



CETRA²⁰¹⁴

3rd International Conference on Road and Rail Infrastructure
28–30 April 2014, Split, Croatia

Road and Rail Infrastructure III

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SUSTAINABLE MOBILITY OF SMALL TOURIST PLACES

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Abstract

Article describes the development of a strategic plan of sustainable mobility of the Municipality Lopar on the Rab Island. In small tourist places number of tourists greatly exceeds the number of the local population during the tourist season. Via the integration, participation and evaluation principles existing plans are upgrading. Scenarios of transport system were developed by the analysis of the shortcomings and the introduction of the measures as a whole. Evaluation scenarios were based on ensure the accessibility offered by the transport system to all, improve safety and security, reduce air and noise pollution, greenhouse gas emission and energy consumption, improve the efficiency and cost-effectiveness of the transportation of person and goods, contribute to enhancing the attractiveness and quality of the municipality environment and design. Finally, the proposed measures are necessary, measures to improve, measures of scenarios for each of the reference year to which examines traffic.

Keywords: sustainable mobility, scenario, evaluation, measures

1 Introduction

A new approach of planning mobility in areas, is directed to cleaner and more sustainable means of transport, in particular this applies to pedestrian, cycling and public traffic. This process is based on the existing practice of planning and takes into account the principles of balance, integration, participation and evaluation. In order to effectively apply the new approach and in a large extent, the concepts and tools developed at European level should be adapted to the circumstances of individual member states and then actively promote the national and regional levels [1]. A new approach to urban mobility planning show table 1. Through the planning sustainable mobility, it stimulates the development of urban transport systems to improve the accessibility of urban areas and to ensure the mobility and traffic of high quality to the village, out or inside village [3]. For the attainment of the objective it is necessary planning the urban transport system that tends towards:

- sustainability with consider social, health and environmental component;
- better use of existing urban areas and transport infrastructure;
- improving the urban environment, quality of life and public health;
- improving transport safety;
- reducing air pollution and noise impacts;
- balanced development and integration of different modes of transport.

The planning is encouraged balanced development of all types transport by encouraging towards more sustainable types [3]. The plan features an integrated set of technical, infrastructural and policy measures to achieve these objectives. Integrated planning involves cooperation, coordination and complementarity with local policies, strategies and measures in the field of traffic, spatial planning, land use, health, and social services. The principle of participation implies the involvement of local authorities, citizens, civil organizations and businesses to develop and implement plan to ensure the support and acceptance.

Table 1 Differences between the planning process [1]

Traditional Transport Planning	Sustainable Urban Mobility Planning
Focus on traffic	Focus on people
Primary objectives: Traffic flow capacity and speed	Primary objectives: Accessibility and quality of life, as well as sustainability, economic viability, social equity, health and environmental quality
Modal-focussed	Balanced development of all relevant transport modes and shift towards cleaner and more sustain-able transport modes
Infrastructure focus	Integrated set of actions to achieve cost-effective solutions
Sectorial planning document	Sectorial planning document that is consistent and complementary to related policy areas (such as land use and spatial planning; social services; health; enforcement and policing; etc.)
Short- and medium-term delivery plan	Short- and medium-term delivery plan embedded in a long-term vision and strategy
Related to an administrative area	Related to a functioning area based on travel-to- work patterns
Domain of traffic engineers	Interdisciplinary planning teams
Planning by experts	Planning with the involvement of stakeholders using a transparent and participatory approach
Limited impact assessment	Regular monitoring and evaluation of impacts to inform a structured learning and improvement process

Monitoring and evaluation plan in achieving the defined objectives and the achieved results is implemented through defined indicators.

The basic steps to create a plan sustainable mobility (Figure 1) are presented through the project to encourage sustainable mobility in coastal towns on the example of municipality Lopar. The specificity of coastal cities is seasonal variation in transport demand induced by tourism.

