

Assesement of urban risk in the city of Timișoara (Romania)

Cătălina Ancuța, Claudia Muțulescu

Abstract— The study of urban risk is subordinate to the general frame of risk within territorial systems. Thus, the knowledge of risk factors enables within urban systems the optimization of the ability to anticipate, control and manage risks. Urban risk represents a complex concept, including several components. The evaluation of integrated risk represents for local authorities a method to ensure an efficient and sustainable management. The present study has as starting point the risk theory, especially the urban risk theory, and offers an analysis of risk within the city of Timisoara, a post-communist city where local authorities reassumed the role of self-manager after a period of half of century. In this context, the evaluation of risk is of real interest. According to the information possibilities, the study shows the premises of risks within the analyzed territory and focuses on traffic risk, crime risk and perception of risk.

Keywords—post-communist cities, risk assessment, Timișoara, urban risk.

I. INTRODUCTION

THE concept of risk is one of the most debated present issues of academic environment and the social economic actors. The paradigm of the concept derives from societal risk, respectively sustainable development [1] and is built from the perception of equity and in the virtue of the right of individuals to life quality [2], [3].

The analysis of the risk represents evermore a compulsory subject for the societies emerging from totalitarianism which have to regain their auto-organizing capacity, inclusive within o context of risk.

II. THEORETICAL ASPECTS

A. Risk within the territorial system

The concept of urban risk derives from the concept of risk also adopted in the analysis of the evolution of territorial systems.

Manuscript received March 2, 2012; Revised version received June 2, 2012. This contribution work was supported in part by POSDRU 89/1.5/S/63663 “Trans-national network of integrated management for post-doctoral research in the field of Science Communication. Institutional construction (post doctoral school) and fellowship Programme (CommScie)”.

C. Ancuța, Department of Geography, West University of Timișoara, Romania (phone: +40-256-592-225; fax: +40-256-592-310; e-mail: ancuta.catalina@cbg.uvt.ro).

C. Muțulescu, Department of Geography, West University of Timișoara, Romania (e-mail: claudia.mutulescu@cbg.uvt.ro).

Today, risk is considered to be one of the most important scientific categories, with a generalizing character specific to philosophical categories [4]. Referring to the dimension of the danger of a certain situation that can generate factors capable of having a negative effect upon the individual, the society and the environment on the whole, the risk phenomenon is characterized by a pronounced complex character, the study of which having a strong trans and interdisciplinary character [4], [5].

Most often the risk phenomenon has a negative connotation being defined as the possibility of suffering a loss, damage [6] and is connected to the danger of halt in the functioning of the system.

There is also a positive meaning of the risk given by the increase in performance of the territorial system exposed to risks as the only possibility of resisting to it [7]: although on short term the system loses its balance, on long term it may gain in efficiency.

The territorial system is considered from this perspective to preserve a memory of the risk which develops *mechanisms of anticipating, control and management of risks*.

Within the concept of globalization, the development of the contemporary human society enables the exchange of knowhow and the development of anticipating capacities within territorial systems, not only grounded in personal memory but especially on the demonstrative role of the examples of risks within similar systems.

In building instruments of risk management two fundamental features of the territorial systems must be considered: vulnerability and resilience.

Risk management strategies that territorial systems may and must define have as main objectives the decrease of vulnerability and, respectively, the increase of resilience. The first refers to the degree of potential instability of some structures or the degree of internal perception of some external interventions. The second refers to the capacity to invalidate these perturbations by the complexity and structure of the system [7].

A great number of processes and phenomena are included in the category of risks [8].

Most recent analyses admit the existence of five major risk categories:

- economic risks: major systemic financial failure, chronic fiscal imbalance, severe income disparity, extreme volatility in energy and agriculture prices;

- environmental risks: failure of climate change adaptation, rising greenhouse gas emissions, irremediable pollution, land and waterway use mismanagement, species overexploitation, vulnerability to geomagnetic storms, persistent extreme weather, antibiotic resistant bacteria;
- geopolitical risks: terrorism, failure of diplomatic conflict resolution, diffusion of weapons and mass destruction, pervasive entrenched corruption;
- technological risks: mineral resource supply vulnerability, unintended consequences of new technologies, of climate change mitigations and of nanotechnologies;
- societal risks: unsuitable population growth, food shortage crisis, water supply crisis, entrenched organized crime, widespread illicit trade, unilateral resource nationalization [9].

B. Urban Risk

Among human systems, cities are most exposed to the occurrence of risks due to the high density of population, infrastructures and goods, due to urban expansion and difficult management [10].

