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## TOURISTIC BICYCLE ROUTES IN EASTERN POLAND

## TURISTIČKE BIKIKLISTIČKE RUTE U ISTOČNOJ POLJSKOJ

### ABSTRACT

*This article is related to the Touristic Bicycle Routes in Eastern Poland as an instrument of regional development. The project and its implementation are carried out in the framework of the Operational Programme for Cohesion "Development of Eastern Poland" of European Union for the years 2007-2013. Development of infrastructure for long-distance tourist cycling in very attractive conditions of landscape, nature and in area rich in monuments of material culture is intended to increase tourism in these areas, as well as increasing the number of cycling tourists. As a result, the proposed Tourist Bicycle Routes (length 2390 km) and the development of cycling tourism should influence in to socio - economic development of Eastern Poland.*

**Key words:** long-distance cycling tourism, Operational Cohesion Programme "Development of Eastern Poland", Touristic Bicycle Routes in Eastern Poland, infrastructure conditions and using of bicycles in Poland.

### SAŽETAK

*Ovaj članak se odnosi na turističke biciklističke staze u istočnoj Poljskoj kao instrument regionalnog razvoja. Projekt i njegova provedba se provode u okviru Operativnog programa za kohezijsku "Razvoj istočnoj Poljskoj" Europske unije za razdoblje 2007 - 2013. Razvoj infrastrukture za dugo-udaljenost biciklizam turista u vrlo atraktivnim uvjetima krajolika, prirode i na području bogatom spomenika materijalne kulture je namijenjen za povećanje turizma na ovim prostorima, kao i povećanje broja biciklističkih turista. Kao rezultat toga, predložene Turističke biciklističke staze (duljina 2390 km) i razvoj biciklističkog turizma trebali utjecati na društveno - gospodarskom razvoju istočne Poljske.*

**Ključne riječi:** međugradskim Cikloturizam, Kohezijski Operativni program "Razvoj istočnoj Poljskoj" Iznajmljivanje turističke rute u istočnoj Poljskoj, infrastrukturne uvjete i koriste bicikala u Poljskoj.

### 1. Introduction

The purpose of this paper is to show the project of Touristic Bicycle Routes in Eastern Poland, as well as their potential impact into socio – economic development of these regions contained of Eastern Poland.

At the beginning of the twenty-first century in Europe observed the dynamic development of cycling, including long-distance tourism, which is an instrument of strategy of Intelligent Tourism 2020 (smart, sustainable and growth-oriented) (EIT, 2007, ECF, 2011).

The development of bicycle tourism is an important component of sustainable tourism, the objectives of which are:

- promote sustainable and environmentally friendly tourism
- to highlight the importance of cycling, benefits and regional economic impact
- promote the development of transnational tourism cycling routes (e.g. EuroVelo Cycleways Network Greenways) (ECF, 2011, Greenways, 2012)
- promote cultural tourism (cultural routes).

The European Union promotes the development of long-distance cycling routes also in different countries, spending on these activities considerable financial resources. Such solutions must also Bicycle Trails project in Eastern Poland implemented under the Operational Cohesion Programme "Touristic Bicycle Routes in Eastern Poland" (MRD, 2012). This is one of the first project of this scale in Poland and Europe. The project is scheduled for the years 2013 to 2014. Total investment cost of EU funds near by 61 000 000 € (MRD, 2012).

## **2. Socio – economic and transportation background in Poland**

### **2.1. Socio-economic aspects**

Poland is a country located in Central Europe and occupies an area 312 685 km<sup>2</sup> and a population of 38.6 million people. National income per capita GDP/capita is \$8890 (CSO, 2012). The demographic structure there is a small percentage of women - 51.7%, compared to men, which is 48.3% of the total population. The urbanization rate is 60.9%, indicating that the numerical superiority of the population living in cities compared to rural residents. The structure of urban areas in terms of quantity is dominated by the city under 10 000 inhabitants, which is 502 and the city numbering 10 - 50 thousand inhab., which is the 315. Spatial structure is complemented by the 47 cities with more than 50000 - 100000 inhab., 22 cities numbering 100 - 200 thousand. inhab. and 17 the largest urban centers, with more than 200 thousand. population. From the standpoint of use bicycles as a means of everyday transportation and recreation center of the structure of urban areas is of great importance because cycling has a different character depending on the size of the urban area. In general, population growth is associated with increased space for the urban center, and this in turn greatly prejudice the transport behavior of inhabitants, including the increase in the average length of travel and modal choice.