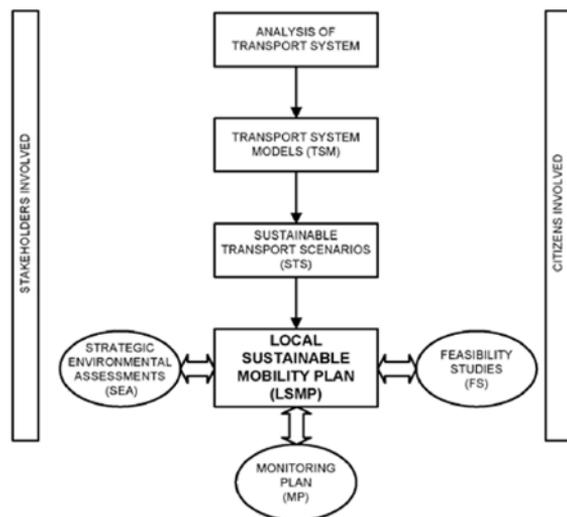


Figure 1 Elements of sustainable mobility planning

Municipalities of Lopar is situated in the Kvarner coast in the northeastern part of the Rab Island, and under the administration of the municipality are the islands of Goli and St. Grgur. Conducted census of people in 2011., in the municipality lives 1,263 inhabitants. In the summer guests visiting or staying in place exceeds 13,000.

2 The components of planning sustainable mobility

2.1 Analysis of the situation

Needs to be analyzed existing transport system and all documentation relate to the transport system and sustainable mobility, [4].

Existing and planned state, county, local and unclassified networks of individual traffic must be detected and displayed in a GIS environment. It is necessary to collect data about transport loads, safety indicators, transport and technical characteristics.

Public bus transport should be described with the stations, routes, timetables, number of transported passengers. Also should analyze the characteristics of ferry and boat lines that connect the place with the mainland. Should be analyzed all ports of county and local significance, offer and functioning of stationary traffic, the number of parking spaces, type and spatial distribution of which is shown in tables and graphs. Need to be determined the length of pedestrian and bicycle paths and their traffic-technical characteristics. In the current planning is implemented:

- analysis of spatial planning documents (spatial plan of the county, spatial plan of the municipality, urban development plan);
- analysis of documentation traffic field (Decision on the regulation of traffic on the territory of municipality Lopar, Decision on conditions and mode of parking, etc.);
- analysis of other documents (Action Plan for development tourism in the municipality Lopar, demographic data, etc.).

Data need be collected and analyzed for all participants in the traffic system. Participants are considered in all institutions, companies, firms and other legal and natural persons who have a particular role or significance in the functioning the transport system, as well as have or may have a role in planning or design transport system.

2.2 Transport system model (TSM)

Transport system model show the current situation and enables the prediction of traffic demand over a period of 15 and 25 years. The model using for detect shortcomings in the transport system, defining and testing scenarios, and as a basis for the development of local mobility plan, feasibility studies and strategic environmental assessment. Steps in the development of transport models:

- collection and analysis the data of the network (table2), demand and calibration;
- development of transport models
 - networks of individual and public transport;
 - zoning system;
 - demand model;
 - joining the traffic on the network.

Table 2 Attributes of network segments

Category	Free flow speed	Permitted direct	Stops
Length	Capacity	Timetable	

The research area is divided into zones. Zones are using for dividing places in less homogeneous surface, connection places with the surrounding area, defining prognostic model and displaying the origin-destination area (Parking locations are defined as separate zones). Table 3 shows frequent zone attribute.

Table 3 Attributes area

Population	The number of parking
Accommodation capacity	Area of attraction

Demand model must be developed on the basis of socio-economic data. Data came from the Central Bureau of Statistics, at Tourist Board the Municipality of Lopar, Spatial Plan and research in the field. After joining the traffic on the network, must be made calibration and validation of the model. The result of a transport model is traffic volume of the overall transport network (Figure 2).