The city is a complex territorial system which includes, besides the natural environment, other four artificial environments: the population (the demographic compound), the built environment (buildings), the economic environment (economic activities) and the societal environment made by

the behavior of the collectivities (mentalities, sets of values). Consequently the city is exposed to risks originating in all these categories which can be included from a genetic point of view in two major categories: natural and human [7].

Natural risks include: geological risk, geomorphological risk, climatic risk, hydrological risk and soil risk [8].

Human risks include: demographic risk (child death, aging of population, unemployment), social (poverty, criminality, social conflicts) technological risk (explosions, fires, leaking of toxic substances, severe contamination), pollution determined by human activities, transportation risks (idem)

The analysis of all these categories, i.e. of integrated urban risk [10] represents a special tool for responsible local authorities in ensuring an efficient and sustainable management system.

III. THE FEATURES OF THE URBAN SYSTEM OF TIMIȘOARA AS RISK PREMISES

A. Premises of Natural Risk

Premises of natural risks: the city of Timișoara is situated in the western part of Romania (Fig 1), at the intersection of the 45°47' N latitude parallel with the 25°17' E longitude meridian.

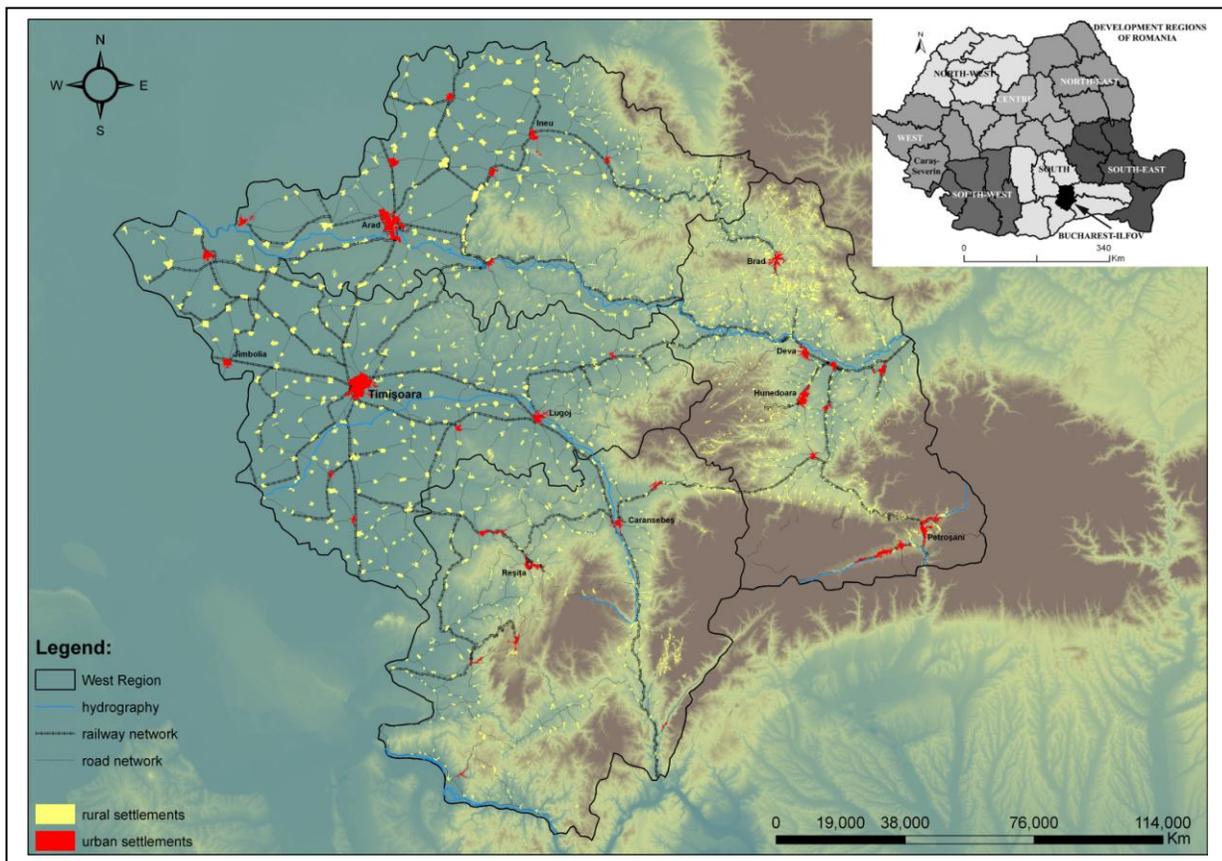


Fig. 1 Geographical position of Timișoara city

The geographical positioning ensures the city a highly favorable environment. The climate is moderate temperate continental, with annual average temperatures of 10.6°C and average annual level of precipitation of 614.3 mm. Extreme climatic phenomena as torrential rain, storms and tropical summer days (with temperatures passing 25°C) are extremely rare. The geomorphological basement - is given by the valley of Bega channel and the low subsidence plain has undergone major draining and ditching works starting with the 19th century which, together with the channeling of the river Bega diminished phreatic and water risk. The tectonic context has a certain restrictive character as the location in an active fault system generates seismic risk, the number of earthquakes over 5 degrees on Mercalli scale being rather high [11].

The change in dynamics of atmosphere as a consequence of the climatic change determines phenomena like: storms, showers, and tropical air invasions with prolonged intervals with temperatures above 26°C [12].

A. Premises of Human Risk:

In order to shape the premises of human risk we must start from the premise that the city of Timisoara is the largest city in the western part of Romania and the second city in the country, merging point of two road routes of European importance and 12 main railways, situated at 570 km distance from the capital of Romania, Bucharest, and at less than 700 km from 12 European capitals, being thus considered “the main entry to Romania from western and central Europe” [13]. The gradual buildup of urban functions along its historical evolution explains the increased degree of hypertrophy of the city of Timisoara within the regional and county urban system, the ration of the city to following city being 1 to 1.9 and the ration towards the second city of the county being 1 to 6 [14]. As a city with multiple urban functions and a dynamic economy (concentrating 80% of the county turnover) [15] Timisoara plays an important role as an endodynamic which attracts important migratory fluxes.

