



**Latgale Region Development
Agency**



BALTIC COUNTRY OF LAKES

BJR INTERREG IIIA projektu SII-050 līdzfinansē Eiropas Savienība

**Feasibility study
"LAKE AND RIVER USE FOR TOURISM, RECREATION AND
TRANSPORT IN LATGALE AND RYTU AUKŠTAIĻA REĢIONOS –
POTENTIAL, INFRASTRUCTURE DEVELOPMENT AND NECESSARY
INVESTMENTS"**

1st progress report

From December 10, 2006 to March 28, 2007

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1. INTRODUCTION

The report represents progress of the feasibility study "Lake and River Use for Tourism, Recreation and Transport in Latgale and Rytu Aukštaitija Regions – Potential, Infrastructure Development and Necessary Investments" during the time period from enhancement of the project, i.e. 13rd of December, 2006 to 28th of March, 2007

The feasibility study has being performed by Grupa 93. Ltd. in collaboration with subcontractor in Lithuania UAB Vilnius Consult within the Interreg IIIA financed project No: SII-050 "Creating New Tourist Destination By Joining Two Border Regions in Latgale-Rytu Aukštaitija" which leading partner is Latgale region development Agency and partners: Latvian Tourism Development Agency, Euroregion "Country of Lakes" Lithuanian office, Ignalina Nuclear Power Plant Regional Development Agency.

The report has been set up according to the revised time and task schedule, approved in Inception report (22nd of March, 2007).

Main activities of the 1st progress report refer to inception phase – meetings with project partners, and Study of trends in lake and river development (2000 lakes).

The goal of the study is to explore the tourism development possibilities in Latgale and Rytu Aukštaitija near lakes and rivers, elaborate justification for investments in infrastructure, as well as prepare funding application for the first set of investments.

2. PERFORMED ACTIVITIES

2.1. Meetings and seminars

A project **kick-off meeting** was held in Daugavpils on December 10, 2006, in which representatives of Grupa 93, Vilnius Consult and the Client, represented by Latgale Region Development Agency participated. It was conducted to clarify Client expectations of the Project and coordinate common activities. Moreover, a presentation was made about the project on a monthly infoseminar and partner meeting of the project on January 9 in Daugavpils.

Project partner seminar was held in Daugavpils on February 8, 2006. Main results of the seminars were: agreement on main principles on data collecting about lakes, rivers, tourism infrastructure and service providers (data availability, credibility, institutions holding data and how to treat them). It was agreed to collect general data (name, water surface area, administrative location, public or private status, NATURA areas, water quality, tourism operators) about all 2000 lakes and rivers. Then select a hundred lakes in each country and explore more detailed them about the services in the nearest neighbourhood and accesses to water line, and infrastructure.

Info seminars in six Latgale district councils were held in February and March, 2007. Project experts informed local municipalities as one of the crucial project stakeholders about the project and gathered opinions on necessary investments. The seminars had been held in Balvi district council (13th of March), Kraslava district council (13th February), Rezekne district council (14th February), Daugavpils district council (15th February), Ludza district council (22nd February), Preiļi district council (28th February).

2.2. Interviews and questionnaires

25 interviews in Latgale to clarify current use of lake and river have been carried out in Latgale (Ludza, Daugavpils, Krāslava) in 8th and 9th of January, 2007 and **41 in Rytu Aukštaitija** in January and March 20, 2007. Project experts interviewed officials from local and regional governments, representatives of state institutions in regional structures, tourism information centres and local businessmen engaged in the field of tourism. The list of the interviewed persons has been created to cover wide range of local stakeholders which could help to develop water based tourism offer, taking account all the aspects – economic, environmental, property management and policy.

The purpose of the interviews was to clarify:

- demand in water tourism
- what kind of tourism offer has been demanded the most;
what kind of places has been popular, where they are located (distribution and concentration),
is the difference between summer and other seasons offer is crucial, what kind of activities has been "replaced" in winter time;
can we speak about current target groups and their specific demands;
what are the proportion between numbers of local, regional, state and international visitors;

is there are growing or decreasing tendencies in the demand and in the demand of specific tourism products, places and activities.

- supply of tourism services
major tourism accommodations and service providers;
their growth in the latest years, new products;
municipal role in the tourism products development and promotion;
main problems (needs) of the service providers, what they lack the most;
Main groups of tourism services, characterization, groups (beds, fishing, routes, boating sites, unique offers etc.).
- demand / supply interaction
is supply sufficient and in what fields demand is not fulfilled, what kind of services are missing.
- potential of increasing revenues from tourism (if price is not increasing)
potential for new services, new activities, new accommodations and infrastructure etc.;
service providers' plans for future;
business ideas;
municipalities plans related to water object management;
obstacles for greater utilisation of tourism potential, delaying factors;
infrastructure that would be needed to increase lake and river use for tourism and associated revenues;
fill rates of accommodation providers.

Interviews also helped to expand and review the list of potential lakes and rivers where investments would be the most effective. Nevertheless criteria about the 10 ha and bigger water surfaces, in the list has been included, for example, attractive small size lakes (favorite place, remarkable services, significant cultural or nature object etc.) – potential sites for further tourism development. Interviews also helped understanding that investments has to be focused on those lakes, where the investments could give the most reasonable return and serve as an impulse for other service providers in the neighborhood. Besides just those sites has to be taken as first places for investments where all partners have interest, where public-private partnership could be established.

Questionnaire for Latgale region local municipalities were spread in March 5, 2007. Five municipalities responded and characterized 14 lakes and rivers. The most valuable gain from the questionnaire was information about plans, landscaping and technical projects around the lakes. Information about the rest lakes had to be gathered from planning documents, which are more general.

2.3. Strategic planning documents. Desk work.

Document study was done to summarize development visions and strategic documents of various stakeholders from different sectors, branches and management levels.

The strategic documents in tourism were selected, based on interviews tourism development agencies / TIC / municipalities / tourism businesses concerning (see 2.2.).