Figure 2 Traffic image of Lopar [4]

2.3 Development of Sustainable transport scenarios (STS)

Problems in traffic and disadvantages in the area should be detected for all transport systems. It should be create scenarios of transport supply as well as the scenarios of traffic demand. Initial baseline scenario serves as a reference level, which is compared with the other scenarios, and allows calculate indicators for evaluating individual scenario. Selection of the best scenario of the transport system is based on the analysis and evaluation. The proposed scenario should allow for the development of all planned contents and encourage the development of sustainable transport. In the municipality Lopar it is proposed relocation of the access road out of the village and out of the main pedestrian and bicycle corridors. Such measures will improve the attractiveness of places and reduce the impact of noise and exhaust emissions. It is proposed the formation of bicycle and pedestrian network along road corridors but also as independents corridos. Creating listed infrastructure contributes to the increase of number of users and increase safety.



Figure 3 Scenario development of the municipality Lopar [4]



Figure 4 Plan of the cycling network [4]

2.4 Local sustainable mobility plan (LSMP)

On the basis of previous activities and results need be made Local Sustainable Mobility Plan (LSMP). The plan defines strategic objectives, priorities, measures, common and the individual activities. The plan includes traffic problems, environmental problems and the impact of activities on the environment, the ability of actors in the implementation of solutions, the legal framework for the implementation, cost solutions, tools for their implementation and the time-frame of implementation. The municipality of Lopar LSMP contains a total of 60 actions that are associated with the priorities from P1 to P4. Overview LSMP per all mentioned entities and their attribution is given in table 4.

Table 4 LSMP overview [4]

Prometni sustav	Redni broj	Akcija	Smanjenje / Difer.	Prioritet	Potrebna dokumentacija				Građenje		Nošitelj	Ljudski resursi	Izvor financiranja	Aktivnost		
					PP	LD	GD	Trajanje (mjeseci)	Iznos (Kis)	Trajanje (mjeseci)				Iznos (Kis)	početak	kraj
B. Biciклиčki promet	1	Biciклиčka staza ŽCS138-vedoprema	MP	P0					21.926	570.086						
									21.926	570.086						
A. Individualni promet	2	T rak za ukrcaj na trajekt - od kružnog raskrižja "D105 - Crkvena" do trajektne lake	NM	P1	/	DA	DA	8	8.190	6	212.940	OL, HC			01.04.14	01.06.15
	3	Plato - referencija trajekt	NM	P1	/	DA	DA	8	15.480	6	402.240	OL, HC			01.04.14	01.06.15
	4	Formiranje nove ulice (naziv ulice)	NM	P1	/	7	7	5	1.200	0	31.200	OL			01.04.14	01.09.14
	5	Imenovanje ŽCS138	S2-1	P1	DA	DA	DA	20	150.958	6	3.924.910	OL, ZC			01.04.14	01.06.16
	6	Spojna cesta - SJEVERNE PLAŽE	S2-1	P1	/	DA	DA	8	10.193	6	499.011	OL			01.04.14	01.06.15
	7	Cesta prema Ciganki (od D105 do turističke zone Crkvena) - DIONICA 1	S2-1	P1	/	DA	DA	8	32.024	6	832.628	OL			01.04.14	01.06.15
	8	Kružno raskrižje "D105 - Crkvena"	S2-1	P1	/	DA	DA	8	36.000	6	936.000	OL, HC			01.04.14	01.06.15
	9	Kružno raskrižje "D105 - ŽCS138"	S2-1	P1	/	DA	DA	8	36.000	6	936.000	OL, HC			01.04.14	01.06.15
	10	Kružno raskrižje "ŽCS138 - Rapska plaža" (kod PRZ-a)	S2-1	P1	/	DA	DA	8	36.000	6	936.000	OL, ZC			01.04.14	01.06.15
	11	Kružno raskrižje "D105 - smještanje ŽCS138"	S2-1	P1	/	DA	DA	8	36.000	6	936.000	OL, HC			01.04.14	01.06.15
	B. Biciклиčki promet	12	Sjeverna biciклиčka staza	MP	P1	/	DA	DA	8	293.866	6	7.640.506	OL			01.04.14
13		Biciклиčka staza uz ŽCS138	MP	P1	/	DA	DA	8	16.800	6	436.800	OL, ZC			01.04.14	01.06.15
14		Biciклиčka staza na nerazrađenoj cesti paralelnoj sa ŽCS138	MP	P1	/	DA	DA	8	3.840	6	99.840	OL			01.04.14	01.06.15
15		Biciклиčka staza uz D105 prema Rabu od kružnog raskrižja "D105 - Crkvena" do Mela	MP	P1	/	DA	DA	8	11.904	6	309.204	OL, HC			01.04.14	01.06.15
16		Biciклиčka staza od D109 prema turističkoj zoni Crkvena	MP	P1	/	DA	DA	8	8.448	6	219.648	OL			01.04.14	01.06.15
17		Biciклиčka staza uz cestu prema turističkom naselju San Marino	MP	P1	/	DA	DA	8	15.648	6	406.848	OL			01.04.14	01.06.15
18		Biciклиčka staza ŽCS138-D105 kroz polje	MP	P1	/	DA	DA	8	8.314	6	218.154	OL			01.04.14	01.06.15