As in the majority of urban agglomerations, the population is diverse from the perspective of the mental and behavioral representations and increasingly less cohesive.

The urban structure is characterized by incoherence as a consequence of the specific stages of urban evolution.

In the late medieval period the city developed as a citadel-city surrounded by marshes.

In the modern period the rural nuclei developed towards the city after the drainage works and after the destruction of the fortification system the city spread from the urban nucleus towards the rural areas.

In the communist period (1947-1989) the socialist centralized economic development determined initially the building of industrial platforms and residential districts for the working class situated at the periphery. In the '80s the commandments of *urban planning* imposed a development *towards the interior*.

The socialist urban notion, imposed by the communist regime preoccupied by the preservation of the exterior agricultural terrain and the maximal use of the existing

infrastructures without considering the most elementary rules of urbanism (the existence of urban green areas, of playgrounds and leisure areas, the proper dimension of streets and parking places etc.) in major discrepancy with the industrial development and pronounced increase of the population [14].

We should add to all these aspects the elements that affected the social content of the city: the leaving (by deportation or freewill) of the German population and of the wealthy upper class Romanians, on one hand, and the bringing of labor force from other regions of Romania, on the other hand, for the fast developing industrial sector at the order of the communist regime with the purpose of diminishing the cosmopolite and bourgeois character of the city.

The transition period, after 1989, is characterized by institutional and legislative lack of response considering building regulations and urbanism; degradation of abandoned industrial areas; leaving of a part of the urban population towards the suburban communes and its replacement by a population with precarious material status which determined the degrading of buildings; lack of funds for the renewal of transport infrastructure; organizing and financial difficulties of the institutions responsible to ensure public safety; apparition of international fluxes of immigrants.

This context determines several areas and types of risks within the city:

- *historical buildings* (dating from 18th and 19th centuries) that during the communist regime suffered no renovation works (Foto 1). These were nationalized, the rightful owners leaving the country or the city and were inhabited by tenants (there are 14500 historical buildings in the city, only 10% of them having been reconstructed) [15];
- *rural peripheral nuclei* built at the beginning of the 20th century which are in various stages of degradation (Foto 2);
- *neighborhoods of collective living buildings*, such as blocks of flats, with a 60% wear degree built in the communist period with minimal expenses and without following any security standards (Foto 3);
- *peripheral rural nuclei* from which the population migrated and was replaced by a population with a precarious material status which increases the risk degree;
- *industrial areas* inserted in the urban structures which have a high technological and environmental risk (Foto 4);
- *major communication axes* which traverse the city and generate risk of traffic accidents;
- *neighborhoods with social risk* associated to poverty, unemployment, criminality (Fig. 2 and Foto 1 - 4).