Poland is a country where, from 1990. there is a dynamic development of private cars. Number of passenger cars in Poland in the years 1990 - 2010 increased by 227% and per 1000 inhabitants was 451 (CSO 2012). This significant increase in the number of registered vehicles increased by only minimal length of the street, caused a significant increase in traffic congestion and had implications for the use of the bicycle. On the one hand household equipment in the car encourages its use in place of other means of transport, including bicycles, on the other hand creates a premise for the use of bicycle as a means of recreation imported in car to a place of rest.

### **2.1. Climatic conditions for development of tourist cycling**

Bicycle in Polish cities and metropolitan areas are seasonal means of transport. The greatest use of the bicycle has a place in the spring - summer between June – September. Usage of bike is almost zero in the winter during the months December - February. In the month of April is a significant increase in the use of the bicycle and fall in November. Seasonality of use bicycles is associated with changes in temperature.

During the winter, when the average temperature during the day is below 0°C, cycling, at least in large cities and large is practically nil. This is also the lack of operability of the existing cycling

infrastructure. In small towns, where the bicycle is often the only means of transportation, inhabitants enjoy the bike throughout the year.

In the April follows a significant increase in use of the bicycle, which is inherent in the temperature of at twenty degrees Celsius, which promotes the use of the bicycle. A significant decrease in the use of the bicycle is in the November, resulting in the deterioration of weather conditions, including the lowering of air temperatures and rain and even snow. Research of Zalewski (Zalewski, 1993) indicates that there is a strong correlation between average monthly temperature and relative use of the bicycle. The use of the bicycle is moved on a monthly basis in relation to the average temperature for the month. This can be interpreted as meaning that, in March cyclists "waiting" for better weather (higher temperature), while in November, even though the temperature is already relatively low, "with momentum" still use the bike.

## **2.2. Legal conditions for cycling and development of infrastructure and road safety**

Some of the most important determinants of use bicycles as a means of locomotion are legal considerations. They are included in the Act on Road Traffic (Act of Polish Parliament, 2012) which was amended in 2011. Changed regulations adapt the Polish law to European solutions. It include the following:

- Admission of bicycles in the opposite direction to the existing traffic
- Create „contra – flow” bicycle lanes
- Create locks for bicycles at intersections
- Preference for the bicycle as priority traffic on the carriageway
- Significantly enhanced ability to use the sidewalks by cyclists, if no bike paths and atmospheric conditions are bad
- The possibility of cyclists riding side by side
- The possibility of using an electric bike.

A very worrying in terms of pedestrian safety is the permission of bike traffic on the sidewalk, because the regulations are very soft and practically there are no penalties for rampaging bikers. The solution is a significant reduction in pedestrian and road safety are expected to confirm that the statistics of road accidents.

Risk of injury for cyclists in Poland is among the highest in European countries (2nd place - 251 deaths per year). In 2011 by National Police (NPH, 2012), happened to 1714 road accidents with cyclists, which is 5,7% of all accidents. 1631 people were injured and 152 killed. Accident statistics show that cyclists in Poland are the most vulnerable of all the European countries in terms of the number of deaths per 100 accidents. This ratio in Poland is 10.3 persons/ 100 accidents, while in countries that are leaders in Germany and Britain is about six times lower than 1.6 and not killed in 100 accidents (NRTSB 2009). Somewhat more satisfactory for the Polish are statements of accidents with cyclists in relation to the population. So the statistics are ahead of Poland, Hungary, Romania, Belgium, Slovenia, the Netherlands and the Czech Republic, where it should be noted that the two discussed above rates do not include the use of the bicycle (cyclists transportation work), and therefore do not show the actual risk of this group of road users. In the Polish case, where the use of the bicycle is relatively small, the index related to the risk of accidents in transport would be even higher.