Spatial development plans or territorial plans under Latvia legislation is being elaborated on 1: 10 000 scale, which allows showing quite a lot of detailed information. Local territorial plans has been approved as municipal binding regulations. Thus from local plans experts extract places next to waters envisaged for tourism development in future.

125 local municipal plans and 6 district municipalities' plans have been revised, analyzing following data:

- Rivers and lakes situated in the certain administrative division;
- Allowed use of lake and river (recreational, fishing, recreational-angling etc.);
- Tourism and recreational zones around lakes.

Developmental plans of Utena Region of the year 2006-2013 were surveyed, Latgale planning region spatial plan has been revised, (more general plan worked in scale of 1: 200 000) to see water bodies of regional importance.

Nature Protection Board information – NATURA sites situated in the Latgale region, specially protected areas' management plans, regulations of the Cabinet of Ministers on individual use and protection of the protected area (if any)

- NATURA area, where lake or river is situated,
- nature protection plan (author, year of approval), planned management measures related to tourism infrastructure building (year, foreseen costs),
- special restrictions set under nature protection regime/

Regional Environmental Board information – technical regulations issued for building of new tourism objects or setting up a tourism area

- year, land owner/ submitter, short description of planned activity and building, address.

The following documents have been studied in order to find out background of context of other sectors:

- European Regional Tourism Institute (2005). Rural tourism development strategy.
- European Regional Tourism Institute (2006). Interviews with tourism professionals from Latvia and Lithuania concerning Baltic Country of Lakes.
- LOWE-AGE (2006). Baltic Country of Lakes - Communication Strategy.
- Municipal spatial plans of selected municipalities in the Latgale region*
- Government of the Republic of Lithuania. State Environmental Monitoring Program of the year 2005-2010.
- Seimas of the Republic of Lithuania (2007). National Energy Strategy.
- Lithuanian State Department of Tourism. Strategic Action Plan of the year 2007-2009
- Lithuanian Science Academy. Long-term developmental strategy (economics, transport, energetic) of Lithuania (until 2015).
- LIFE project going on in areas with lakes (Lubana wetlands complex).

* Spatial plans for Lithuanian side municipalities will be studied and summarised in the River and Lake Use concept to be submitted by May 31, 2007

Based on the spatial development plan of the Latgale region, there are three main natural values of national (regional) importance:

- **Daugava valley.** Area of unique nature, undisturbed Daugava River in its natural flow, great landscape and culture heritage;
- Land of lakes. **Land of Blue Lakes** is one of the most significant symbols of Latgale, with big number of lakes, beautiful landscape, unique culture monuments and popular tourism objects;
- Complex of specially protected nature areas – **Lubana wetland complex** – pure, undisturbed environment with great biological diversity, wetland ensures hydrological regime in rivers and lakes of the region, as well manages natural purification of the surface waters.

The prospective plans of the energy sector, map priority fish waters and economically significant fish waters and prospective plans for improving transport infrastructure will be done in next periods.

2.4. Progress in study

Complete study will be presented in the Concept of river and lake use. Here are intermediate results and conclusions from the reporting period.

2.4.1. The database of lakes

There are approximately 3000 lakes with total water surface 1000 km² in Latvia; 2256 lakes are bigger than 1 ha. The most of them are small. 16 lakes are bigger than 1000 ha and represents 42% from total area. The average density of lakes is 1,5% in Latvia, very close to Lithuanian density of lakes (5% in Estonia, 8,5% in Sweden, 9% in Finland), but in Latgale – 4,5%. Total water surface is 69405,1 ha i.e. 4,8 % of Latgale region area.

Latgale lakes are represented in the 20 biggest lakes of Latvia, such as Lubans Lake (8210 ha), Razna Lake (5756,4 ha), Rusons Lake (2373 ha), Sivers Lake (1759 ha), Cirma Lake (1261,2 ha), Ezezers Lake (987,9 ha) and Big Ludza Lake (846,4 ha). Lubans and Razna are the biggest lakes of Latvia by surface.

Dridzis Lake is the deepest lake not only in Latgale, but in whole Baltics. To deep lakes belongs Geranimova and Ilza. The best water quality is in Rics Lake, Razan lake and Svente lake, the lake with the biggest number of islands is Ezezers.

Project experts set the criteria to analyze lakes and rivers in the project area:

- Name of lake;
- Other (historical, toponym) names;
- District municipality;
- Local municipality;
- Code in water bodies classificatory;
- Juridical status (private, public, private with state fishing rights)
- River catchments' basin;

- Name of special protected area, Natura site;
- Water surface area, ha;
- Length of coast line;
- Hydrological regime;
- Name of surface water body object;
- Type or ecological class;
- Average depth;
- Water colour;
- Structure of lake bed;
- Characterization of banks;
- Islands;
- Accessibility (main roads leading to the site, where lake is located);
- The nearest town, village;
- Electricity supply, water supply and sewage systems;
- Tourism providers, enterprises, farms, their tourism services;
- Recreational and tourism infrastructure in water, on banks, next to lakes and rivers (access roads to water, shores, camping sites, dressing cabins, parking places, toilets, benches and tables, fireplaces, garbage cans, sport grounds, sightseeing buildings or grounds, playing fields, infrastructure for boat launching and so on);
- Info stands, signs (set by TIC, municipalities, informing on cultural, nature objects and sites);
- Planned development, according to local municipalities plans (territorial plans) and projects;
- Planned infrastructure, according to nature management plans (activities, finances);
- Planned infrastructure by private owners;
- Planned infrastructure – view gathered in interviews (but source of financing are not clear);
- Threats, problems;
- Ecological quality;
- Anthropological load (persons per year);
- Hydrological map;
- Photos;
- Name of the lake group.

For initial database were chosen lakes bigger than 1 ha, in Latgale - 972 lakes. The collection of data is being step by step. The database will be added to the 2nd report.

The data has being gathered from Latvian Environmental, Geological and Meteorological Agency, public database "Ezeri" (www.ezeri.lv), municipal plans, nature management plans and Nature protection board database, regional environmental board database, tourism information centres, questionnaire of municipalities and interviews.