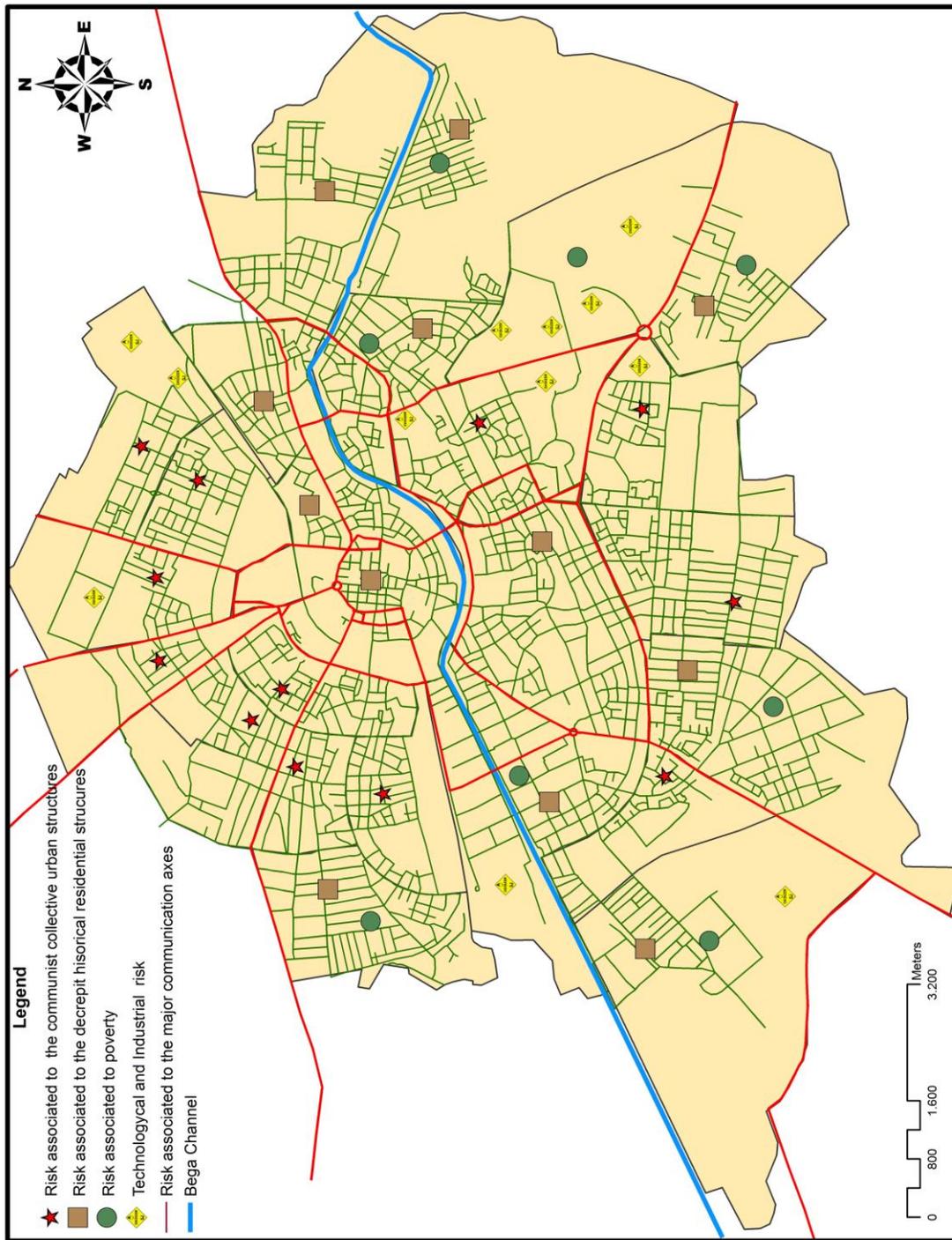


Fig. 2 Types of risks within the city of Timișoara



Foto 1 Degradated historical building (Muțulescu 2012)



Foto 2 Rural degraded nuclei (Muțulescu 2012)



Foto 3 Communist collectiv neighborhous (Muțulescu, 2012)



Foto 4 Industrial buildings (Muțulescu, 2012)

I. EVALUATION OF TRAFFIC RISK

Traffic risk evaluation was done considering the data on road accidents with victims in 2011, in the Municipality of Timisoara, offered by Timis County Traffic Police. In Timisoara, in 2011, 314 traffic accidents took place, i.e. 0.99 accidents for 1000 inhabitants; 12 of these were accidents with victims, namely 1.09 deaths caused by traffic accidents for 1000 inhabitants. The map, made in GIS techniques, showing the exact location of these accidents, enables the emphasis from this perspective of the main risk areas (Fig. 3).

