

Danube Cycle Plans

Guidelines to Define National Cycle Route Network



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Danube Cycle Plans | Policies, plans and promotion for more people cycling in the Danube region

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1 Introduction

In 2016 United Nations Economic Commission for Europe started cooperating with the Transport, Health and Environment Pan-European Programme (THE PEP) to develop the pan-European master plan for cycling. In its report, the ECE (2020) proposes the definitions of various infrastructure types of importance in regard to cycling and offers recommendations for the further development of cycling networks at pan-European and national, regional and local levels.

Afterwards, in 2019 nine European countries joined together to develop a project idea and submit a candidacy to the Danube Transnational Programme with the application form for the Danube Cycle Plans project. The project Danube Cycle Plans aims to address (1) Lack of, or poor, cooperation between local/regional authorities and national/transnational authorities crystallises in the low number of countries (AT, CZ, SK, HU) having national cycling policies, supported by National Cycling Plans (NCP) in place. (2) Lack of coordination also leads to fragmented cycling infrastructure development, differences in quality of infrastructure conditions amongst participating countries, existing design standards (if any) differ a lot between countries, and financial support is inadequate. (3) Cycling is often treated as a side topic in transport policies and there is little awareness about the needs of cyclists and benefits of cycling. The project will address these challenges by setting actions to strengthen the three main pillars of cycling promotion: (1) Facilitate the development of cycling policies at national and transnational level supported by National Cycling Plans based on a common transnational Danube Cycling Strategy; (2) Support the provision of adequate cycling infrastructure by defining the Danube Cycle Route Network, developing common standards and deriving an investment plan to upgrade current conditions; (3) Increase the awareness of relevant stakeholders for the needs of cyclists and increase their capacity to promote cycling in the whole Danube region by implementing a mentoring system, inspiration events and national cycling conferences.

Ministry of Infrastructure of Republic of Slovenia, one of the project partners, was responsible to elaborate the output T.2.1. Guidelines to define a National Cycle Route Network (NCRN) in the Danube Cycle Plan project. The assignment was to prepare the document that shall provide guidance for partners and other interested stakeholders through the preparation, development, adoption and implementation phase of the NCRNs. This guideline ensures that the development of the NCRNs follows a common transnational approach.

The following guidelines will be the base document for all other participating project partners to define their national cycling network together with the stakeholders of the National Cycling Working Group (NCWG). Project partners will then work together to draft a Danube Cycling Route Network (DCRN), a macro-regional network of cycle routes of different categories that connects the participating countries in the Danube region.

The creation of guidelines is based on two starting points:

- the development of professional criteria for defining a National Cycle Route Network, including cross-border and international routes, based on Slovenian show case with a methodological approach, which included cooperation with stakeholders at the national and regional level and with an example of the implementation of the Drava cycling route as a good practice in Slovenia;
- the results of the online workshop on „Guidelines to define the National Cycle Route Network“, held on 26th November 2020, also provided in the interim report, showed that the involvement of stakeholders and the general public is very important for the planning of the cycle route network. The workshop was organised by Slovenian project partner, Ministry of Infrastructure, in cooperation with

Faculty of Civil and Geodetic Engineering from University of Ljubljana, Slovenia. Present participants were all project partners (AT, CZ, HU, SK, SL – organiser, HR, RO, BG and SR), 5 associated partners (RO, SL, HU, CZ and HR) and 4 external experts (AT, SL, RO and BG).

Besides defining the general National Cycle Route Network, it is also necessary to implement coordinated follow up activities and link the national with regional and local cycle route networks, and networks in neighbouring countries.

The guideline is based on the Slovenian target research project *Development of a model to connect Slovenia with cycling routes* that was finished in 2017. Aim of the project was to establish a comprehensive cycle route network at the national level for Slovenia. It consisted of several interconnected steps, which led from the analysis of the current situation to the concept of a comprehensive National Cycle Route Network. Steps of the target research project were transformed into these instructions for other project partners to use.

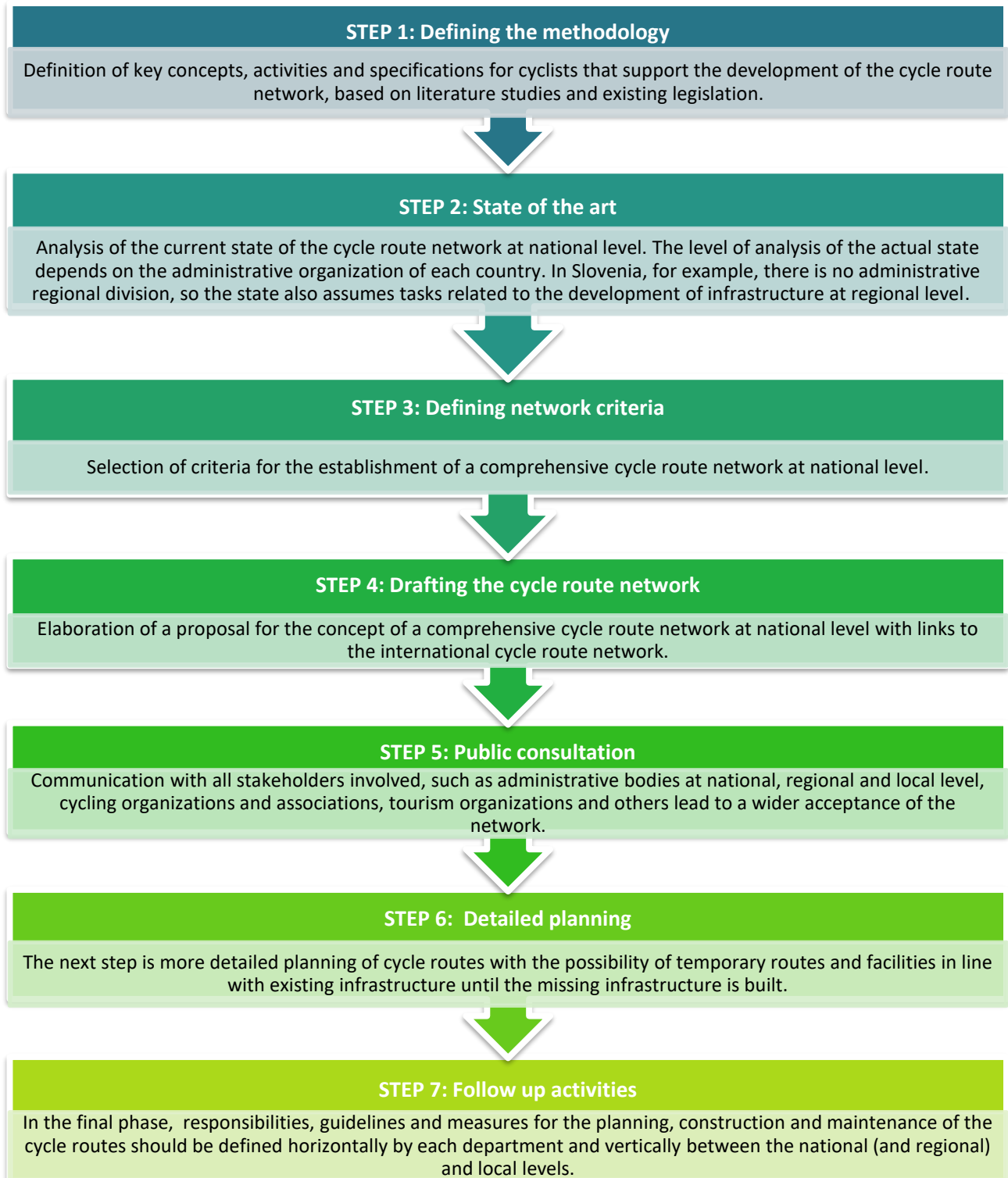
The mentioned target research project was initiated by the Ministry of Economic Development and Technology, which has launched a project to create a comprehensive National Cycle Route Network primarily with the aim of promoting tourism development. In the second half of its implementation, the project grew into a broader cross-sectoral cooperation. During this period the project team from the University of Ljubljana, Faculty of Civil and Geodetic Engineering - UL FGG and its partner (NGO Institute for Spatial Policies) has already developed planning criteria and designed the framework concept of the National Cycle Route Network.

Crucial for the success of the project was that Slovenia had already adopted the Strategy of Spatial Development of Slovenia (2004) and then in 2018 the amendment of the Road Act, which laid the foundation to define the National Cycle Route Network in a legislation. The Rules on bicycle connection were adopted in 2018, based on the results of the target research project.

Based on the comments and remarks of the project partners on interim report, the final report contains comprehensive guidelines to define the national cycle route networks that will also set harmonized base for the joint Danube Cycle Route Network (DCRN).

2 A comprehensive approach to the National Cycle Route Network planning

The steps for the definition of a National Cycle Route Network are:



STEP1: DEFINING THE METHODOLOGY

Definition of key concepts, activities and specifications for cyclists supporting the development of the cycle route network, based on literature studies and existing legislation.