During the collecting of data it became clear that specific data as electricity, water supply, and detailed infrastructure is more important information for those lakes which will be carried forward investments. And it depends what criteria will be defined to choose lakes for investments.

The Lithuanian part will be provided in the next report.

2.4.2. Review of rivers

The Project area is situated in Daugava River basin region in Daugava River and Velikaja River catchments basins. Rivers density in Latgale region is 830 meters per km² in Daugava basin area and 190 meters per km² in Velikaja basin area.

There are 44 water objects and their catchment's basins (9 objects in Velikaja basin, 33 – Daugava basin and 2 – Lielupe River basin). The biggest concentration of rivers and lakes is in Latgale central and Eastern part.

The hydrological characteristic and separate study for rivers has been done to enlighten those rivers appropriate for tourism (mainly boating). Major conclusions and recommendations from the study are:

- Recreation and tourism on rivers is less popular than that on lakes, as it is more convenient to establish a stationary recreational area at a lake.
- There are many beautiful lakes in Latgale with scenic views on surrounding hillocks. Rivers of Latgale, except Daugava River, cannot compete with this beauty. However, potential of rivers is underestimated, because of their overgrowth and bad management of riversides, existing dams, silt etc.
- Lately new riverside guest houses emerge, which offer canoeing or other water tourism along Daugava River or other water courses and lakes of Latgale. However, at present these activities are not as widespread as could be. Upstream section of Daugava River from Piedruja to Daugavpils is more popular. There are many guest houses, which offer rafting and canoeing.
- Riversides are usually overgrown, therefore, special camping sites should be established, as well as access to surrounding guest houses ensured.
- The main appropriate rivers for boating are:
 - Daugava (with its different sectors – upper Daugava, Daugava between Kraslava and Daugavpils or "Daugavas loki" - section with many river winds, Daugava from Daugavpils to Livani;
 - Rezekne River,
 - Malta River;
 - Dubna River;
 - Tartaks River;
 - Jasa River;
 - Kalupe River;
 - Feimanka River;
 - Ilukste River;
 - Indra (Indrica) River;
 - Zilupe River;
 - Ritupe River also Udraja (in Russia - Utroja)
 - Ludzas upe (in Russia - Lža)
 - Pilda (Isnauda) River;
- Smaller rivers can be used for water tourism during spring flooding, which varies from year to year. Sometimes summer flooding occurs, when boating is also possible. It means that surrounding guest houses and recreational centres should be prepared for organising water tourism, when it is possible.
- Elaboration of route schemes, including description of river itself, places of interest and camping sites, would be helpful. Such information could be distributed to tourists at boat rental stations. Route length would differ according to the selected boating type and predicted speed, for example, in wider rivers, where floats can be used, the route should consider slow going. Almost all rivers of Latgale are easy and can be only used for so called non-category or recreational water tourism.

Full Review of rivers in Latgale region see in the Appendix No.1.

2.4.3. Tourism service providers

The database of enterprises and operators that take advantage from the watercourses to offer recreation and tourism services has been started to create. The list of tourism operators has been provided by Latgale Regional Development Agency. As it is agreed, the main criteria for differentiating active tourism providers from the passive ones, is information availability in Internet. If the service provider is represented in public information space then it can participate in the market. The list has been created from catalogues of accommodations, recreational and tourism places found in web: www.celotajs.lv; www.viss.lv; www.1188.lv; www.eiropa.lv; www.cope.lv. Also regional websites are available.

Data collected about rivers, lakes and service providers will create characterization of current use of watercourses for The Concept of lake and river use.

3. CONCLUSIONS

The stakeholders from all significant groups has been informed about the feasibility study, its tasks and approach of the study methods.

Project Partners has been informed at kick-off meeting as well in Daugavpils seminar. Recommendations has been listened up by project experts and applied to the study work. Commonly new understanding on lake and river infrastructure has been reached. It is very important to keep attention on the investment part and stakeholders willingness to continue collaboration after the project. Therefore from the very beginning there has been focus on the next projects. At this project stage the focus is on the potential watercourses, as well on the mechanism to raise the interests from municipalities.

Desk work gave the context of other plans, especially information on planned investments (mainly from management plans, technical regulations issued by Regional Environmental Boards), thus providing possibility to integrate investments in future.

Database of lakes consists of wide range of data and has to give as much as possible information for selection the lakes for further investments. More detailed information about electricity, water supply, and current infrastructure has to be fulfilled by field research as no information source could provide it. Field researches are to be performed in summer time, also to observe of tourism flow. At the first selection of 200 lakes and rivers has to be made.

The river overview and recommended rivers for boating accomplish the database for selecting potential 200 watercourses.

The list of tourism providers will be analyzed in the next report, as well revenue from water-based tourism activities. The tourism offer could be divided on main groups of tourism offer already –

hostels, saunas, organizing of banquets, campsites, sport grounds, rent of boats. The offer differs by quality of service. In the context of lake database there are first indications of areas with potential for intensive and less intensive (nature, eco-) tourism. More intensively watercourses have been used, if they are situated in towns or near them, but easy accessible. Therefore the watercourses and recreational places will be analyzed by directly reachable, situated in 25 km from the town, situated in 50 km from the town and adding the aspect of existence of roads, especially asphalted roads.

4. PLANNED ACTIVITIES FOR NEXT PROJECT PERIOD

Next progress report will encompass activities from March 29 to May 28, 2007.

In the next project period 200 lakes (and rivers) will be selected. Selection will be based mainly on the following criteria:

1. The surface of lake is not smaller than 10 ha;
2. Recommendable, that lake has public status;
3. Lakes are situated in the town or easy accessible, they already have significant visitors' flow;
4. At the nearest are significant tourism services have been available;
5. The lake and tourism provider will have investments (information from other plans, interviews);
6. Unrecognized but great potential for specific kind of tourism development (active/mass/nature have investments).

These criteria would be discussed and complemented in the vision seminar. Two seminars are to be held in LT and LV for municipalities, tourism entrepreneurs and other institutions. Powerpoint presentations to show the findings of the pre-study will be prepared. The main result expected from the vision seminar is formulated river and lake development concept and selected 200 lakes/rivers for detailed study. Together with Subcontractor approach of the selection of 200 lakes will be specified.

