health and well-being, partly landscape and biodiversity preservation, partly culture heritage and resources. In order to manage the identified spin-offs, the intervention logic could be amended by the following enhancement measures:

- Increasing the sustainability of tourism through inclusion of sustainable mobility solutions for tourism projects in the project selection criteria (contributes to a positive evaluation); Examples:
    - Promoting the use of public transport where possible;
    - Arranging parking lots and organizing group transport to more visited tourist attractions;
    - Equipping parking lots with charging infrastructure for electric vehicles;
    - Promoting cycling, walking or other forms of sustainable transport.
- Increasing the sustainability of tourism through inclusion of:
    - solutions that promote circular economy to reduce waste, wastewater and GHG emissions in the project selection criteria (contributes to a positive evaluation of the project)
- soil sealing in the project selection criteria (contributes to a negative or positive evaluation of the project); e.g. tourist products and services will require new building land (negative evaluation), tourist products and services will be provided in existing facilities or in degraded areas (positive evaluation),the project includes compensation- and mitigation measures for soil sealing ( positive evaluation); e.g. tourist products and services will be provided in existing facilities or in degraded areas, or the project will ensure the replacement of lost built-up land.
- Where the projects would potentially increase the number of visitors in protected areas, a requirement from the call for proposals could be to take in consideration the carrying capacity of specific protected area(s) or site(s) and provide related sustainable solutions for visitor management. The mentioned challenge should be described within the project proposal.
- In cases where the implementation of projects would require the installation of outdoor lighting (e.g. arrangement of bicycle and footpaths), in addition to the statutory requirements, the following recommendation should be taken into account: Public lighting and other outdoor lighting should be planned restrainedly and according to actual needs. Environmentally friendly lighting that does not emit a large proportion of blue and ultraviolet light should be used. In cases where a small-scale visitor infrastructure is planned with the project, it is recommended to give an advantage to infrastructure aimed at controlled guiding of visitors through the area.
- Enhancement of the programme contribution to the integrated heritage conservation could be provided if additional project criteria in the call for proposals would address the cultural heritage. On this basis, more projects that would include activities directly or indirectly connected to cultural heritage would apply on the call for proposals.

### 7.1.3. Priority 3 –Interreg-specific objective 1 – An accessible and connected region SO 3.1 - Interreg-specific objective1 –Enhance efficient public administration by promoting legal and administrative cooperation, and cooperation between citizens, civil society actors, and institutions, in particular with a view to resolving legal and other obstacles in border regions;

The aim of the specific objective is to support public administration in its role as an initiator/coordinator of processes aimed at improving the quality of services and developing of innovative solution in the area of health care, social inclusion and welfare, energy efficiency, and accessibility in the border region. A place-based and participatory approach, sustainability, digitalisation, and inclusion are the guiding principles when implementing the activities within this priority. The cross-border cooperation and resolving legal and other obstacles is crucial when taking into account the functional relations between the different actors and activities in the border area. Under the *Type of action: Improvement of the quality and diversity of the services and development of innovative solutions in the areas of health care, social inclusiveness and welfare, accessibility and energy efficiency in the border regions by overcoming legal and administrative obstacles* possible cooperation actions can include development and implementation of cross-border cooperation models, tools and learning networks for more efficient and accessible public administration in the areas of healthcare, social inclusion, accessibility and energy efficiency, establishment and co-ordination of joint multi-level and multisectoral knowledge exchange, governance models and development of territorial strategies, setting up new or/and upgrading existing cross-border organisational structures providing the services in the areas of support, development of innovative cross-border solutions and pilot actions in the field of energy efficiency, development of joint solutions and pilot actions for improving the quality and diversity of health, social and complementary services, development of solutions and pilot actions for improvement of accessibility and mainstreaming and up taking of developed solutions in the area of healthcare, social inclusion, accessibility and energy efficiency in the cross-border area towards civil society and public administration at different levels.

*Potential impacts on the environment:*

Under the SO, non-investment cooperation and coordination activities are expected to be supported to foster public administration in its role as an initiator/coordinator of processes. This SO aims to focus on improving quality of services and developing of innovative solution in the area health care, social inclusion and welfare, energy efficiency and accessibility in the border region. Through institutional, inter-municipal and national administration collaboration, networking and removing barriers, the implementation of ISO II can have a considerable positive impact on human health, and due to the focus on energy efficiency, also smaller indirect positive impacts on air, climate and energy and other environmental aspects.