The cycling route network represents an infrastructure intended for different users and, at the same time, it is an important element of the tourist offer that increases the visibility of an area (e.g. a region, a country). When creating a National Cycle Route Network, one should focus on the cycle routes and the equipment of the national (long-distance) cycling routes and routes both for tourists and for residents who use the same routes for their daily commute.

Therefore, when creating a National Cycle Route Network, one must address the following questions:

- How many levels of cycle route network do we need?
- What purpose will they serve?
- What are the concerns, needs and priorities of different users (a traveller vs. a daily commuter)?

The selection of objectives is focused on the creation of such a national network of cycle routes and may vary from country to country. The most general objectives should be:

- **Safe** - the routes have to enable safe cycling for different types of cyclists.
- **Direct** - as short a route as possible, serving mainly daily commuters.
- **Continuous** - routes should be contiguous/uninterrupted and, where possible, should run on existing cycling infrastructure. Otherwise, intermediate routes on secondary roads and low-traffic roads should be used. The ultimate goal is to build a stand-alone cycling infrastructure at the state level that connects to regional, local, and especially urban cycling route networks.
- **Attractive** - a route that complements and enhances its surroundings in a way that is attractive for cycling and that makes use of the natural and tourist potential of the area.
- **Comfortable** - the route should allow a comfortable flow of bicycle traffic and ensure easy use.
- **Equipped with systematic and homogeneous signs** - these should clearly identify the National Cycle Route Network and, where necessary, especially in larger urban centers, connections to local cycle route networks, primarily intended for residents for everyday use (shopping, commuting to school and work, etc.).
- **Equipped with appropriate facilities** such as rest areas, drinking fountains, bicycle services, first aid equipment, etc.
- **Connected to public transport services** – mostly to railway network, but also bus lines, cable cars and water transport.

In creating National Cycle Route Network, we propose to define more levels to keep the hierarchy. It must be emphasized that ***it is necessary for each country to adapt the levels and number of cycle routes to its own circumstances, in particular to its administrative regulations and legislation.*** There is (still) no common definition

at European level for cycling infrastructure and cycle routes at different levels, ***so countries have to consider national definitions of cycle routes.***

It should also be noted that long-distance and main cycle routes are most important for travelers, while regional and local cycle routes are important for daily commuters. As the needs and priorities of both types of infrastructure users are different, this should be considered especially when planning a route near urban centers. The principles of attractiveness, convenience and connectivity to public transport are more important to cycle tourists, whereas time of travel is important to everyday commuters, so they will use the shortest and most direct cycling connections. Ensuring a basic level of safety is a criterion that must be considered when planning a route for both types of users.

For example, Slovenia has no official administrative division of the country by regions. Therefore, all regional cycle routes fall under provision of a National Cycle Route Network, which is not the case in most of other countries. Considering the existing Slovenian legislation four levels of cycle route network have been created in Slovenia:

- I. The long-distance cycle route: is intended for the bicycle traffic within the European cycle route network on the territory of the Republic of Slovenia and is usually connected with the cycle route network of the same level in a neighbouring country. The European cycle route network may also run along the route of the main cycle route.
- II. The main cycle route: is intended for the bicycle traffic between centers of national, regional and inter-municipal importance and can be connected with a similar cycle route in a neighbouring country.
- III. The regional cycle route: is intended for the bicycle traffic between centers of inter-municipal importance and important local centers and tourist areas and may be linked to similar cycle routes in a neighbouring country.
- IV. The local cycle route: is intended for the bicycle traffic between settlements in neighbouring municipalities or between settlements and parts of settlements in one municipality and may be connected with a similar cycle route in neighbouring municipalities or regions. It is not subject to the national cycle route network planning.

Result of Step 1:

As a first step, each preparer of the expert basis for the determination of the NCRN should ask himself on which essential principles the determination of the NCRN in his country should be based. The priority orientation will also be used to determine the order of the proposed principles. In determining the number of bicycle connection levels, it is necessary to consider the country's administrative regulations (whether the country has regions and what powers the regions have) and whether existing regulations already determine the bicycle connection levels.

The outcomes of Step 1 are:

- Priorisation of objectives and
- Levels of cycling connections in the national cycling network.

STEP 2: STATE OF THE ART

Analysis of the current state of the cycle route network at national level. The level of analysis of the actual state depends on the administrative organization of each country. In Slovenia, for example, there is no administrative regional division, so the state also assumes tasks related to the development of infrastructure at regional level.

The purpose of the situation analysis is to obtain an up-to-date status of the existing cycling infrastructure. For the development of cycling tourism, the existing range of services for cyclists must be included in further decision-making. The most important factor for the qualitative implementation of this step is the availability of data on cycling infrastructure at national, regional and local level. Cycling infrastructure is part of transport infrastructure, which is why most countries inventory and manage it in their road databases.

So when obtaining the up-to-date status of the existing cycling infrastructure, one must ask the following questions:

- How does the current cycle route network look like?
- What data do we have of the current cycle route network? What is the quality of these data?
- Is the current cycle route network safe? Is it direct, coherent, attractive, and comfortable?
- Is the current cycle route network equipped with proper signage?

As listed above, the key question is whether the cycling infrastructure data exist at all and what is the quality of the data (positional correctness and detail, thematic correctness of descriptions, completeness - can we get all the information we want in timeliness). If these data are of poor quality, deficient or non-existent, this step will take more time, but it makes sense to work more efficiently in the next steps.

When analyzing the situation for the national cycling network, it is important to be aware that there are often already suitable cycling routes at regional and local level that can be used for sections of the national cycling network. There are certainly areas that have a developed network but also have much to offer cyclists, so they cannot be bypassed when defining the national network. Obtaining comparable data on connection flow, infrastructure condition and traffic signals is important to the final establishment of NCRNs.

Long-distance cycling connections are those that are intended for cyclists on multi-day trips and for which adequate accommodation and food facilities need to be provided. Following the starting points outlined in Step 2.1, when analyzing the state of the existing network of international cycling links, it is necessary to consider the standard for identifying and equipping them. In this step we ask ourselves how we want to connect the national network to international networks. International cycling links are usually the highest category of cycling connections in a given country. In Europe, these are the EuroVelo cycling connections.

EuroVelo, a project of the European Cyclists' Federation is a network of currently 17 long-distance cycle routes criss-crossing Europe, in various stages of completion. When completed, the EuroVelo network's total length will almost be 90,000 km.

Among the existing cycle routes, EuroVelo enjoys great popularity among cyclists and cycle tourists and connects European nations and regions, including the more remote areas. It is a growing and very active network of cycle routes, users and professionals, creating jobs and economic growth. The EuroVelo network (Figure 1) can therefore serve as the backbone for the establishment of the main pan-European cycle routes and networks, as well as for many national, regional and local networks across Europe. The course of the EuroVelo cycle paths through the countries involved in the project is shown in the Table 1.



Figure 1: Schematic EuroVelo Diagram (Routes, 2019)

Country	No. of EuroVelo cycle routes								
	4	6	7	8	9	11	13	14	
AUT		X	X		X		X	X	
HUN		X				X	X	X	
CZE	X		X		X		X		
SVK		X				X	X		
SLO				X	X		X		
HRV		X		X	X		X		
SRB		X				X	X		
ROM		X					X		
BUL		X					X		

Table 1: The course of the EuroVelo cycle paths among the countries involved in the project

The ECE report (2020) also presents essential characteristics of a good network/route:

- coherence of the network by connecting cities and towns in a region with well-developed and continuous cycle routes and with links to other modes of transport;
- good road surface and signposting;
- regular maintenance; and
- relevant offer of additional services - accommodation providers, restaurants, bicycle rental and repairs, etc.

Besides the international routes, a detailed overview of existing cycling infrastructure should be collected. Next to the defining the existing cycling infrastructure, all other relevant data also needs to be collected, like a list of centers of interregional, national and regional importance, central tourist spots along the (existing or potential) cycling infrastructure, main river network, railway and other public transport network, etc.

For example, in Slovenia the main problem is non-existing database on cycling infrastructure. There were some data obtained within the target research project through the cooperation between regional development agencies and municipalities in 2017. The participation was carried out with the help of a questionnaire. In addition, the municipalities had the opportunity to enter data on existing and planned cycling infrastructure directly into a web application prepared for this purpose. The problem with this type of data collection was a high heterogeneity of the data collected between municipalities, both in terms of content, and inconsistency in terms of when the survey was performed, the level of details provided in the survey (inconsistency of spatial criteria, methodological approach to signposting of cycle paths and routes, inconsistent terminology and consequently inconsistent presentation of existing and planned cycle paths and routes). Therefore, data collected was hardly comparable.

According to the Rules on bicycle connection, adopted in 2018, the National Infrastructure Agency has to elaborate the database. The Agency in 2019 implemented a pilot project of methodology to record cycling infrastructure and at the moment the pilot project is in public procurement procedure to set database on national cycle route network. When the database will be in function, also local communities will have to report their local infrastructure.

The most updated estimation on national network that Agency is maintaining currently are app. 300 km of separated cycling infrastructure on national level.