The analysis of spatial location thus emphasizes the fact that approx. 50% of all accidents take place along the main axes of the city which are, in the same time the main transit routes: Șagului Road (continued with E 70), Lipovei Road (connection with Lipova town on DJ 691), Aradului East

Road (connection with E 671 and DN 79), Aradului Vest Road (connection with DN 6, Sânnicolau Mare), Take

Ionescu Bld. (connection between E 70 and E 6671), Baba Docia str. And L. Rebreanu Bld. (transited by the traffic following E70 from the south of the country, Lugoj city and Traian Vuia International Airport and continuing towards the south of the country and the border crossing with Serbia.

These axes represent the continuation within the urban tissue of several national roads and of the E 70 European road.

Considering the role of county and regional pole played by the city of Timișoara and the inexistence of the ring road of the city (except of a north-western sector put into service at the end of the analyzed year) these axes are transited daily by heavy vehicles as well as by busses and small vehicles transporting the population from and towards the surrounding localities.

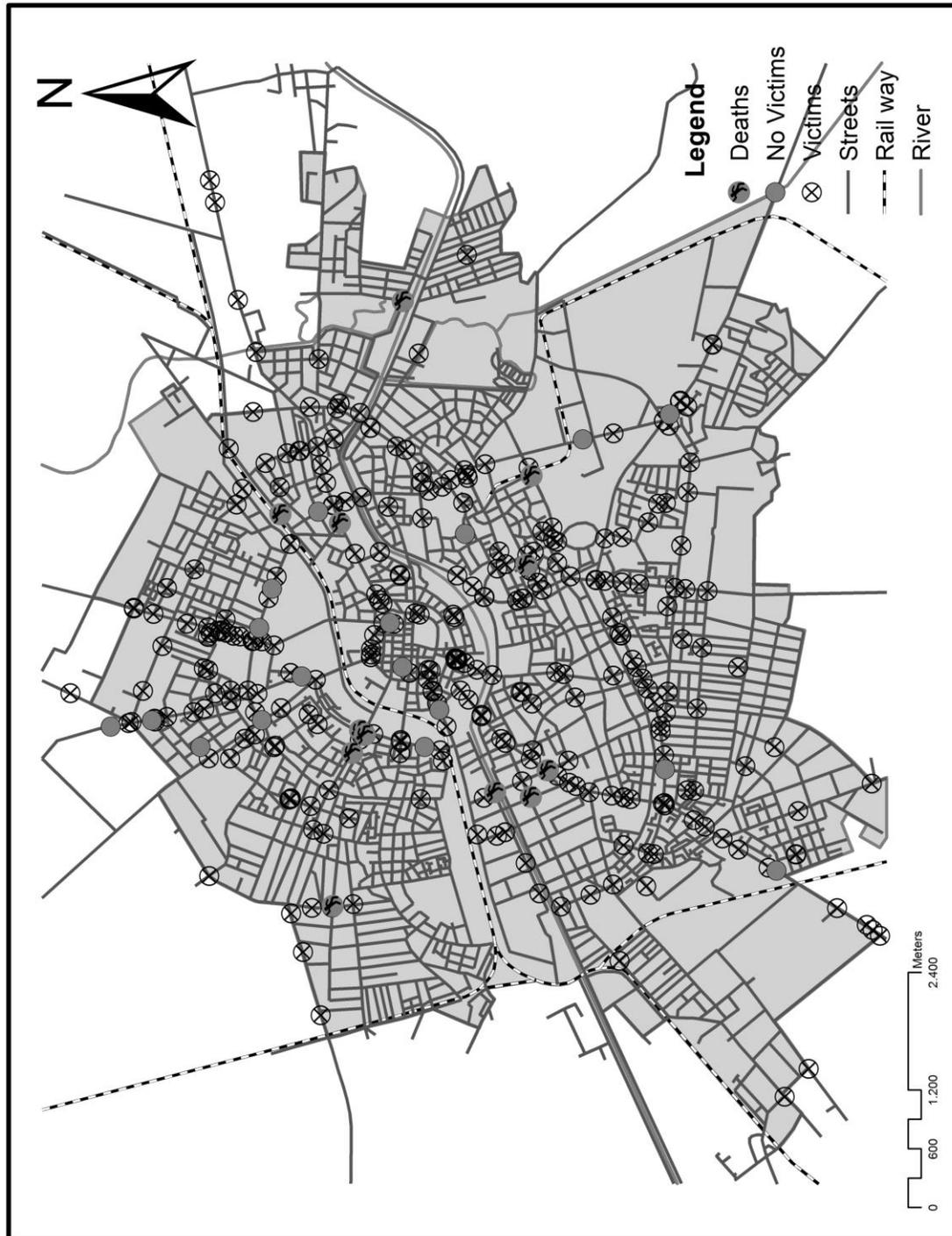


Fig. 3 Localization of trafik accidents in Timișoara (2011)

The radial-concentric structure of the city favors as well the penetration of these axes to the immediate vicinity of the center of the city.