## **2. Brief characteristics of Eastern Poland**

Area of Eastern Poland referred to in this paper makes five provinces located along the eastern border of Poland: Warmia - Mazury, Podlasie, Lubelskie and Podkarpackie and the Świętokrzyski

region (CSO 2012). Separating this area occurred in the early the years 2000 - small for the needs of one of the Operational Programmes of the European Union, aimed at economic and social development of the least developed region in Poland. This area occupies totally 99 039 km<sup>2</sup>, which is inhabited by 8152600 inhab. (Zalewski, 2012) This represents approximately 31.7% of Polish territory and 21.1% of the total population. The average population density of the area is 82 persons/km<sup>2</sup> and is well below the Polish average of 123.4 persons/km<sup>2</sup>. The most similar average population density are in Podkarpackie and Świętokrzyski regions, where the figure are respectively 118 and 108 persons/ 1 km<sup>2</sup>.

The same is true with urbanization rates, which for the area of Eastern Poland is equal 51.3%, with 60.9% of the national average. The most urbanized region in the analyzed area is the Warmia – Mazury - 60%. In Podkarpackie Voivodeship most of the population lives in rural areas, as much as almost 60%. The values of these indicators reflect aspects of the historical development of these regions.

According to data for 2010 in the Eastern Poland is almost 100000 beds of different categories. The largest accommodation is located in the province of Warmia - Mazury and there are 38 736 seats, representing almost 39% of the accommodation capacity of the whole area (Zalewski, 2012) This high percentage of beds in the Warmia - Mazury is due to the development of tourism development in this attractive tourist destination in the region.

In terms of economic development of the region forming the area of Eastern Poland are well below the national average. If we assume an average value of GDP in Poland for 100 (\$8890), the GDP in the Analyzed regions is 67.2 - 77.6% (CSO, 2012). The lowest GDP is in the provinces of Lublin and Podkarpackie, Which amounts to 67.2% and 68.5%. The total length of the road network in the eastern English is 116 063 km, Which corresponds to the density of the road network of 117 km/ 100 km<sup>2</sup> and is significantly lower than the national average of 79.6 km/100 km<sup>2</sup> (CSO, 2012). The total length of existing roads and bike trails is in the five provinces 2429 km (CSO, 2012) ,but they are in bad technical standards and badly maintained. Projected Touristic Bicycle Routes in Eastern Poland should bring the development of a further network bike than 2000 km. Data on the economic development of the regions that make up the Eastern Poland are showed in Table 1.

Table 1 Data concerning economic development of the Polish Eastern Area

	Name of voivodeship					Total Eastern Poland
	Warmińsko-mazurskie	Podlaskie	Lubelskie	Podkarpackie	Świętokrzyskie	
Population [thous.]	1427	1191,5	2161,8	2099,5	1272,8	8152,6
Surface [km <sup>2</sup> ]	24173	20187	25122	17846	11710	99039
Density of population [people/km <sup>2</sup> ]	59	59	86	118	108	82
Urbanization rate [%]	60	59,5	46,6	40,6	45,4	51,3
Number of beds [1]	38736	11006	18742	21349	9492	88325
GDP [100%=\$8890] [%]	73,8	73,7	67,2	68,5	77,6	100
Total length of public roads [km]	22569	24195	34013	18370	16916	116063
Total length of existing bicycle trails [km]	909,4	151,5	244,2	873,1	250,5	2428,7

### 3. Project of Touristic Bicycle Routes in Eastern Poland

#### 3.1. Basic assumptions of project

The connections between regions have been established by regional authorities in the initial phase of work and were so called „fixed points” that should be carried out the cycle route. After selection of route corridor, which was indicated by the local provincial authorities on the basis of the results of the Authoring Team, multi-criteria analysis for the three route options in each province was effectuated. The 30 factors analyzed ranked in six main groups of criteria: environment, natural resources, landscape - natural, cultural values, transportation and economics.

In the selected variant searched optimal route cycling and its possible functional forms - technical according to the following criteria:

- tourist attractions - sightseeing,
- topography of the site,
- its management and
- spatial barriers.

Following design criteria for the location of bike in the cross section of road was taken into consideration:

- Safety - cycling on the road was adopted by max.  $AADT^{81} \leq 1000$  vh/ day, recommended bike lanes max  $AADT \leq 2000$  vh/ day
- Maintaining cohesion of connection
- Availability of land demarcation lines of roads and streets.