The capital city of Ljubljana has, by Cycling Journal Ljubljana, over 300 km separated local cycle paths, tracks and lanes within Ljubljana municipality. Cycling contra-flow is allowed in more than 70 one way streets and cycling is allowed in pedestrian zone in city center – 12 hectares. For other cities at the national level we do not have any official data.

The unofficial record of existing separated cycling infrastructure (Figure 2) was elaborated within target research project in 2017. The red lines present separated sections of cycle routes.

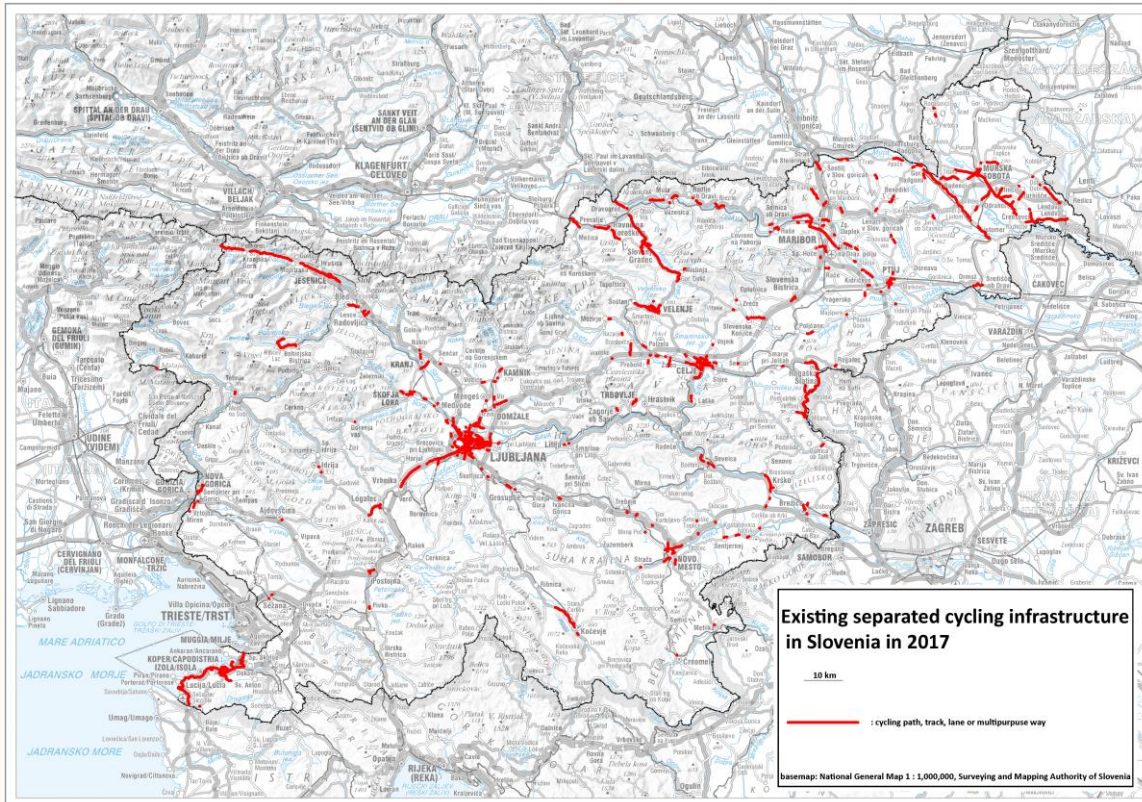


Figure 2: Cycling infrastructure in Slovenia (Uroš Rozman, 2017; Gregor Steklačič, 2019), map: DPK 1000

Result of Step 2:

Step 2 provides the NCRN determinant with data on existing cycling infrastructure, both for physical traffic infrastructure and for cycling areas with developed services for cyclists.

Outcomes of Step 2 are:

- Data on existing and under construction cycling infrastructure;
- Information on marked cycling routes;
- Data on the course of international EuroVelo cycling routes in the country;
- Data on services for cyclists (accommodation capacities, bicycle services, possibility of taking bicycles on public transport).

STEP 3: DEFINING NETWORK CRITERIA

Selection of criteria for the establishment of a comprehensive cycle route network at national level.

Users of cycle route network can be classified according to several criteria. They can be classified according to the type of bicycle used, the length of the cycle route, the duration of the cycling, the location or the type of cycling (Table 3). It is therefore necessary to decide what to take into account when defining network criteria and ask ourselves the following questions:

- Who are our main target group – type of cyclists?
- What are the priorities for each level of cycling route?
- What level of services should be provided along cycling routes?

In the following steps, the criteria and their order of priority (determining mandatory and optional) will determine the placement of each route in the site.

There is wide variation in expected speeds, pavement, elevation configurations, widths, ancillary equipment, and maintenance, so the guidelines for long-distance and second category of national routes are aimed primarily at long-distance and touring cyclists, and to some extent at daily commuters, families, and part-time riders, as well as cyclists on classic touring bikes and increasingly common touring e-bikes.

When planning a National Cycle Route Network, consider the **three main pillars of cycling** and understand the different needs depending on the type of cyclist:

- **cycling for daily commuting** to work, school etc., multimodal, in conjunction with public transportation that allows bicycles on board,
- **leisure cycling** for recreational purposes and
- **cycle touring (trips)** as an integral part of tourism.

It should be emphasized that depending on the pillar of cycling, the importance of the criteria for cycle route network varies. For example, directness is one of the more important criteria for cycle routes that are important for daily commuters, where cycling is exclusively for commuting to work or for daily tasks by bicycle (for this type of cycling, distance or travel time is the main factor when comparing with other modes of transport). The goal of a tourist or recreational cyclist, on the other hand, is not to get from point A to point B in the shortest possible time or distance, but to spend their leisure time in the best possible way. We should therefore have in mind that for the long-distance and main cycle routes of the national cycle route network, it is not necessarily the directness of routes that is the key criterion for their design, but that the criterion of attractiveness must also be taken into account, which implies a great potential for regional routes along rivers and over hilly areas. With the aim of separating the cyclist from other (motorized) modes of transport, getting closer to nature, ensuring attractiveness and striving for the most tranquil possible ride, the journey can also be extended in time and length, which from experience, made cycling also much more pleasant.

Type of cyclists	Cycling mode	The most common type of bicycle
Travellers	River and long-distance cycling, tourist cycling	Classic travel bikes (trekking bikes)
Commuters	Daily cycling due to commuting to work, to school, after shopping (housework, personal needs)	Different types, in last years also E-bikes, e-scooters, (rollerblades)
Family excursionists (walking speeds, road width, perfectly flat)	Cycling for relaxation, maintaining general fitness, excursion cycling	Leisure bicycles, e-bikes (different types), e-scooters, rollerblades
Road cyclists and triathletes (high speed, unhindered, on roads)	Road cycling	Roadster bikes, cross-country skates
Touring cyclists (unpaved paths)	Touring cycling	Mountain bikes (different types)
Gravity mountain bikers (special parks)	Mountain (gravity cycling)	Mountain bikes (different types)

Table 3: Different types of cyclists (extended by Zajc, Obu 2011), cycling and bicycle types.

In planning the National Cycle Route Network, consider the following **objectives**:

- there are three main starting points for the creation of a cycle route network: strategy, marketing and development of cycling infrastructure (including financial issues);
- the involvement of interested stakeholders and the general public is very important for the planning of the cycle route network, and;
- in addition to planning long-distance cycle routes at international and national level, it is also necessary to develop a strategy for more detailed planning of cycle routes at national level, linking regional and local cycle route networks (presented in more detail in step 6).

Based on the three pillars of cycling and objectives mentioned above, an initial concept of cycle routes between the starting point, important urban and tourist centres and the end point should be developed. The detailed placement of the cycle routes in site, ensuring above all the criteria of safety, comfort, signposting, additional services along the way, etc. must be the subject of a detailed spatial placement. It is necessary to take into account national legislation, technical construction requirements, property ownership, etc. Likewise, any cycle paths that have already been completed, must be taken into account in the process of detailed placement in site.

The levels of cycling connections in the national cycling network defined in Step 1 which are in accordance with the national legislation (if any existing), already imply the prioritisation of the criteria we made (according to the priorities of each country) and the hierarchy of settlements and tourist points in the country (outcomes of Step 3).

For example, at the transnational online workshop on the definition of National Cycle Route Network, which took place on November 26, 2020, Slovenia proposed criteria that were taken into consideration when planning the national cycle route network:

1. connection to the **international cycle route network** (mainly international EuroVelo routes),
2. connection of cycle routes with **the most important urban centers at national and/or regional level, where the determination of the selected urban centers depends on the respective country and its strategic orientations of spatial and the settlement (urban) network development,**
3. connection of cycle routes with **important tourist centers, areas and attractions** (cultural, natural and other sights),
4. connection of cycle routes **into a comprehensive network** (continuity of cycle routes),
5. **connecting conurbations** and creating sustainable transport alternatives,
6. cycle routes **along waterways** where spatially possible exist, so that the natural values and habitats of wild plant and animal species are preserved and the protection regimes of the protected areas are respected,
7. taking into account **the variability of the terrain** and avoiding steep slopes,
8. connecting the cycle route network **with the railway network or other public transport networks** (boats, busses, cableways) and to public car parks. The results of BiTiBi project (<http://www.bitibi.eu/>) provide further information on the combination of public transport network and cycle route network.