Strengthening effective public administration may have indirect positive long-term effects on the environment by pooling experiments, engineering services, material resources that cannot be predicted in the scope of the IP programme, especially when this is focused on environmentally related issues.

In terms of indirect impact, these actions could cause an increase in the number of inhabitants and users of the area in the future, and this could put additional pressure on environmental components: flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity, water quality, air, landscape, forests, and hunting. This form of impact is indirect and has a low probability and scope due to limited amount of funds dedicated to the implementation of actions in this ISO. .

Interreg-specific objective 1 is not directly contributing to any of the four goals laid out by the Low Carbon Strategy of Republic of Croatia, Climate change adaptation strategy in the Republic of Croatia for the period up to 2040 with a view to 2070 (OG 046/2020), Slovenian climate long-term strategy and Strategic framework for adaptation to climate change, but a better connected and cooperative governance (especially in the aspect of energy efficiency) can accelerate the approval of projects that will contribute to reaching the low carbon goals. Better cooperation of governments can also contribute to recognising and changing the projects that are not in line with the low carbon goals to improve them.

*Alternatives, enhancement and mitigation measures, recommendations*

Since there are no significant direct or indirect negative impacts on the environmental aspects, no mitigation measures, enhancement measures or additional proposals of alternatives are necessary.

*Interreg specific objective III – Build up mutual trust, in particular by encouraging people-to-people actions* Possible cooperation actions under *Type of actions 4.4 People-to-people projects to improve cultural and social relations, and to get actively engaged in the community* are cross-border awareness raising actions (e.g., on solidarity, community support, and healthy living), cross-border learning actions and joint events to increase connectivity, networking and intergenerational support .

*Potential impacts on the environment:*

In the environmental aspect, the impacts related to these activities can be considered negligible or such that there are no measurable impacts.

An increased trust may have indirect positive long-term effects on the environment by awareness raising, learning and networking. The indirect positive impact could be expected in terms of increasing community resilience and strengthening the platform for future development and protection activities, especially in relation to protection of human health and climate change mitigation.

### *Alternatives, enhancement and mitigation measures, recommendations*

Since there are no significant direct or indirect negative impacts on the environmental aspects, no mitigation measures or additional proposals of alternatives are necessary. Considering the focus of the SO no enhancement measures or recommendations were identified that could improve the status of environmental aspects.

## 7.2. Inter-relationship between the effects on environmental aspects and environmental objectives

Table 38: Environmental aspects and main environmental objectives

| Environmental aspects | Main environmental objectives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | overall | SO1.1 | SO1.2 | SO2.1 | SO 3.1 - ISO 1 | SO 3.2I SO 1 | Alternatives, enhancement and mitigation measures, recommendations |
| Human health and well-being | Reduce the population share exposed to excessive air pollution<br>Reduction of emission levels in consideration of respective emission limits<br>Reduce the population share exposed to excessive noise levels<br>Improved flood risk management<br>Reduced light pollution | B | B | B | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary.<br>For enhancement measures and recommendations see chapter 9.1.2. |

| Environmental aspects | Main environmental objectives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | overall | SO1.1 | SO1.2 | SO2.1 | SO 3.1 - ISO 1 | SO 3.2I SO 1 | Alternatives, enhancement and mitigation measures, recommendations |
| Flora, fauna, habitats, biodiversity, areas with nature protection status, including protected areas and Natura 2000 areas, geodiversity and landscape diversity | Safeguarding the biodiversity of the flora and fauna including protected/threatened species and habitats, geodiversity and landscape diversity, maintaining the quality of protected areas, Natura 2000 areas and fostering ecological connectivity between them where possible | B | B | B | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary.<br>For enhancement measures and recommendations see chapters 9.1.1., 9.1.2. and 9.1.3. |
| Soil, land use | Minimized land take for the economy and reduction of the environmental impacts of existing economic land use. | B | B | B | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary. |