The sections of the route run in the general traffic, where car traffic volume is estimated as <1000 vh/h going through urban areas, traffic calming zones and reduce of speed permitted to 30 km/h is planned.

The area for 5 ÷ 10 km from the planned route axis depending on the phase of the project was analysed as the bicycle route corridor and there have sought to safe the location of bicycle road. Forecast cycling traffic was done for the year 2025, ie 10 years from the planned route dedication to service. The forecast made by Polish (Zalewski, 2012) using the method recommended by the European Cyclists' Federation (ECF, 2011)

Following basic technical assumption was taken into consideration in project of Touristic Bicycle Routes in Eastern Poland:

1. Total length near by 2000 km
2. Width – min. 2,5 m (exceptionally – 2m)
3. Pavement – bitumic (min. 20% of total length), other sections in ground broken or stone paved
4. Adaptation of existing shoulder and foot paths
5. Maximal vertical slope – 5% (slope > 5% on 3% of length)
6. Ratio of mean elongation < 1,2 in all voivodeships
7. Access to train station < 80 km
8. Income from one day tourist – 16€/day
9. Income from multadays toursit – 32€/day

#### 4.1. Description of the routes

The proposed cycle route with a total length of 2028 km is through very attractive sightseeing areas (MRD, 2012, Zalewski, 2012). During the tour are located a numerous sites which are natural attractions and sightseeing in Europe and the world, such as the three National Parks: including the Valley of Biebrza and Białowieża and National Park Roztocze. Moreover, all the way in all

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<sup>81</sup> AADT – Avarage Annual Daily Traffic [vh./d]

provinces are located numerous historical heritage material in the form of churches, orthodox churches, cemeteries, castles, palaces and manor houses and forts defense. Informative description of the Tourism Bicycle Routes in Eastern Poland by provinces and major touring - natural attractions is showed in Figure 1 and Table 2. The main centers of tourist services located on the route are listed in bold in Table 2.

Bicycles traffic in planning Touristic Routes of Eastern Poland will be carrying out on roads in general approximately 59% of total length. For this purpose, it is assumed the use of existing roads primarily auto traffic at low flow below 1,000 vh/d and unsurfaced roads. Existing and planned bicycle facilities in the form of bicycle paths and pedestrian - cycle itineraries will be located outside the roadway is a total of 873 km, which represents almost 41%. The largest use of Touristic Bicycles Routes of Eastern Poland is expected in cities, where is due to the concentration of settlement, exactly in: Białystok – 4666 bikes/d (AADT) and Rzeszów and Chełm – 3140 bikes/d in 2015.



Fig. 2 Planned itinerary of Touristic Bicycle Routes of Eastern Poland

Designers expect that the implementation of Touristic Bicycle Routes of Eastern Poland will generate „induced” cycling traffic. The proposed bicycle route is planned mainly along of district roads (52.1%), municipal (23.5%) and other local low-traffic area (8.6%). Along the roads is the biggest intensities of traffic carried is only 0.8% of the entire designed cycling itinerary. Along the national road cycling route is conducted outside of the carriageway as a two-way bicycle path or pedestrians – cycles itineraries. The technical characteristics of the proposed solution by province is shown in Table 3

Table 2 Informative description of the cycling routes by provinces and major attractions touring - natural

Name of voivodship	course of the route <sup>82</sup>	The main sightseeing tourist attractions
Warmia - Mazury - Length 432 km	Border with Pomerania Region - <b>Elbląg</b> – Tolkmicko – Frombork - Braniewo- Lidzbark Warmiński – Bartoszyce – Górowo Iławieckie – Sepol - Korsze – Węgorzewo – Gołdap – Border with Podlasie Region	Baltic Coast The Mazurian Lake District - The Gorawskie Hills and Sepopol Lowland The Szeskie Hills
Podlaskie - Length 592 km	Border with Warmia-Mazury Region - Sejny – <b>Suwałki</b> – Augustów – Goniadz – Łomża – Tykocin – Choroszcz – <b>Białystok</b> – Supraśl – Białowieża – Hajnówka – Border with	The Suwałki Lake District The Biebrza Valley – Swamp Land – National Park