The criteria listed above already imply that we also need to define a hierarchy of settlements (urban centres) and main tourist points in the country. In the case of Slovenia, this was done in accordance with our country's strategic orientations for the development of the spatial and settlement network. According to Spatial Development Strategy of Slovenia (2004), we have 15 centres (or conurbations) of national importance (red dots), 15 regional (blue dots) and 20 inter-municipal ones (green dots):

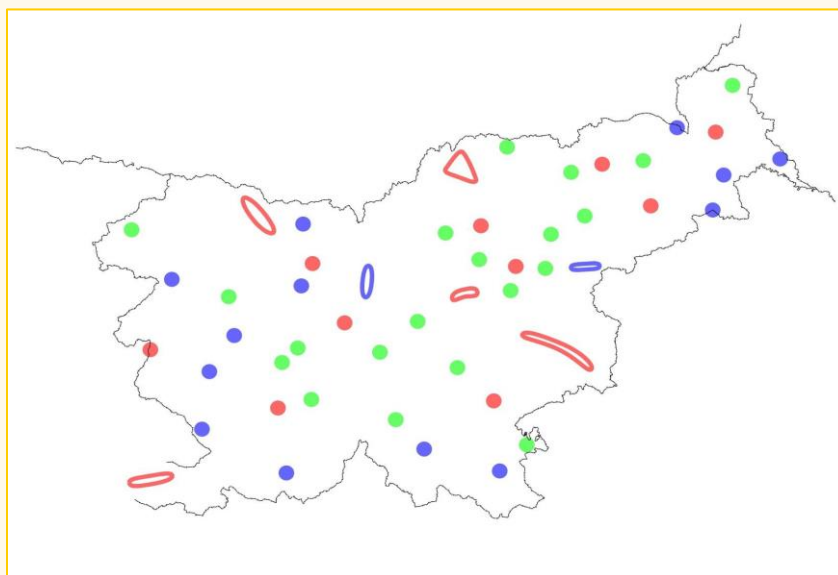


Figure 3: Hierarchy of settlements in Slovenia.

The importance of main tourism centres, areas and attractions was based on tourism tax revenues reported by municipalities (2016). We recognised 27 main tourist centres (yellow dots):

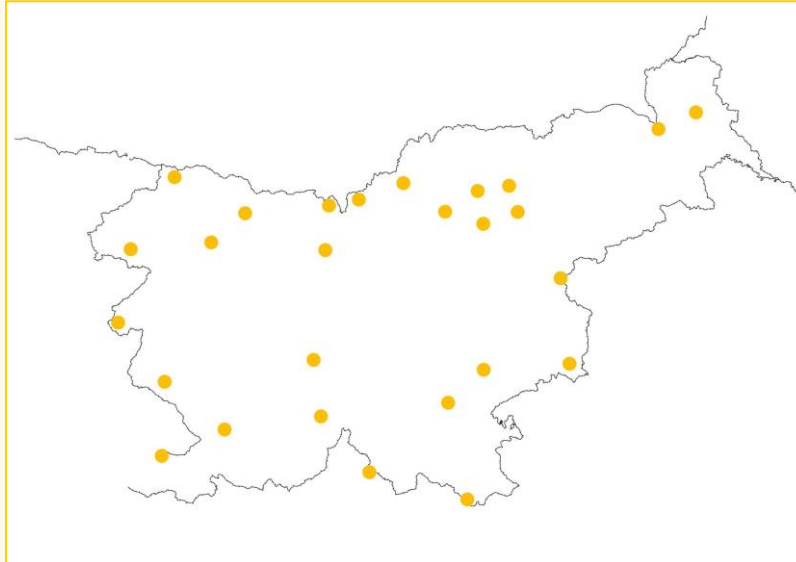


Figure 4: Main tourism points in Slovenia.

The criteria listed here were assessed and discussed during an online workshop with participants from all partner countries of the project. Participants were first familiarised with the method of designing and applying criteria for planning the national cycle route network in the case of Slovenia (Žura et al., 2017). Using the proposed criteria, the participants made a first attempt to define a national cycle route network in 6 nationally mixed groups for 6 countries involved in the project.

Based on the conclusions presented by the rapporteurs of the each working group, there was a common finding that the proposed criteria and the idea of hierarchy of settlements and main tourist points are useful for designing long-distance cycle routes at international and national level.

Result of Step 3

Step 3 determines the order of criteria by which the state will determine the levels of the national network and later considers them in the placement process.

Outcomes of Step 3 are:

- Order of criteria for determining and placing the NCRN;
- Hierarchy of settlements according to importance and main tourist points in the country:
 - Level 1: settlements of highest national importance;
 - Level 2: settlements of regional importance;
 - Level 3: settlements of inter-municipal importance & main tourist points¹.

¹ Depending on the importance of tourism, each country can define for itself in which hierarchical level it places the most important tourist points. It could be in level 1, 2 or 3.

STEP 4: DRAFTING THE CYCLE ROUTE NETWORK

Elaboration of a proposal for the concept of a comprehensive cycle route network at national level with links to the international cycle route network.

The development of the cycle route network concept at the national level should take into account the criteria described in Step 3. As mentioned earlier, it depends on the individual country and its legislation how many levels/categories will form in their national cycle route network. It should be noted that the order of the criteria is not the most important, as countries differ both in terms of national administrative laws and regulations and natural conditions. In view of this, we recommend that each country assesses the weight of each criteria and proposes a national cycle route network accordingly.

When drafting the cycle route network, one must take into account the following questions:

- Which are the most important urban centers at national and/or regional level and their connection to the public transport network?
- Which are important tourist centers, areas and attractions that must be considered connecting to the cycle route network?
- Will it allow coherent connections, attractiveness of the routes (along waterways, near the nature), and comfortable terrain (no steep slopes)?
- Will it be connected to other means of public transport?
- Will it allow easy border crossing and connection to cycle networks of neighbouring countries?

To determine the corridors of each cycling route, we suggest identifying the settlements you want to include in the national cycling network. From a state and national cycling perspective, cycling connections between central settlements, which include major tourist centers, make the most sense as state connections. It makes sense to use the central settlements defined by the strategy in the spatial development area of the country. Therefore, defining the settlements to be connected by individual levels of the national cycling network is crucial. It is also useful to consider international corridors (EuroVelo) and connections to the networks of neighboring countries when defining the bases of the corridors.

As an example, we present the concept of a cycle route network in Slovenia, which was designed taking into account the above criteria. Let us stress again, that Slovenia has no official administrative division of the country by regions. Therefore, all regional cycle routes fall under provision of a National Cycle Route Network. Considering the existing Slovenian legislation, Slovenian proposal included three levels of cycle routes at national level (Figure 3):

- **long-distance** (red line on the map): connecting national (15 in Slovenia) and regional centers¹ (additional 15 in Slovenia) , allowing access to international cycle routes, connection to the rail network,
- **main** (blue line on the map): connects centers of national and regional importance, connection to the railway network is also important, and
- **regional routes** (green line on the map): enable the connection of inter-municipal centers (20 in Slovenia), important centers of local importance, tourist areas (27 in Slovenia) and areas with outstanding natural attractions, but do not meet the criteria for long-distance or main cycle routes.

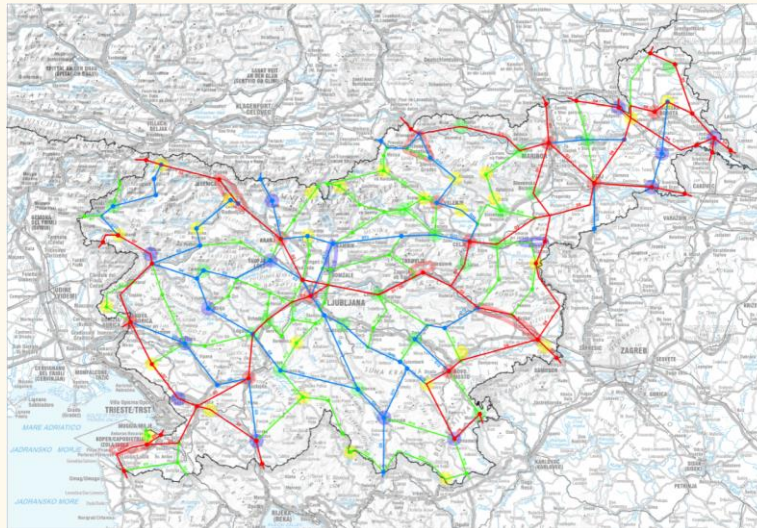


Figure 5: The concept of the national cycle route network, which was also adopted in the Rules on bicycle connections (2018).

¹ According to the Strategy of Spatial Development of Slovenia (2004).