| Environmental aspects | Main environmental objectives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | overall | SO1.1 | SO1.2 | SO2.1 | SO 3.1 - ISO 1 | SO 3.2I SO 1 | Alternatives, enhancement and mitigation measures, recommendations |
| | Protection of soil functions | | | | | | | For enhancement measures and recommendations see chapter 9.1.2. and 9.1.3. |
| Cultural heritage | Favourable conditions for cultural heritage (both objects and areas) through protection, preservation, and awareness-raising | B | B | B | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary.<br>For enhancement measures and recommendations see chapter 9.1.2. and 9.1.3. |
| Landscape | Favourable condition of protected natural and cultural areas (natural parks, cultural landscape) through management | B | B | B | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary.<br>For enhancement measures and recommendations see chapter 9.1.2. and 9.1.3. |
| Water | Protection of groundwater against pollution and harmful substances | B | B | B | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary. |

| Environmental aspects | Main environmental objectives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | overall | SO1.1 | SO1.2 | SO2.1 | SO 3.1 - ISO 1 | SO 3.2I SO 1 | Alternatives, enhancement and mitigation measures, recommendations |
| | Protection of surface water against pollution and harmful substances<br>Sustainable water use and preservation of good quantity status of water bodies<br>Effective water and risk management | | | | | | | For enhancement measures and recommendations see chapter 9.1.2. and 9.1.3. |
| Climate and energy | Reduction of GHG emissions (non -ETS) by 20% in 2030 compared to 2005 for Slovenia<br>Reduction of GHG emissions (non -ETS) by 18.5 to 21.7 % in 2030 compared to 2005 for Croatia<br>Fostering of renewable energy sources | B | B | B | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary.<br>For enhancement measures and recommendations see chapter 9.1.2. and 9.1.3. |

| Environmental aspects | Main environmental objectives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | overall | SO1.1 | SO1.2 | SO2.1 | SO 3.1 - ISO 1 | SO 3.2I SO 1 | Alternatives, enhancement and mitigation measures, recommendations |
| | Improvement of energy efficiency<br>Climate resilience | | | | | | | |
| Material assets, raw material resources | Reduction and efficient recycling of waste<br>Promotion of recycling and the circular economy | B | A* | A* | B | B | A | Since there are no significant direct or indirect negative impacts on the environmental aspect, no mitigation measures or additional proposals of alternatives are necessary.<br>For enhancement measures and recommendations see chapter 9.1.2. and 9.1.3. |
| Impact class (IC): **A** no impact (*) or positive impact; **B** negligible negative impact; **C** negligible negative impact due to implementation of mitigation measures; **D** significant negative impact; **E** devastating negative impact; **X** impact assessment is not possible | | | | | | | | |

# 8. DIFFICULTIES ENCOUNTERED IN PRODUCING THE ASSESSMENT

The main difficulties encountered when assessing potential impacts of a funding programme which only sets the frame and general direction of projects, but does neither define concrete projects nor concrete sites, are related to the abstractness of the set frame and the wide range of potential implementation projects. The assessment relies on triangulation of potential effects from different information sources, i.e., the knowledge of similar actions undertaken in the 2014-2020 programming period, the knowledge and input from the programme authorities and PTF members about potential and likely projects as well as the knowledge of the SEA team based on longstanding experience in assessing similar funding programmes. While this allows for a sound judgement on potential significant impacts on the programme level, some uncertainties related to location-specific impacts are inherent to the SEA.

# 9. MONITORING MEASURES

Article 10 of the SEA directive specifies that monitoring measures shall be prescribed in the context of an SEA if significant negative impacts can be identified. Such monitoring measures shall allow to identify unforeseen adverse effects at an early stage and take mitigating action.

For all 5 SOs no significant negative impacts have been identified in the SEA for the IP Slovenia-Croatia 2021-2027, thus no mandatory monitoring measures are necessary to implement.

However, to measure the enhancement of the IP impact and to ensure coherence with assessments of the SEA we suggest monitoring measures that would cover implementation of all three priorities and are linked to the most sensitive and mostly affected aspects. They are also designed with administrative burden in mind, thus allowing for an overview of potential developments for sensitive aspects, without placing a disproportionate burden on programme authorities or projects:

- Number of projects that take into the consideration the carrying capacity of the protected areas.
- Number of projects that involve sustainable mobility solutions for tourism projects to reduce traffic impacts
- Number of projects that involve solutions that promote circular economy to reduce wastes, waste water and GHG emissions
- Additional soil sealing created in total by projects
- Number of projects that involve registered units of cultural heritage and/or heritage communities (units and bearers of intangible cultural heritage);

# 10. INDICES

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