<sup>82</sup> Bold – biggest cities in region and main centers of cycling tourism

Name of voivodship	course of the route <sup>82</sup>	The main sightseeing tourist attractions
	Lublin Region (Gnojno - river Bug, connecting by ferry)	The Valley of Narew River The Białowieża Forest – National Park – UNESCO World Heritage Site and Biosphere Reserve
Lubelskie - Length 384 km	Border with Podlasie Region (Gnojno - river Bug, connecting by ferry) - Janów Lub. – Terespol – Włodawa – <b>Chelm Lub.</b> – Krasnystaw – Szczepleszyn – Zwierzyniec – Józefów – Border with Podkarpackie Region	The Bug River The Polesie Lubelskie and The Włodawa Lake District The Lublin Upland and The Roztocze National Park
Podkarpackie - Length 430 km	Border with Lublin Region - Karol – <b>Przemyśl</b> – Dynów – Tyczyn – Boguchwała – <b>Rzeszów</b> – Łańcut – Sokołów Małop. – Leżajsk – Nowa Szarżyna – Rudnik n.Sanem – Ulanów - Border with Świętokrzyskie Region	The San River Valley
Świętokrzyskie - length 190 km	Border with Podkarpackie Region - <b>Sandomierz</b> – Koprzywnica – Klimontów - Daleszyce – <b>Kielce</b> - Sielcia	Świętokrzyskie Mountains

Table 3 The Functional - technical datasheet of designed Tourist Cycling Routes in Eastern Poland

	Unit of measure	Warmia - Mazury	Podlaskie	Lubelskie	Podkarp.	Świętok.	Total
Population in corridor	[thous.]	444,2	1152	668,3	1116,7	700,6	4081,8
Number of towns and communities	[1]	27	32	27	37	17	140
Urbanization rate	[%]	24,6	26,2	35,4	45,1	52,8	37,3
Number of beds	[1]	5746	10948	7704	14374	5045	43835
Number of catering facilities	[1]	444	334	509	511	283	1081
<b>Length of EPTBR</b>	<b>[km]</b>	<b>432</b>	<b>592</b>	<b>384</b>	<b>430</b>	<b>190</b>	<b>2028</b>
Length of existing infrastructure	[km]	236	345	273	297	157	1308
	[%]	54,6	58,2	71,2	69	82,5	64,5
Length of planning cycle infrastructure outside of carriage-way (bike paths, etc.)	[km]	150	298	106	173	40	767
	[%]	34,5	50,3	27,7	40,2	21	37,8
Length of section in general traffic road	[km]	282	294	278	257	150	1261
	[%]	65,5	49,7	74,3	59,8	79	72,2
Number of engineering structures requiring reconstruction	[1]	34	12	23	27	9	105
Number of intersections needed to rebuild (sight posts and traffic lights)	[1]	41	21	28	31	20	141

## 5. Conclusions

1. In the Polish cycling can be a significant factor for local development, as there is untapped potential in this as the natural sightseeing and - tourist and nature with high values of cognitive, developed based catering and accommodation, as well as a developed road and railway network provided access to nodes.
2. Implementing of The Eastern Poland Bicycle Touristic Routes are a very big chance into socio – economical development of 5 voivodeships in Poland. This results from:
  - excellent landscape conditions
  - many of architectural monuments
  - good base of accommodation and catering
  - good transportation accessibility to trains, buses and airports.
3. To obtain mentioned results of social – economic development is necessary to:

- develop significantly cycling infrastructure. First of all, should be made to improve the quality of infrastructure in non-urban sections as well as absolutely complete of the base points of cycling and bike repair in urban areas
  - develop accommodation and catering infrastructure, that should go in the direction of differentiation (categorization) and standardization.
4. The Touristic Bicycle Routes of Eastern Poland should be attract many tourists not only to cycling, popularize Eastern Poland in Europe and worldwide as well as be a impulse to the development of cycling infrastructure and cycle tourism in other Polish regions, either. These activities will also provide a base for socio - economic development and increase the number of jobs, improve living conditions for synergies.

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