Result of step 4

Step 4, based on the set criteria and hierarchy of settlements and main tourist points in step 3, draft the corridors between those points and form the national cycle route network. This may be in more levels, depending on the applicable regulations and the state's administrative rule. Based on the definition of the settlements and the international connection, in this step you will also determine the level and corridor of each cycling route in the national cycling network.

Outcome of Step 4 is:

- Draft of the cycle route network.

STEP 5: PUBLIC CONSULTATION

Communication with all stakeholders involved, such as administrative bodies at national, regional and local level, cycling organizations and associations, tourism organizations and others lead to a wider acceptance of the network.

Stakeholder participation in establishing a comprehensive national cycle route network is one of the most challenging stages. Cycling is a very widespread activity with enormous tourist, travel, environmental and general economic importance, while on the other hand cycling infrastructure takes a lot of space and creates many spatial conflicts of interest among the different stakeholders (quite often they have opposing views and requirements).

Public and various stakeholder participation must take place in accordance with both Aarhus Convention (2004) and national law in each country. Formal public and stakeholder participation refers to an agreed minimum level of participation in the planning process provided by the state to balance different interests. It is a formal, prescribed by law, cooperation that does not depend on the goodwill, willingness, resources and time of planners, investors and other stakeholders or the administration.

When establishing a national cycle route network, the following questions relating to stakeholders' interests must be taken into consideration:

- Does the draft meet the expectations and requirements of the stakeholders?
- Is the draft in accordance with national legislation that covers the stakeholder's area (authority)?
- Does the draft encompass aspects beneficial to the stakeholder?

In addition to the formally prescribed involvement of the public and other stakeholders, informal participation is also very important, at the earliest possible stage of planning. Informal collaboration is any involvement of the public, user groups, and other stakeholders in planning processes to achieve greater consensus on proposed regulations and maintenance. Informal forms of cooperation arise in agreement with investors and administrations and are often aimed at further publicizing projects and obtaining various information for the preparation of the project.

In Slovenia, both methods of public (mostly professionals¹) and stakeholders' involvement were used. Informal engagement was used during the project Development of a Slovenian cycle routes master plan (Žura et al., 2017), in the phase where we tested the concept of a comprehensive cycle route network at the national level with a wider range of participants, including representatives of ministries, regional development agencies, all members of the Slovenian Cycling Network and other organizations (Slovenian Tourist Board, Slovenian Infrastructure Agency, Cycling Association of Slovenia), Chamber of Commerce, Traffic Safety Agency). To this end, a workshop was organized at which representatives of these institutions and organizations confirmed the selection of key criteria for the establishment of a national cycle route network, which, due to the absence of administrative regions, must also cover the regional level. The importance of connections to European corridors and cycle routes with neighbouring countries was also emphasized. On the other hand, the cycle route network at the national level must also be the backbone that enables the development and connection to local cycle route networks.

At this stage, individual municipalities were not involved, as the project was only concerned with developing the concept of the national cycle route network.

As already mentioned, in the second half of the project, when the criteria for the planning of the cycle route network have already been agreed with the main actors at national and regional level and the first concept of the national cycle route network has been drawn up, the formal procedure for preparing and adopting of Rules on bicycle connection in Slovenia was initiated. The adoption of such rules was crucial for the further development of the national cycle route network and, above all, for more successful financing of its implementation.

In this case, the formal process was led by the Ministry of Infrastructure, which coordinated the preparation of the rules. Moreover, a need for wide public consultation before the rules were adopted. This is part of the established legislation of practice in Slovenia².

At the same time, the importance of an open and inclusive approach to the development of Rules on bicycle connections in the context of the proposed concept of a national cycle route network was recognized and the following stakeholders were closely involved in the preparation:

- Ministry of Infrastructure,
- Ministry of Economic Development and Technology,
- University of Ljubljana, Faculty of Civil and Geodetic Engineering - UL FGG and Institute for Spatial Policies (IPoP) as project partner, and
- Slovenian Infrastructure Agency.

¹ The involvement of the general public follows the whole project of planning and building a national cycle route network as a follow-up project.

² In Slovenia, public hearings are mandatory for any rule prepared either at the state or local level. In the case of adoption of spatial planning documents, the procedures for public involvement and stakeholder participation are described in great detail in Spatial Planning Law (2017).

Their main objective was not only to elaborate the concept of the national cycle route network, but also to prepare the rules that would form the legal basis for its implementation. A permanent working group was set up, in which not only representatives of the above-mentioned institutions participated, but also representatives of the cycling interest groups:

- Various directorates within the Ministry of Infrastructure,
- Slovenian Infrastructure Agency,
- University of Ljubljana, FGK, and
- Slovenian Cycling Network.

After the development of the concept of the national cycle route network, there was also an interdepartmental coordination between:

- Ministry of Finance,
- Ministry of the Environment and Spatial Planning,
- Ministry for Economic Development and Technology,
- Government Office for Legislation, and
- Coordination group of 212 Municipalities.

Due to the successful cooperation both between sectors at horizontal level and between stakeholders at different levels, only minor changes in the concept of the national cycle route network and in the regulations were necessary to harmonize interests at local level. In 2018, Rules on bicycle connections were adopted. In the further implementation of the national cycle route network in space, efforts should be focused on:

- positive approach, positive public awareness of the benefits to society,
- activities related to the unification of the marking/classification of cycle routes (step-by-step approach),
- active cooperation between Ministry of Infrastructure, Slovenian Infrastructure Agency, regional development agencies and municipalities.

Clear definitions of criteria and their prioritization are crucial to begin a public consultation with stakeholders, especially subordinate regions and local communities. If the criteria are not defined in sufficient detail, individual communities will take the initiative to have a national cycling connection through their area. There are several advantages to running a national cycling link through their area. From the point of view of financing, in the case of national cycling connection, the state is usually the investor or at least the co-financier; on the other hand, remote cycling routes encourage the development of tourism and thus revenue for local service providers. In order to avoid excessive changes to the planned routes of the national cycling network, the expert basis for the adoption of a national regulation establishing the NCRN must be adequately supported by reference to the technical criteria for its establishment.

At this stage, a planned final route should already be drawn in the background for the corridor of a single route, for which we do not recommend public disclosure due to challenges in spatial location of separate cycling infrastructure (project conditions at the planning stage) and acquisition of property rights. Experience from Slovenia shows that even in the final planning a significant deviation from the originally planned route and type of cycling surface is possible.

Result of Step 5

Step 5 involves coordination with the public of specific levels and corridors of the NCRN, which are determined based on the previous steps.

Outcomes of Step 5 are:

- Consensus on the NCRN and
- The basis of an official regulation at the state level that determines the NCRN.

STEP 6: DETAILED PLANNING

The next step is more detailed planning of cycle routes with the possibility of temporary routes and facilities in line with existing infrastructure until the missing infrastructure is built.

The regulation that determines the NCRN and the corridors of each route is the basis for the implementation or preparation of plans (project documentation) in accordance with the applicable legislation in the field of roads and construction in the country. Detailed planning on the basis of an official regulation is also the legal basis for determining the investor and the subsequent operator of the cycle route.

However, before preparing the project documentation for a single cycling route, the route must be determined in more detail in accordance with the criteria from Chapter 2.3. Although we have already recommended in Chapter 2.5 that a more detailed drawing of the planned routes be prepared, it is recommended that this step be carried out after the official definition of the corridors, as this reduces the number of stakeholders with whom this placement must be coordinated. According to national legislation in the field of spatial planning, this step requires coordination with the spatial planning authority. In most of the countries, the holder of the regulation of the intended land use is the local community (municipality).

Therefore, during the process of detailed planning, one must take the following questions into consideration:

- How do we put the draft of NCRN on the ground?
- Can we use the existing cycling and road infrastructure?
- Can we use the existing cycling infrastructure connections with other means of transport (looking for best possible ways of intermodality)?
- Can we provide provisional routes of national cycle route that will allow coherent cycle route network, until the final network is constructed?
- What are the minimum standards for the quality of the cycling infrastructure, the road surface, traffic loads, speed limits, maximum gradients and standards for the maintenance of unpaved surfaces?

Detailed track of each cycle route should be planned in GIS environment using different available source spatial data and follows the common principles and national legislation. The main result of this phase is a georeferenced topologically correct vector line network. For creating joint Danube Cycle Route Network (DCRN), pan-European or wider international network and also to run any cross-border projects and activities these vector data should be harmonised. The Pan European Masterplan proposes following necessary technical requirements: Shapefile format (file extension .SHP) or ESRI ArcMap format (geodatabase).

- Shapefiles should include information on the Projected Coordinate System used.
- Each feature, e.g. existing or planned route should also have a unique identifier. Any other field providing additional information can also be provided if possible.

The detailed course of the planned routes can be displayed to users in various ways, e.g. by means of GPX or KMZ files in a freely accessible Google Earth environment or interactively based on Google Maps (Figure 5). One of the main problems with such displays is insufficient interpretation when users zoom in or out too much. In this case there might be a visible discrepancy between the course of the route and the content of the cartographic base, usually an orthophoto or satellite image, which, like the route itself, has limited positional accuracy.