River and lake use concept draft will be provided to the project partners for discussion. Significant part of the Concept will be the investment impact planning and creation of investment plan.

The work on lake database will be continued.

Appendix No.1

Review of rivers in Latgale region for boating

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Hydrological characteristics of the Region

The Region is situated within the Daugava River Basin District, including catchment areas of both upstream section of Daugava River and Velikaya River (Latvian part). Some streams located within Daugavpils region belong to Lielupe River Basin, however, no noteworthy rivers can be found there.

The Region includes Balvu, Daugavpils, Ludzas, Krāslavas, Preiļu and Rēzeknes Districts. Water surfaces of these Districts vary a lot according to the terrain features. Balvu, Ludzas and Preiļu Districts mostly lie within

East Latvia Lowland with relatively inexpressive landscapes, and only some local municipalities have hillock areas. Krāslavas, Rēzeknes and partially Daugavpils Districts lie within Latgale Upland.

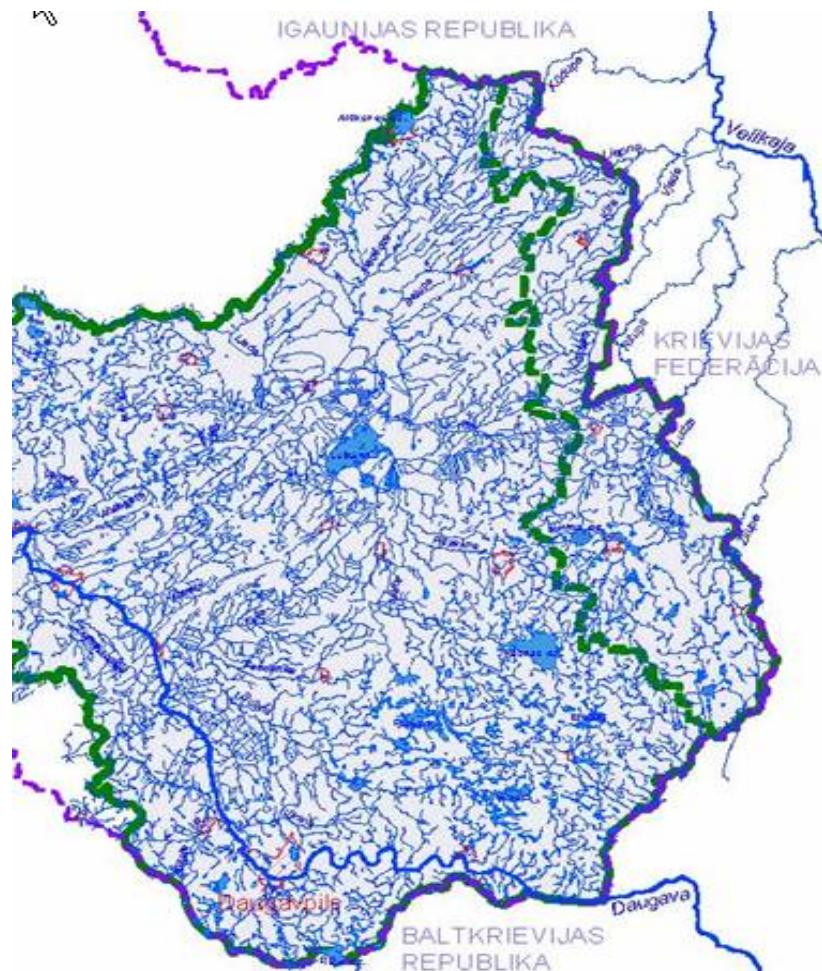


Table No.1 Proportion of water resources in the Region

District	Area, ha	Total water surface area, ha	Relative proportion of lakes, %
Balvi	238,121	5,052	2,12
Daugavpils	251,457	9,551	3,80
Krāslava	228,884	13,897	6,07
Ludza	239,239	9,669	4,04
Preiļi	203,642	9,635	4,73

Daugavpils District. The mayor part of the District lies within the Daugava River Basin and is split into two parts by Daugava River. The main tributaries, which fall within this District, are Laucese River, Dubna River with its tributaries Tartaks, Līksna etc. Hydrological regimen of these rivers vary per season: relatively low water level in summer and winter, but high - during flooding

season. Ice jam downstream Daugavpils can rise water level above 7 m, thus, flooding large areas within Dvietes, Līksnas, Bebrenes, Pilskalnes and Nīcgales local municipalities. On the other hand, in summer, when water level in Daugava River tributaries is low, silt and overgrown riverside obstruct natural flow of rivers.

Rēzekne District. Rivers of Rēzekne District belong to Daugava River Basin. The most remarkable rivers of this District are Rēzekne River with its tributary Malta River, as well as smaller tributaries of Rēzekne River - Pārtava, Lūzena, Čečora, as well as of Malta River - Balda, Vertūkšņa, Liska, Tiskāde.

Preiļu District. Several rivers, which are longer than 10 km cross Preiļu District: 30 km section of Daugava River at the border of the District, Dubna River with its tributaries - Feimanka, Oša, Kalupe, Preiļupe, Jaša and Tartaks. All rivers, except Tartaks, are mainly potamal.

Ludza District. Most rivers of Ludza District belong to Velikaya River Basin. The exception is Iča River in Northwest of the District and Sarjanka – in the South, which belong to Daugava River Basin.

The mayor rivers of the District - Ludza, Zilupe, Rītupe and Istra Rivers - are upstream sections of Velikaya River tributaries. Pilda River crosses the District. All rivers are rather narrow and shallow, with relatively low gradient. They are mainly replenished by snow and storm waters. All rivers are mainly potamal.

Balvu District. The mayor rivers (more than 50 km) flow along the border of the District - Aiviekste, Pededze, Kūkova (Kuhva). Other remarkable rivers of the District include: Bolupe (Balupe), Iča, Vārniene, Tilža. All rivers and partly also their tributaries are slow potamal type rivers. Only Pededze River with its left bank tributaries of the middle section is faster and could be referred to as being rhitral.