2.5 Feasibility study (FS)

For the chosen scenario of development transport system for which is made LSMP should be made feasibility study. The study includes a cost-benefit analysis for the entire LSMP for a defined period. The study approach to the feasibility from financial, socio-economic and organizational views. At implementation of the proposed measures is mainly case of the indirect effect unless the parking to be charged (direct financial effects). Increased financial effects are expected through:

- increasing tourism capacity;
- increasing parking spaces;
- introduction of tourist bracelets;
- extending the tourist season;
- increasing tourist arrivals because of the attractiveness places.

2.6 Strategic environmental assessments (SEA)

For the chosen transport system should be made strategic environmental assessments. Through strategic environmental assessment, evaluates the likely significant environmental impacts that may arise from the implementation of the plan. The objective of the implementation process is to contribute to sustainable development, i.e. reducing adverse environmental impacts of development activities. The process includes analysis of the likely environmental impact of the development documents, their record in the report and public consultation. At formulating the final plan or program, and the decision on acceptance of the plan, need be participate comments and suggestions on the report.

2.7 Monitoring plan (MP)

For monitoring of implementation of LSMP in the time, organization and implementation of indicators, need to be made the monitoring plan. On the basis of monitoring plan the project manager creates a report, at specific time intervals, about of implementation plan for mobility. The report contains a comparison from planned and realized activities based on defined indicators, deviations in the financial plan, measures to mitigate the difference, suggestions for possible changes to the mobility plan and monitoring plan.

Difficulties in implementing the plan are recognized through monitoring and evaluation what enables timely and effective response. Defining the indicators (Table 5) and target values enables monitoring plan. Through the monitoring plan it is defined:

- connection with the target value indicators;
- data collection strategy;
- monitoring and evaluation plan connected with time during the implementation plan of sustainable mobility;
- responsibility of institutions for monitoring and evaluation;
- minimal involvement of participants for monitoring and evaluation;
- budgetary funds and activities (5% of the budget for the implementation of measures).

Table 5 Indicators

number of passengers on buses	number of tourist arrivals	occupancy of the parking
levels of noise pollution	content of harmful gases	number of accidents (minor, heavy)
length of the bicycle and pedestrian network	amount of traffic on the bicycle and pedestrian networks	number of passengers on a tourist train, tourist boat lines
modal split	number of tourist facilities	tourist bracelets use
yearly average stay of the tourist	rental price	

3 Conclusion

Current practice in planning mobility is not sustainable. A new approach to mobility planning builds on elements which respect sustainable development. Plan for sustainable mobility is based on the principles of balance, integration, participation and evaluation. Through the plan of sustainable mobility it is ensured the need for mobility and development with respect to environmental conditions and future generations. In Croatia, as a young member of the EU, should be encouraged at national, regional and local level, making the sustainable mobility plans based on the framework and tools developed at European level with consideration of local specificity.

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