Knowledge of existing transportation infrastructure, both road and cycling, is very important for accurate planning. Indeed, when the NCRN is planned, it is not yet built and does not fully meet safety requirements, but it also does not consider all the principles such as connectivity, directness, comfort and attractiveness. For this reason, until the construction of the entire network, it is necessary to provide provisional routes of national cycling connections that allow the continuity of the network, which is given along the existing public road network. However, to the extent that national legislation allows for the routing of national cycling routes on private property with appropriate agreement and payment of compensation to the owner, this is also one of the ways to avoid excessively busy and dangerous sections.

Therefore, we recommend that the current roads are evaluated whether they meet the conditions for redirecting cyclists to ride on them (depending on the traffic load, truck percentage and measured vehicle speeds). On the other hand, it is necessary to set a minimum standard for the quality of the road surface, road width, maximum gradients and standards for the maintenance of unpaved surfaces, so that national cycling routes are not guided on muddy field paths or steep forest slopes.

In the phase of detailed planning in Slovenia, with the aim of estimating the value of the investments required for the implementation of the network on the main and long-distance routes, individual routes were placed within the few meters precision based on previously developed criteria and the prepared concept of the national cycle route network (Figure 3).

When breaking down the (dividing) network sections to the ground, we tried to make the best use of the existing cycling infrastructure and when this was not possible we looked for the possibility of reconstruction and use of existing gravel roads, field or forest paths that could be reserved for cyclists. These have the advantage that they are usually away from busy roads, making them more attractive for both tourists and recreational cyclists. When it was not possible to use the previously mentioned infrastructure, we either moved the cycle route to a low-traffic local road (roads with less than 500 vehicles per day) or we planned to build a new cycling infrastructure where this was the only way to ensure a safe route.

We have used four attributes for the presentation of the cycle routes, with which we present the situation on site and the necessary measures in more detail. The following attributes are used:

1. **new construction of the cycling infrastructure** (on these sections there is no existing cycling infrastructure and the existing road infrastructure does not allow safe guidance of cyclists);
2. **upgrading of existing roads** (reconstruction and reorganization of service, public, forest or field paths, categorized or uncategorized gravel paths are planned);
3. **new construction of the cycling infrastructure** (on these sections there is no existing cycling infrastructure and the existing road infrastructure does not allow safe guidance of cyclists);
4. **upgrading of existing roads** (reconstruction and reorganization of service, public, forest or field paths, categorized or uncategorized gravel paths are planned);

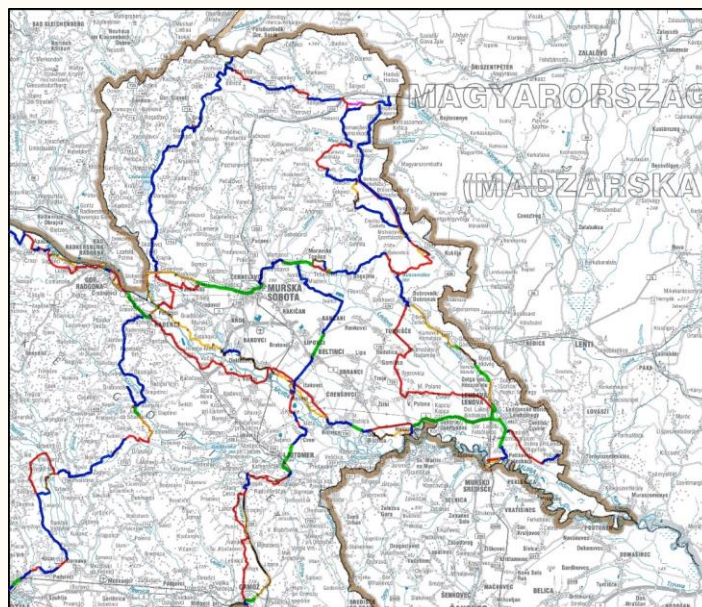


Figure 6: Example of more detailed cycle routes in the Pomurje statistical region (NE Slovenia), where:

- green line - existing cycle paths, tracks, lanes,
- blue line - existing paved roads that are classified as less busy roads,
- brown line - arrangement of gravel roads (service, public, forest, field),
- yellow line - proposed construction of a cycle path,
- red line - temporary course of the route until the construction of the missing cycle path.

For all sections that required a new construction, we have also provided temporary sections, according to the criteria of a less suitable option, which is, however, only conditionally suitable for connection to the construction of a suitable path or route. Through the course of the development of detailed sections we have tried to use the infrastructure already built or to follow the procedures already laid down in the planning or even implementation documents, but we were limited in terms of the data available. The proposed detailed location of a single long-distance or main line represents the starting point for the further localisation of cycle paths as one of the possible options.

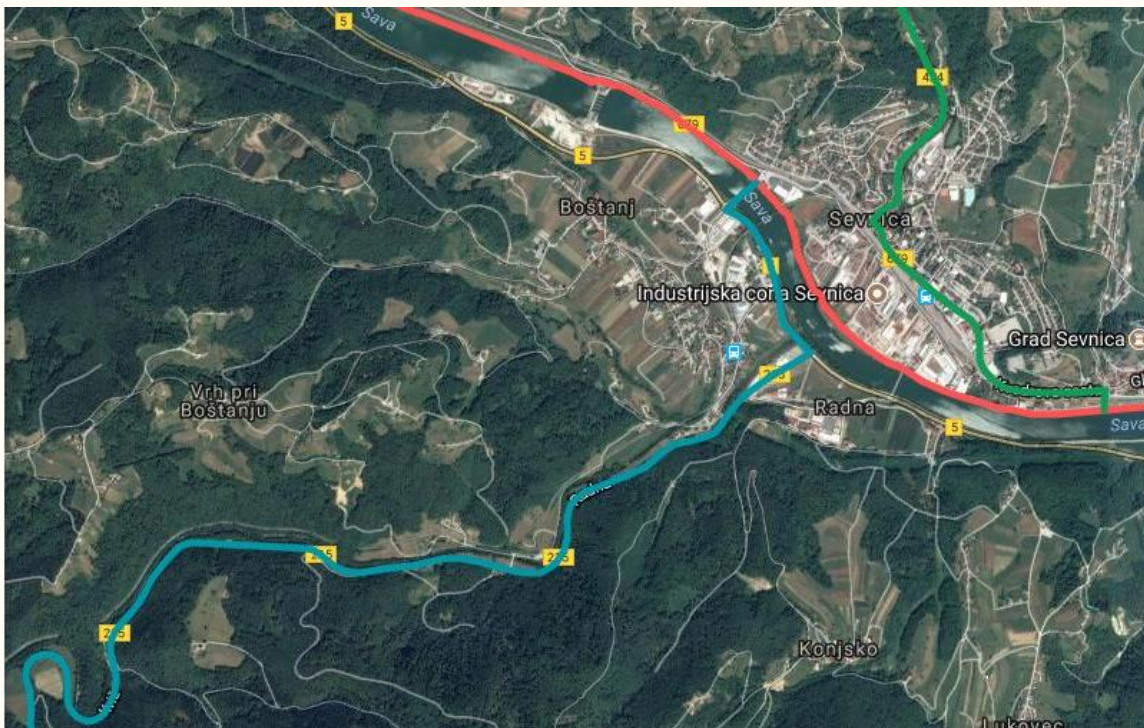


Figure 7: Test plot of sections of National cycle route network on Google Maps, where:

- brown line – long-distance bicycle route,
- blue line – main bicycle route,
- green line – regional bicycle route.

Result of Step 6

In Step 6, the exact routes of each cycling connection are determined. If infrastructure is not available, a provisional route is drawn for an individual route until the missing sections are constructed.

Outcomes of Step 6 are:

- Final routes of individual cycle route and
- Temporary routes of individual cycle route, which lead the cyclist on the road.

STEP 7: FOLLOW UP ACTIVITIES

In the final phase, responsibilities, guidelines and measures for the planning, construction and maintenance of the cycle routes should be defined horizontally by each department and vertically between the national (and regional) and local levels.

The construction of the planned final routes of the national cycle network from step 6 is the final goal, to which much coordination, transport planning and financial resources lead. Because of the great need for coordination of priorities between the state, regions and municipalities, ***it is recommended that a coordination working group is set up, which includes representatives from all levels.***

We need to ask ourselves:

- What else is necessary for successful implementation of a network?
- Who will be responsible in the future to oversee coordination of activities related to cycle route network?
- Who will implement various activities? (such as regulations, improvements, maintenance ...)?

It is also useful that the coordinating body should head or at least be a member of an institution that has the competence to prepare strategic documents in the field of NCRN development. The coordination should include relevant members responsible for the implementation of cycling connections - policy makers at national, regional and local levels, executive agencies that invest in infrastructure by law, and representatives of the NGO sector. It is not useful to have representatives of individual municipalities in the coordination at the national level, but it is advisable to include regional representatives who coordinate projects with local municipalities at a lower level.