The majority of these axes have a linear, straight course facilitating the exceeding of speed limit.

Two concentration areas of road accidents are noticeable besides axes:

In Cetate neighborhood (the central neighborhood of the city) and the area situated between the Stadium and the University Campus.

Both areas are characterized by a high density of streets and high pedestrian traffic, correlated with a high density of public institutions and, respectively of the main cultural and leisure attraction poles, and, also – by the association of several public transportation types and routes.

I. EVALUATION OF SOCIAL RISK

Crime risk was analyzed using the statistical data offered by Timisoara City Police. Statistics offer an aggregation of various types of crimes registered at the police stations of the cities. These are organized as radial sectors, from the periphery of the built space and of the related social content.

The access to the exact location of the crimes being prohibited by the existing laws, this collection of crimes at the level of police stations renders difficult real, tinted evaluation of the crime risk at the level of the urban space, as well as the production of correlations between the crime level and social content. It can be noticed that most crimes committed are thefts, followed by injuries and threats. While thefts are located almost equally at the level of police stations, injuries are more prevalent in the police stations corresponding to Traian and Fratelia neighborhoods which have high shares of gipsy populations (Fig. 4).

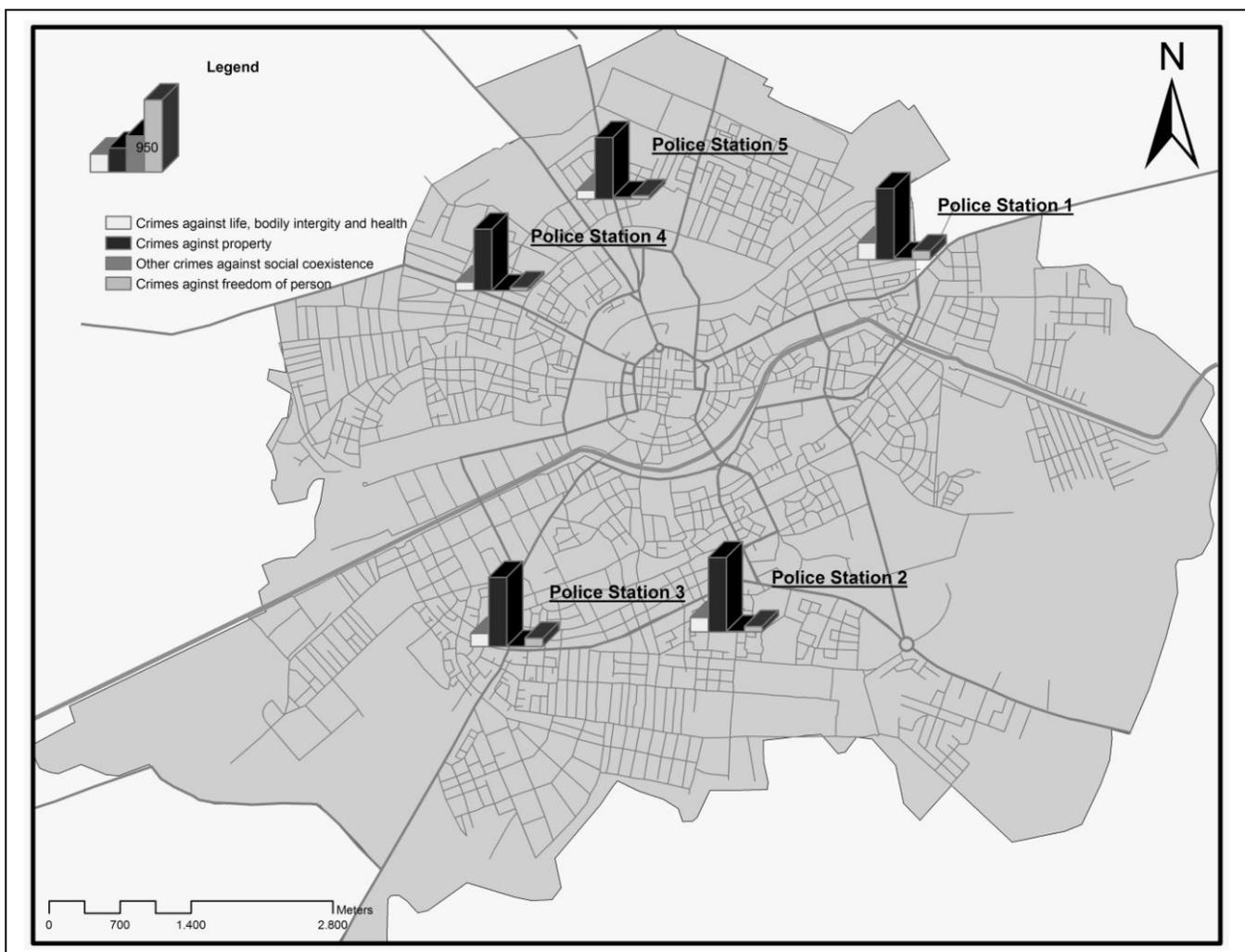


Fig. 4 Localization of different types of crimes by police stations in Timișoara (2011)

I. THE PERCEPTION OF RISK IN TIMIȘOARA

Recent steps in urban planning and local development bring forth the necessity to involve the local population, by means of participating development, in order to ensure the legitimacy of the decisions in this field and the awareness and efficiency of risk management [16], [17], [18]. Innovative methods were thus developed for the involvement of the population in order to know the opinion of the “less heard” „the objective being to develop a more responsive form of local governance, build active citizenship and increase public trust in the existing system of representative local government” [16].

The study of the perception of risk of the urban population is one such attempt.

The explicative paradigm of the perception of risk underlines three components: the psychological perception, the cultural perception and the social perception of risk.