Table No.2 The most remarkable rivers (recreation possibilities)

River	USIK code ¹	Catchment area Total/in Latvia km ²	River length Total/in Latvia km	Falling into
Daugava	4	88752/24700	1020/352	Riga Gulf
Aiviekste	421	9321/9154	182	Daugava
Pededze	424	1690/1523,3	159/134	Aiviekste
Rēzekne	428	2025,7	116	Aiviekste
Malta	4282	886,9	105	Rēzekne
Bolupe	4254	936	80	Aiviekste
Iča	426	1060	68	Aiviekste
Nereta	4316	574,4	46	Daugava
Dubna	432	2785,4	105	Daugava
Oša	4322	638,2	60	Dubna
Feimanka	43243	385,4	72	Dubna
Kalupe	43254	129,2	32	Dubna
Jaša	43258	191,0	28	Dubna
Tartaks	4326	474,5	18	Dubna
Ilūkste	4344	272,8	53	Daugava
Līksna	4352	308,9	47	Daugava
Lauceše	436	454,1	29	Daugava
Indrica	4374	242,5	32	Daugava
Ludza	6842	920,4	155/63	Rītupe

¹ Water bodies classificatory

River	ŪSIK code ¹	Catchment area Total/in Latvia km ²	River length Total/in Latvia km	Falling into
Zilupe	6861	2040/758,8	190/69	Velikaya
Rītupe	68	3000/1442	74	Velikaya

Description of water courses

Daugava River at Augšdaugavas Loci (Augšdaugava Bends)

Daugava River is 1005 km long, including its Latvian part of 352 km. Its total catchment area is 87,900 km², while Latvian part is 24,700 km². Total gradient of the river is 221 m, in Latvia – 98 m.

Gradient within the section between Piedruja and Jēkabpils is 23.5 m (from 97.5 m at Piedruja to 74.0 m at Jēkabpils), which corresponds to 0.13% or 0.13 m/km.

The flow gradient differs among sections of Daugava River. Between Kārsava and Daugavpils it is 0.1-0.15 m/km ensuring the average stream velocity of 0.3 - 0.4 m/s. At Adamova there is a 200 m long



section with the average stream velocity reaching 0.5 m/s. (The presented stream velocities refer to low-water period). It is known that in spring water level of Daugava River can rise up to 9 m, and in this season stream velocity increases least 10 times.

Daugava River enters Latvia at Piedruja, where its 46 km long tributary Rosica River flows into it. At Piedruja Daugava River is 130-150 m wide and 3-5 m deep. It flows through an asymmetric valley and erodes mainly Devonian dolomite. At Kārsava its span decreases up to 100 m. At

Daugavpils Daugava River is 200 m wide, but its depth is only 2-3 m. Its stream velocity between Piedruja and Daugavpils is rather high, i.e., average stream velocity in low-water period is 0.4-0.5 m/s.

Downstream Daugavpils the river bed is sandy and clayey, but at Nīcgale Devonian clay and dolomite prevail again. At Dunava Daugava River is more than 300 m wide and 2-4 m deep. At Jēkabpils – 300-400 m wide² and 5-6 m deep. Downstream Jersika the average stream velocity rises again reaching 0.4 m/s between Līvāni and Jēkabpils.

Long-term flow rate of Daugava River at the monitoring station upstream Jēkabpils is 514 m³/s.

Just below the border Augšdaugava protected landscape area, established in 1990, begins. This area includes Kalniešu, Kaplavas, Krāslavas, Piedrujas and Ūdrīšu local municipalities of Krāslava District and Salienas, Tabores, Naujenes and Vecsalienas local municipalities of Daugavpils District and covers 540 km².

Northern slope of the eastern part of the Augšzeme Upland forms the left bank of Daugava River, but southern slope of the Latgale Upland – the right bank. Both banks comprise steep slopes, numberless ravines, streams and springs with their own beautiful and bio diverse valleys, terraces and slopes hosting different plant, insect and mollusc species. Fields, forests, lakes and outcrops interchange by the riverside. The protected landscape area includes Augšdaugava depression, nature park "Daugavas loki" and Krāslava park. Downstream Piedruja Daugava River flows along the Baltic Ridge, which was formed during the last ice age. The river has eroded the most ancient valley of Latvia, i.e., this 70 km long, 2-4 km wide and 20-50 m deep Daugava River Valley is 13-15 thousand years old. At present this part of Daugava River is 150 m wide and 3 m deep. During the ice age Daugava River eroded glacier and its deposits, thus, forming 10 scenic bends within a 7 km wide section. Eight of these bends (Priedaines, Šķierskānu, Zvainieku, Rudņas, Daugavsargu, Ververu, Rozališku, Butišķu and Elernes) can be still admired nowadays. Local community has given a characteristic name to each of the 4-6 km long bends. Counting from Krāslava Adamovas or Šķierškānu bend is the first one. At this site Daugava River reduces in its width to 103-110 m and is 4 m deep. Adamova slope at the right bank should be mentioned with its extraordinary cemented gravel blocks and landslides. Adamova trail with observation tower is already established. This trail leads to numerous geologic places of interest, historic sites and scenic view points. At the beginning of the trail near Krāslava town there is a hill. 2 km downstream Krāslava a slope begins. During spring flooding Daugava River aggressively erodes the basis of the slope, thus gradually forming a several hundred metres long and up to 40 m high slope facing towards the Daugava bends. The slope consists of moraine clay, sand, peat, Devonian clay and sandstone layers. Many riverside springs within this section contain not only lime, but also iron, thus forming gravel columns cemented by the limy water percolating the gravel, pebble and sand layers. At the base of the slope (approximately 7 m above the water level) there is the so called Adamova Pleistocene peat exposure, which has been repeatedly studied by geologists, and fossils of more than 50 ancient plant and animal species have been found there. This place is a geological monument of national importance. The slope is covered with trees and shrubs and is a viewpoint to Daugava meanders. On the floodplains of the opposite side false pieces of smoothed rock can be seen, which actually are cemented blocks of sand and fine-grained gravel. The highest and the most scenic site of Ververu bend is the Ververu slope, which is located on the left bank of River Daugava at the south-eastern part of Ververu bend. This slope is covered by forests at all its 270 m length leaving only the very tip open. Thus, its the name "Lisaja gora" (The Bald Hill) has originated. Rozališku (Vasargelišku) bend is situated between Naujene and Vecsaliena municipalities. Here the 200 m wide Daugava

² Data obtained from topographic maps of the Soviet Army at the scale 1:10,000

River is surrounded by its 20-35 m high banks. At the northern part of the bend an observation tower has been erected ensuring view over 12 km long landscapes so typical to Daugava River Valley.