In accordance with the Rules on bicycle connections (2018), the operator of the national cycle route network is the Slovenian Infrastructure Agency, an institution at the national level. As mentioned above, there are no formally established regions in Slovenia that would have certain competences (e.g. for the construction of regional infrastructure), the regional level of cycle routes is also the responsibility of the state. This is also the reason why the National Cycle Route Network is quite dense and requires complex coordination with local communities that do not have the same interest in building a cycle route network. Experience shows that in the existing statistical or so-called development regions, which have a coordinator within the regional development agencies; coordination has been more successful and has gone further in the development of the national cycle route network.

The Ministry of Infrastructure has therefore taken on the role of coordinator of the National EuroVelo Coordination Center, which was successfully established in 2020. As the NECC's tasks include not only infrastructure development but also services for cyclists, 10 institutions are involved. In addition to the coordinator of the Ministry of Infrastructure, the following institutions are involved: Slovenian Infrastructure Agency, Ministry of Economic Development and Technology, Slovenian Tourist Board, GIZ Slovenia Outdoor, Slovenian Railways - Public Transport, Slovenian cycling network, Alpine Association of Slovenia and Cycling Association of Slovenia. For better functioning, the NECC has organized its work in three subgroups:

- development of cycling infrastructure,
- development of the cycling services,
- development of strategic documents and legislation on cycling.

The purpose of the segmented working group on development of cycling infrastructure - National Cycle Route Network - is to ensure a coordinated approach from the provision of resources, placement in space, technical planning and also final implementation.

Result of step 7

Step 7 never ends. It is a process of building and continually improving and upgrading the network. Cycling infrastructure standards get higher every year, so sections built 10 or more years ago have to be widened over time, build street crossings for cyclist separate from other transportation infrastructure and new bridges built over watercourses to shorten distances and speed up cyclists' travel time.

Outcomes of Step 7 are:

- Standards and priorities;
- Strategic document with specific priorities;
- Prepared and implemented of individual projects.

3 Example of comprehensive development of an individual cycle route: Drava bike in Slovenia

The Drava bike cycle route is the example where the development of infrastructure and services for cyclists started before the official National Cycle Route Network definition and proves that the development of infrastructure or at least the definition of the cycle route network is not mandatory to create a successful tourism product. Due to the level of development (not of infrastructure, but of the established coordinating body and services) at the time of the preparation of the study on the national cycle route network, experts and decision makers urged to define the highest level of the national cycle route (long-distanced) along the Drava River. When the country defines its cycle route network, not only the existing infrastructure should be the main criterion, but also various other criteria should be considered.

The Drava bike cycle route is also an example that only coordinated cross-border cooperation lead to harmonized cross-border cycle route that connect Italy, Austria, Slovenia and Croatia. The border crossings are defined bilateral harmonization of levels of national cycle route network with neighbouring countries and border crossing points are necessary to elaborate the joint Danube Cycle Route Network (DCRN). In the second phase the common marketing is the goal.

Based on successful practice in Italy and Austria, the Drava bike project was started in Slovenia and simultaneously, *The Rules on bicycle connection (2018)* were established in Slovenia. However, the project was started a few years before the *Development of a Slovenian cycle routes master plan (Žura et al., 2017)*², which was the base for writing these guidelines. Most of the steps and procedure that were used in defining national cycle route network were previously “tested” at Drava bike project, while on the other side, adopted *Rules on bicycle connection* influenced latter activities performed on the Drava bike project. Therefore, this project and its experiences confirm and also practically verify most of activities explained in the previous chapters.

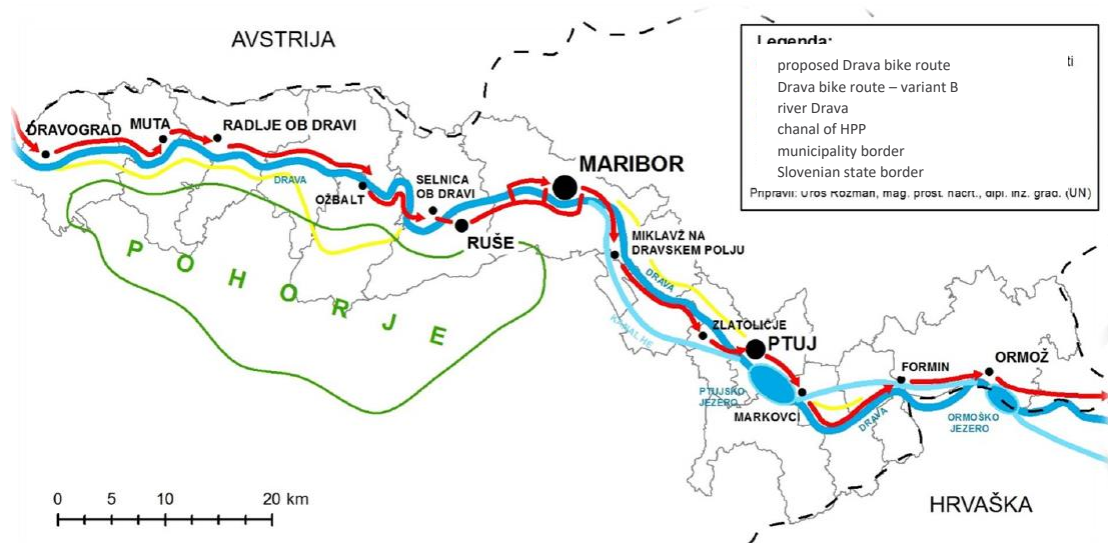


Figure 8: Proposed and adopted long-distance Drava bike route (Rozman, 2020).

² This Report is still in progress and the final version is not published yet.

The planning of the Drava bike route began in 2014 as a test of the methodology for the detailed arrangement of state infrastructure with the method of variant analysis (Figure 8), which is used in Slovenia for all national spatial plans for the planning of state infrastructure (Rozman, 2014). Previously, the method had never been used for the planning of long-distance cycle routes.

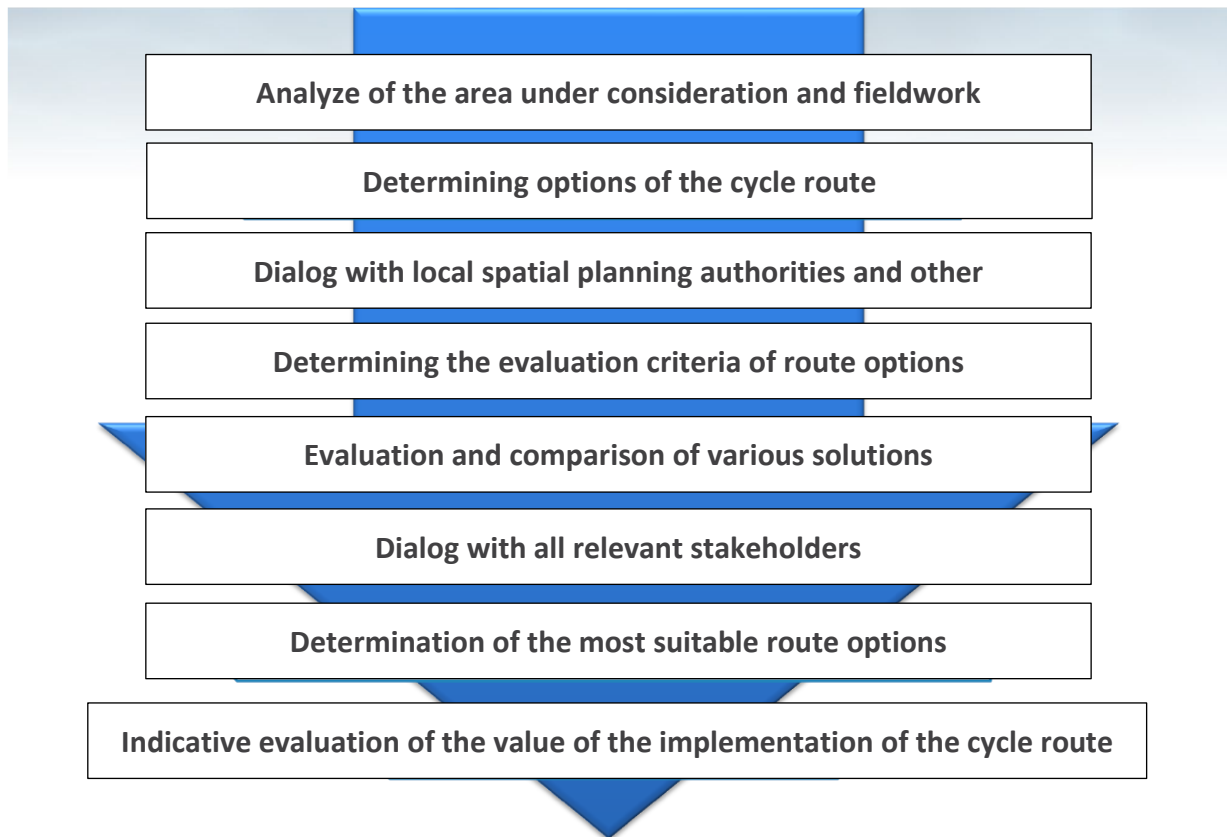


Figure 9: Schematic diagram of the methodological approach to planning a long-distance cycle route according to the study method used in Slovenia for all national spatial plans for the detailed arrangement of state infrastructure.