The psychological point of view starts from the idea that individuals respond differently in relation to different “heuristics” or frames of perception and understanding that structure judgment” [19]. Studies reveal that „acceptable levels of risks are influenced by the level of benefits; whether the risk is voluntary or not; and the number of people who are exposed to the risk” [20]. The cultural perspective connects the awareness of the risk to the values of the group [19], [20]. „Notions of risk are inevitably phrased through cultural assumptions and thus are shared conventions and expectations” [19].

The social perspective focuses on the following major ideas: the risk is a feature of the postmodern global society and thus is difficult to manage and avoid; critical, reflexive

attitude is a feature and an obligation of the contemporary society; individualism influences the perception of the risk grounded in the belief that there is a high degree of individual, personal control on the degree of exposure to risk (risk society, cf. Beck) [19]-[21].

In order to study the perception of the risk of the population of Timisoara we applied a questionnaire to 180 persons. Starting from the premise that the perception of the risk is influenced by the degree of risk awareness, the sample was formed of teenagers between 14 and 18 years old (50%), students between 21 and 23 years old (25%) and adults active adults with higher education (25%).

The questions considered the components of urban risk in general and those that are considered by the answerers to be relevant for Timișoara, theoretically and from experience, the differentiation after the degree of risk and safety the various types of space and the differentiation of the districts of Timisoara according to the degree of risk and safety.

We preset several conclusions of the analysis of the answers.

In defining the idea of risk, the *idea of danger* is situated on the first place, with 32.84% of the citations, followed by that of *violence* (22.06%)

There are differences between the questioned groups: thus, teenagers associate urban risk mainly with violence, which has 32% of the quotations; adults show a more comprehensive understanding of risk, enumerating such elements as the risk associated to decrepit buildings, street dogs of unhealthy lifestyle; only the students give an institutional dimension to urban risk which is understood as resulting in bad management (10%) (Fig. 5 – Fig. 7).