Downstream Krāslava town slopes Daugava River Valley are so colourful that geologists call them geological mosaics. For example, the 40 m high Slutišķu slope on the right bank, where almost horizontal layers of sand, gravel and pebbles alternate. 500 m downstream the top of the 40 m high bald and russet Ververu slope (Lisaja gora) rises. Geologists say that its layers have been bended showing the power of the last glacier. Section between Ververu and Slutišķu slopes is called Daugava Gate, because the river which has grooved itself through the Baltic heap, there is only 500 m wide.

Section of Daugava River between Piedruja and Daugavpils is typical for riverside springs and rocks. Big and medium size rocks can be seen during low-water period in summer at the basis and top of the slopes, terraces and floodplains. From Piedruja to Daugavpils 1736 springs have been recorded, including powerful and micro springs with very various flow rates. The most powerful spring, especially during low-water period, is located on the Daugava riverbed 200 m downstream Poguļanka River mouth. Springs are unevenly distributed, and from Piedruja to Krāslava are mostly found on the right bank. At Kiseļevciems, for example, 160 springs have been recorded within only a 1.5 km long section. 170 springs are located downstream Krāslava between Kaplava and Augustiniškas, but within Daugavsargu bend between Brenči and Slutišķi – 150 springs. On the other hand, one of the most beautiful meander section of Rozališķi Bend from Slutišķu slope to Rozališķi slope hosts only 4 small springs on the right bank and 3 micro springs on the left bank.

The second largest spring – Viļušu spring – is located at Viļušu farmstead within Naujene local municipality. This is one of several hydrogen sulphide springs found along Daugava River. A cave has developed in light grey sandstone of Upper Devonian with a powerful hydrogen sulphide outlet. Amount of hydrogen sulphide varies during season and, according to the opinion of scientists, is related to specific character of groundwater circulation. Many powerful springs can be found on both banks of Daugava River within the Krāslava town, of which Mīlestības spring is the most powerful one. Its outflow is located at the base of the slope not far from Karnišcka grave and flows into Daugava River. 5 km downstream Krāslava on the left bank slope there is a specific concentration of Sproģi springs, which is unforgettable, when seen. This is a 70-450 m wide and 1.5 km long section of 2 deep ravines, between which various scale springs appear.

The most famous stone is the red Sauļeviču rock, which lies in Daugava river bed 700 m downstream Robežupe river mouth. This 4.3 m long and 3.5 m tall rock is called also Robeždaugava rock, after the name of the nearby farmstead.

The second most famous rock lies in Daugava River bed more on the left side at Limanoviča (Voronovas) island. Kaiju rock is also remarkable.

Besides, Daugava River is famous for its rapids, especially between Piedruja and Naujene. The most typical are sonorous and fast rapids formed of rocks. Accumulation of rocks in river bends form natural obstacles, thus, forming rapids, most remarkable of which are Krāslavas and Kaplavas rapids. Downstream Naujene to Daugavpils rapids are smaller and shorter (only 100 to 300 m), however, each of them has its own character dependent on type of rocks.

In this Daugava River section the right bank tributaries Sarjanka and Rosica Rivers, which fall into Daugava in Belarus, are the most remarkable ones. In Latvian side the most significant tributaries are Rudņa, Jāņupe etc.

Spatial Plan of Daugavpils City proposes to resume water traffic along Daugava River up to Daugava Bends and Jersika castle mound. Therefore, municipalities of Daugava District also discuss on a perspective water tourism along Daugava.

Daugava River between Daugavpils and Līvāni

Between Daugavpils City and Dubna River mouth Daugava River flows across a lowland, thus, becoming wider and shallower. It is up to 300-350 m wide and 2-4 m deep, but in some places its depth reduces to less than 2 m. Long-term average stream velocity during low-water period decreases to 0.1 m/s. Steepness of both banks reduces, as does the value of landscapes. The Daugava River Valley at this section is wide with a vast panorama over both riverbanks. The river is more surrounded by built-up areas with less coverage ensuring view to distant floodplains. If water transport is intended to be resumed here during summers, the riverbed should be investigated to find a water way in-between shallows. There are still some rapids from Jersika to Saka, but they are noticeable only during low-water period.

In this section use of larger floats adapted for living on the water should be considered. Thus, whole families or other companies could relax, while slowly floating downstream from one stop to another (for example, islands of Daugava River). Downstream Dubna mouth Daugava River Valley becomes narrower and banks steeper. Width of the river itself also decreases up to 200 m, but depth increases to 3-4 m. Stream velocity is 0.2-0.3 m/s. However, shallows are highly probable in this section as well.

The main tributaries of this Daugava River sections are:

Of the left bank – Eglaine, Berezovka (Dvietei flowing together with Ilūkste), Laucesa that starts in Lithuania, Druika, whose catchments stretches into Lithuanian and Belarus territories;

Of the right bank - Jāņupīte, Līksna, Nereta, Dubna with its catchment area, etc.