Subsequently, the study developed into a concrete project that was also carried out in space, as it was coordinated between all relevant stakeholders at national, regional and local level (Figure 9). One of the most important factors for the successful implementation of the Drava bike was the coordination of all involved (interested) stakeholders in the planning of the most suitable cycling infrastructure.

It must be stressed once again that the lack of a common methodology for planning long-distance cycle routes and the absence of regions at administrative level makes it very difficult to harmonize interests. After the adoption of the *Rules on cycling connections (2018)*, the state decided that cycle routes should not be planned like other state infrastructures, so the process was left to further coordination by Regional Development Agency in cooperation with the state on the one hand and the municipalities on the other.

Namely, local communities often try to assert their interest in the interest of the whole region by forcing certain cycling links into a common solution which they believe better suits their economic interests (especially from the point of view of tourism development).

Despite these circumstances, the entire project was subsequently implemented with the support of various financial sources (Figure 10).

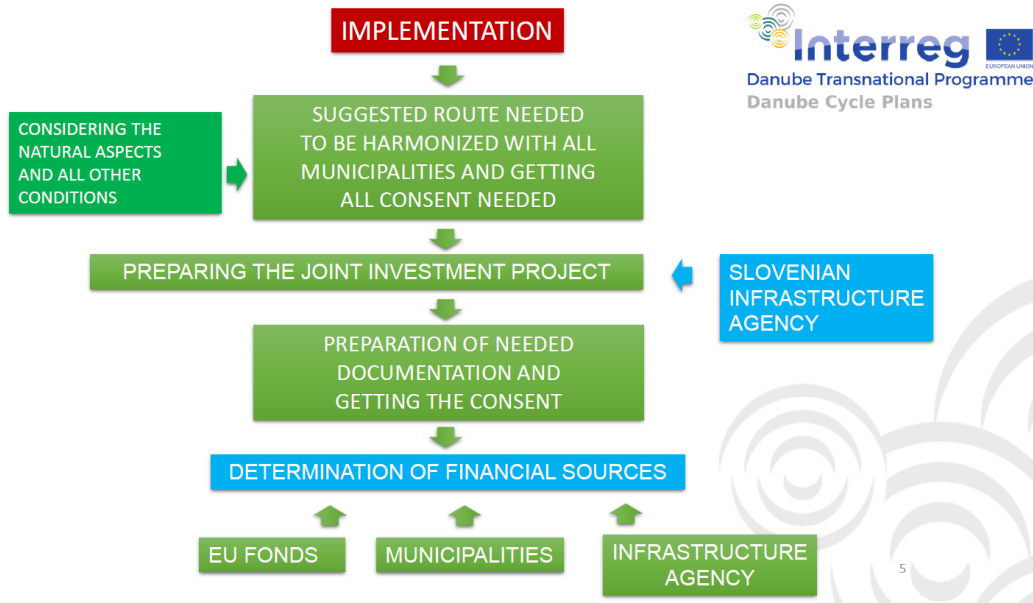


Figure 10: Course of the implementation of the long-distance Drava bike route (Rozman, 2020).

All criteria at national level were considered in the planning and implementation, while other infrastructure (e.g. benches, rest areas, drinking fountains, bicycle backrests) and the possibility of alternative bicycle transport on steeper sections of the route were added. All this is important for efficient, attractive and safe cycling for both tourists and occasional or daily users of cycle routes (Figure 11, Figure 12). Long-distance bicycle routes are therefore also important from the point of view of developing other infrastructure, which includes not only tourist services (e.g. accommodation, guesthouses) but also other services (e.g. bicycle equipment shops, bicycle repair shops).

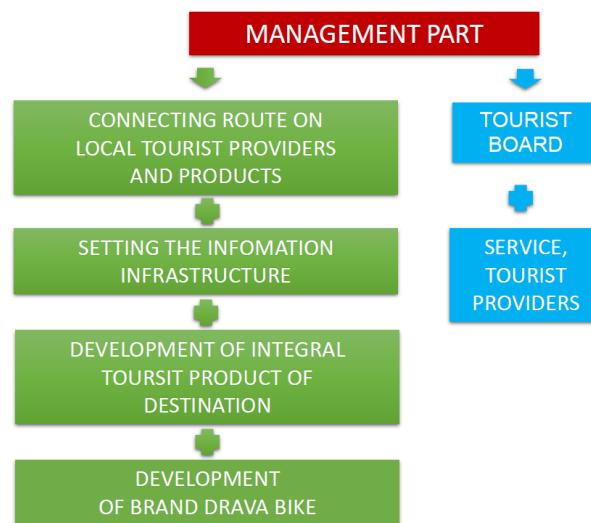
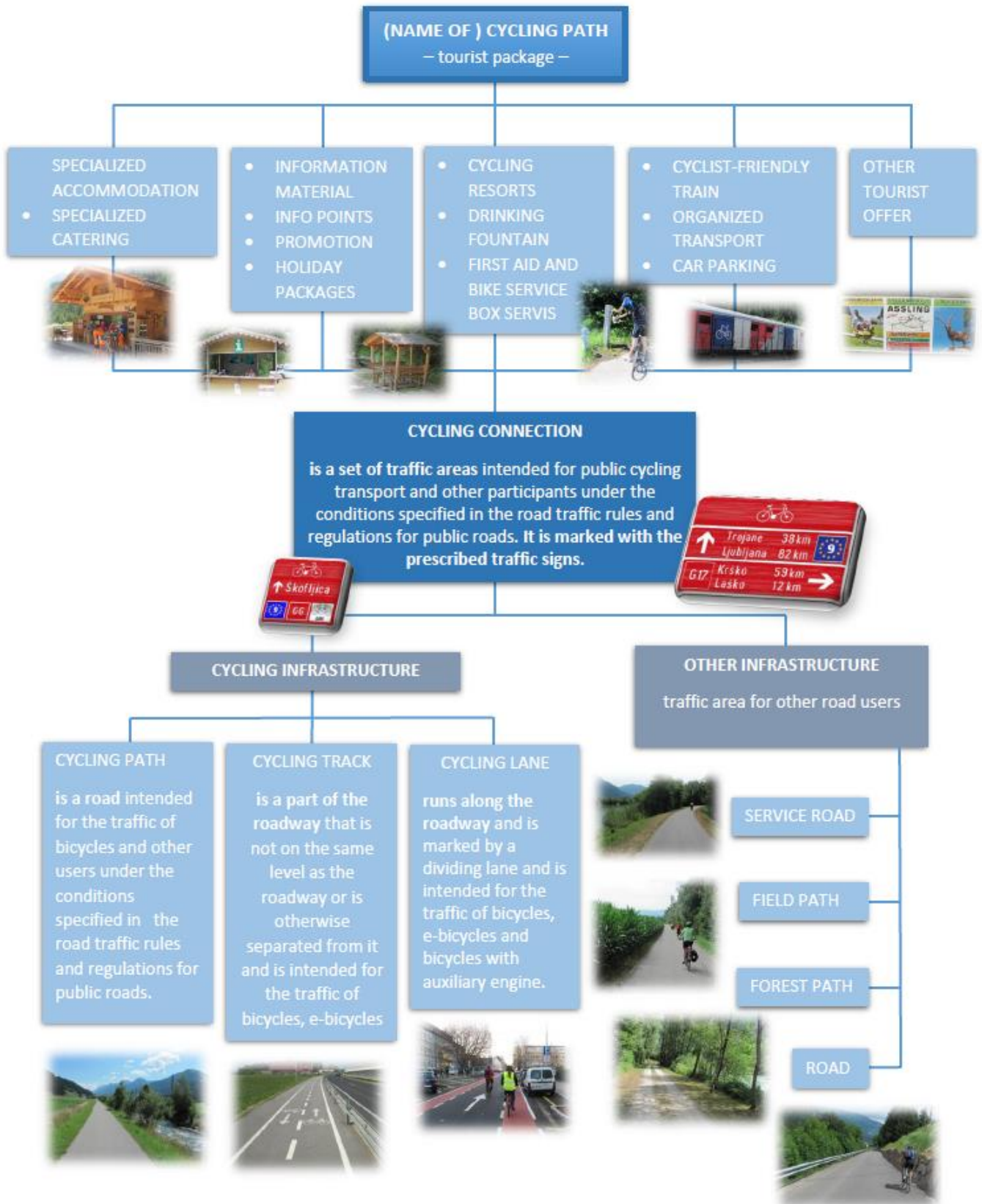


Figure 11: Integration of the Drava bike route into a comprehensive tourist offer.

It is important that this is a cross-border project, as the planned Drava bike route also connects with cycle routes in the neighbouring countries of Austria and Croatia.



Uroš Rozman, mag. prost. načrt., dipl. inž. grad. (UN)

Figure 12: From a cycle route to a tourist package (Rozman, 2014)

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