Rēzekne River

Rēzekne River starts from Lake Rāzna and crosses Rēzekne District. It flows mainly from South to North through Lake Kaunata, water reservoir of Spruktu HPP and other dams, and finally falls into Lake Lubāns. Rēzekne River is 116 km long with the gradient of 71 m, from 163.5 m BS at Lake Rāzna to 92.5 m BS at Lake Lubāns. Zosnas Lake also belongs to the catchment area of Rēzekne River. At the beginning the river winds between moraine hillocks of Latgale Upland. Riverbanks are covered with trees and shrubs forming picturesque landscape. Downstream Rikava the river flows into Lubāna lowland and becomes a potamal type river with inexpressive banks. From Žogoti to Lake Lubāns the river has been canalised. During 1950ties – 1980ties fish farming was highly developed here. Fish ponds are still there along both sides of the river, however, they are not in use for several years and host many bird species. Rēzekne River is heavily overgrown, except its regulated sections. Landscape along the river is scenic from upstream to downstream of Rēzekne town. Two millponds (Fitingofa and Greivuļu) are located in this area. Two HPPs have been reconstructed on Rēzekne River – Spruktu HPP, which is located upstream Stoļerova, and Rikavu mill HPP, which is a reconstruction of a 100 years old mill. Rēzekne River is suitable for water tourism, especially at and downstream Rēzekne town. In spring boating is pleasant already from Stoļerova, as this part has a relatively remarkable gradient.

Malta River

Malta River is the main tributary of Rēzekne River. At present it is 105 km long (115 km until 1996) with a catchment area of 883 km². It starts at Lake Salājs nearby Andrupene. Its gradient is 97 m, but average relative gradient 0.92 m per 1 km or 0.92‰. After construction of the new canal at the Lake Lubāns Malta River mouth is surrounded by dams, and Malta River enters Rēzekne River as a canal. There are several dams on Malta River. Viļānu HPP is located in the very centre of Viļāni using a long-term exploited water reservoir. Another HPP – Nagļu HPP, is located in the lower part of Malta River in the centre of Nagļu local municipality and uses a reservoir, which was intended to supply Nagļu fish farms with continuous flow rate. Malta could be considered as a water tourism site only downstream Malta municipality centre. However, the river should be further investigated, riverbanks cleared, silt and other obstacles evacuated, as well as camping sites established.

Dubna River

Dubna River is the right bank tributary of the central section of Daugava River. It flows parallel to Daugava for a long distance, especially at its downstream part. Dubna River starts at Lake Cārmanis (according to other sources at Lake Sīvers and flows through the Lake Cārmanis) within Krāslava District. The river is 120 km long, its catchment area – 2780 km², gradient – 76 m (the gradient is most expressed up to Višķu Lake). At the beginning Dubna River flows through Dagda hillock area of Latgale Upland. Its height at Cārmaņa Lake is 166 m asl. At this site river is 10-15 m wide and 0.6-1 m deep with well developed banks and trapezium shaped valley. At Višķu Lake Dubna River is at 100 m asl. It is 18 m wide and 1-1.5 m deep at its river mouth. Section from Cārmaņa Lake to Ojatu Lake has been regulated. Approaching Višķu lake the river winds along a deep, covered valley and runs through the lakes. Previously there were many mills on Dubna River. Nowadays four small HPPs (Staškeviču HPP, Šķīvišķu HPP, Dubeņecas HPP and Galvānu HPP) are operating. One of the reservoirs (that of Šķīvišķu HPP) is under national protection. Dubna River flows through the Višķu Lake, which is connected to Luknas Lake. Leaving the lakes Dubna River runs into Jersikas lowland and slows down. Its banks become inexpressive and surrounded by rather unmanaged urban areas. (During 1960ties to 1980ties large dairy farms have been built, which are now abandoned and partially demolished.) Due to the flat riverbanks, downstream part of Dubna River usually was flooded in springs. This is one of the reasons, why tenths of km of the river are regulated starting downstream of Daugavpils-Rēzekne highway. Besides, a polder with pumping station and 2.3 km long protective dam are established downstream Luknas Lake to facilitate economic activities. Regulation or deepening of Dubna riverbed at local scale can also be found downstream Oša tributary. At Dubna River mouth within Līvāni town Straumes HPP has been reconstructed.

Tartaks, Jaša, Kalupe, Feimanka and Oša are the main tributaries of Dubna River.

Tartaks River

Tartaks River starts at Rušonu Lake and runs through Preiļu and Daugavpils Districts. The river is 21 km long, its catchment area – 474 km². The river originates in Feimaņu hillock area of Latgale Upland and flows mainly to the South, but after Cirišu HPP turns towards southwest. Tartaks River falls into Luknas Lake, which is considered as being the right bank tributary of Dubna River. Average annual runoff of Tartaks is 0.095 km³, gradient – 50 m from 150 m BS at Rušona Lake and to 100 m BS at Luknas Lake. Tartaks River winds through scenic Latgale hillock area with beautiful landscapes. Nearby Aglona it enters Ciriša Lake, which is a protected object of national importance, and then through a rather deep ravine flows into reservoir of Ciriša HPP. This section of the river is also called Poguļanka. Then Tartaks River makes its way to Luknas Lake, and this part is also called Salenieku River by local residents. Tartaks River is linked to Bešona Lake and Jazinskas Lake as they are connected by small streams with the reservoir of the Ciriša HPP.

Besides, streams connect Rušona Lake with Geraņimovas Ilzas Lake, Biržkalna Lake, Gadrinkas Lake and Dunsku Lake. Connection of Tartaks River with many lakes makes it attractive from the water tourism perspective. Riverbanks are covered by trees, which now and then bend over the stream. During low water period the upstream part of the river is rather shallow.

To develop water tourism Tartaks River should be investigated to find the best start for boating. Riverbanks should be managed, silt and other obstacles evacuated, as well as camping sites established or already existing guest houses used.

Jaša River

Jaša River is the right bank tributary of Dubna River. It is 28 km long with a catchment area of 191 km² and gradient – 52 m. It starts from Jāšezers Lake and the related lake system. The river is 6-8 m wide and in some places only 0.5 m deep. Average stream velocity during low-water period is 0.1 m/s. In spring river is replenished with waters from Rušona Lake basin. Upstream part of Jaša River flows to the West finding its way among moraine hillocks of Feimaņu hillock area, but at Aizkalne it turns towards South and flows along a beautiful valley with steep and covered banks. Downstream Pelēču millpond it reaches a wider valley and through connective streams receives water from Pelēča Lake, Ārdava Lake and Vīragnas Lake. In general it is a scenic river suitable for water tourism, however, in summer low-water periods – shallow. There are two small HPPs on the river (Korna HPP and Pelēču HPP). Upstream there is Kastīres Dam, which is planned to be reconstructed into a overfall, which would even up water level of the upstream lake system. Water tourism can be promoted in the river during spring, however, in this case banks should be managed.

Kalupe River

Kalupe River is the left bank tributary of Dubna River. It is rather small, but in spring it can be considered for water tourism. Banks of the river are scenic, however, the valley is not very notable. The river is 32 km long, catchment area – 133 km², gradient 16 km. It originates from Garlaku wetland and flows through Jersikas Lowland. The river is approximately 8 m wide and 2 m deep. The river is most prominent downstream Lielais Kalupes Lake and Mazais Kalupes Lake, and it enters Dubna River at Vārkava. Riverbed is regulated, which eases management of the river for water tourism purposes. However, the river is surrounded by urban areas, especially, downstream Kalupes village centre. Riverbanks have not been cleared from silt and other obstacles for a longer time period.

Feimanka River

Feimanka River is the right bank tributary of Dubna River, which flows within the territory of Preiļu District. Its length is 72 km, catchment area – 370 km², gradient 62 m. The river starts from Feimaņu lake as a small stream and bends along the Latgale Upland. Use of Feimanka River for recreational purposes could be considered downstream the former Ančkinu mill, in spite the fact that almost all its downstream section has been regulated. This part of the river is 10-15 m wide with average depth of 2.5 m and gradient 0.6-0.8 m/km, and its location along the Preiļi – Līvāni road is advantageous.

Ilūkste River

Ilūkste River is the left bank tributary of Daugava River, which after confluence with Dviete River fall into Daugava River as Berezovka River. Ilūkste is surrounded by its own singular river valley, which descends into Daugava River Valley. Ilūkste River starts in Lithuania, however, its catchment area becomes noteworthy only downstream Ilūkste town. Total length of the river is 53 km, 37 of which lie in Latvia, catchment area 414 km², total gradient – 54 m. From Šedere to Ilūkste the river winds finds its way through Augšzeme Upland, and its banks are formed of

hillocks covered with forests and fields. At this part the gradient is uneven, in some sections reaching 10 m/km. Downstream of Ilūkste town the river flows into Daugava floodplain and its gradient decreases to 0.3 –1 m/km. In spring the river is unsuitable for boating downstream Ilūkste town, because high water level in Daugava River stops the stream of Ilūkste River. Water tourism could be considered only during late spring and summer, if water is not too low. Two HPP have been constructed on already existing millponds – Šēderes mill HPP and Ilūkstes HPP.

Indra (Indrica) River

Indra River is the right bank tributary of Daugava River, which until Indras Lake is also called Dzeguze Stream. The river is 60 km long, and its catchment area is 258 km². Downstream of Indras Lake the river winds through hillock area and has some mayor bends and many smaller meanders. Gradient and stream velocity are various. Downstream of Indras Lake its gradient is 5-7 m/km, however, further on it reduces. The river is 6-10 m wide and 1.5-2 m deep, thus, it could be used for water tourism during low-water period. There are 14 lakes in the river basin, which would allow elaboration of a varied boating route, including the river and lakes. The surrounding areas are beautiful, as hillock areas interchange with vast grasslands.

Zilupe River

Zilupe River is the left bank tributary of Velikaya River. It starts in Belarus, flows along the Latvian – Russian border for 12 km, enters Latvia for 59 km and returns to the borderline for 9 km. Downstream of its tributary Robeža River, which is almost totally a boundary river, it finally leaves Latvian territory. Reservoir of Zilupes HPP is established at Zilupe. The main tributaries are: Plusona, Podupe, Verbovka, Pudupe, Istra, Jučēvas Stream, Kurjanka, Robeža, Pernovka, Jučēvas Stream.

Zilupe River is not suitable for water tourism because of its low gradient and location too close to the border.

Rītupe River, also Udraja (in Russia - Utroja)

Rītupe River is the left bank tributary of Velikaya River. It is 176 km long, including Latvian part – 56 km. The river starts from Meirānu Lake in Burzavas hillock area and further finds its way through Zilupes Lowland. It is a very winding river with wide floodplains and many oxbows. Its gradient in Latvia is 0.7 m/km, and in general corresponds to potamal rivers. The main tributaries of Rītupe are: Ludza River, Strauja River, Ziblas Stream. Rītupe River is a scenic winding river with overgrown banks and sometimes very narrow. It could be only used for boating during spring flooding.

Ludza River (in Russia - Lža)

Ludza River is the right bank tributary of Rītupe River. It starts from the Lielais Ludzas Lake. Total length of the river is 156 km, Latvian part – 29 km, and for approximately 80 km it flows along the Latvian- Russian borderline. Downstream of Kubulovas HPP and approximately 2 km after Lielais Ludzas Lake the river winds along a relatively deep valley and is a typical rithral river. Felicianovas HPP is located on the river 7 km downstream. After Cibla wetlands surround the river, meanders are typical and gradient drops to 0.1-0.2 m/km, which corresponds to potamal type river. This section of Ludzas River is not very interesting.

Downstream Felicianova long-term hydrological monitoring has been carried out. Long-term average flow rate in this monitoring station is 3.58 m³/s and runoff – 113.2 million m³/year. Low-water and high-water periods during the years are very noticeable.

Pilda River (Isnauda)

Pilda River starts from Brodaižas Lake, which is located in Rāznavas hillock area of Latgale Upland. The river falls into Lielais Ludzas Lake. Its upstream part is also called Robežniece and Ilža, but downstream – Isnauda and Ņukša. At its beginning the river is a fast flowing rithral river, but slows down at Rēzekne depression downstream Pildas Lake. Upstream part is surrounded by beautiful landscapes, however, the river itself is overgrown and narrow. Boating could be considered only downstream Pildas Lake.