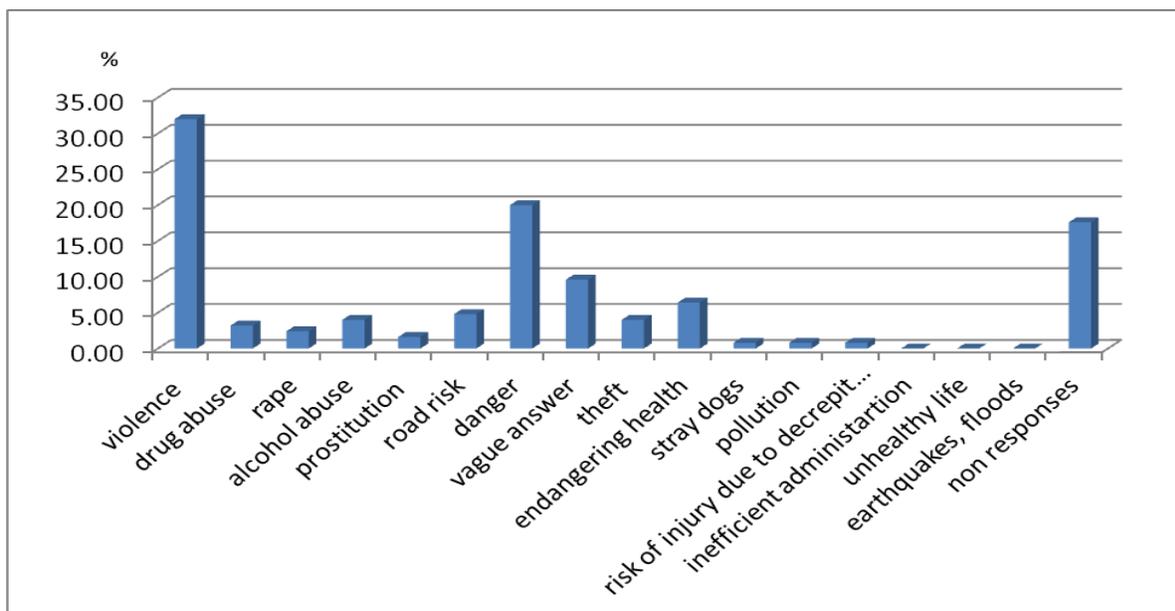


Fig. 5 Pupils' risk definitions

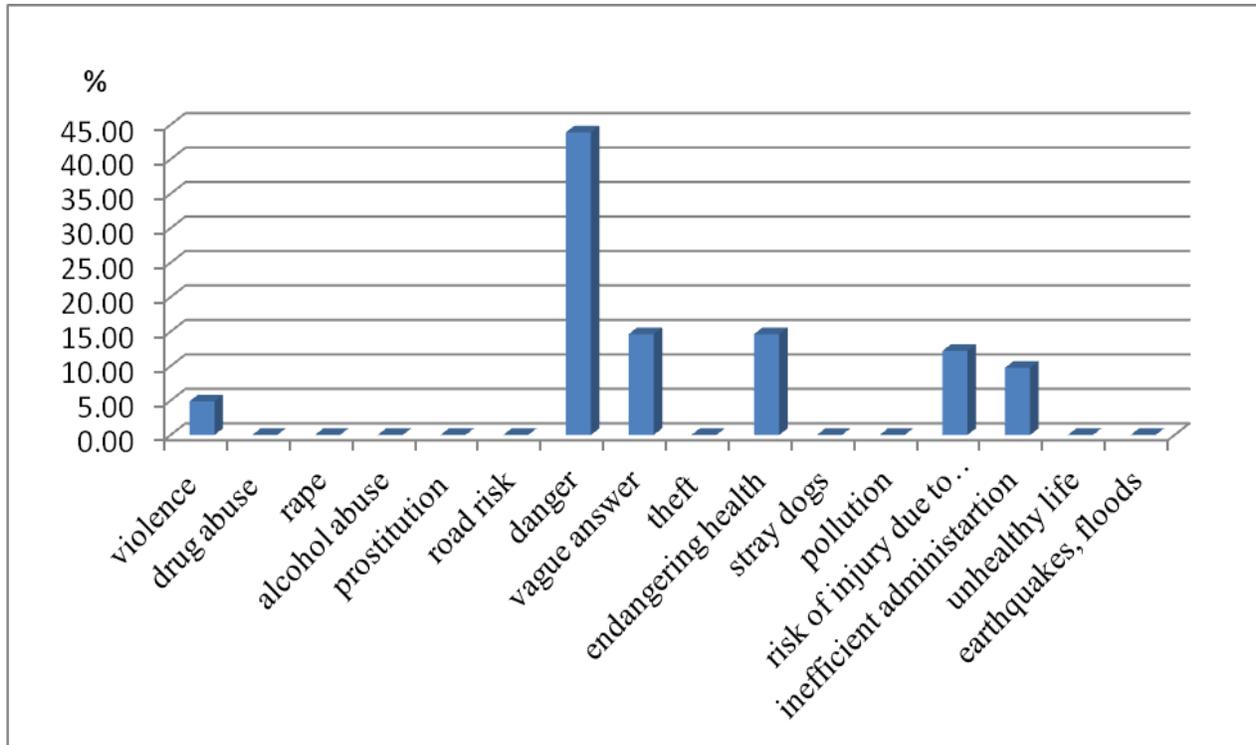


Fig. 6 Students' risk definitions

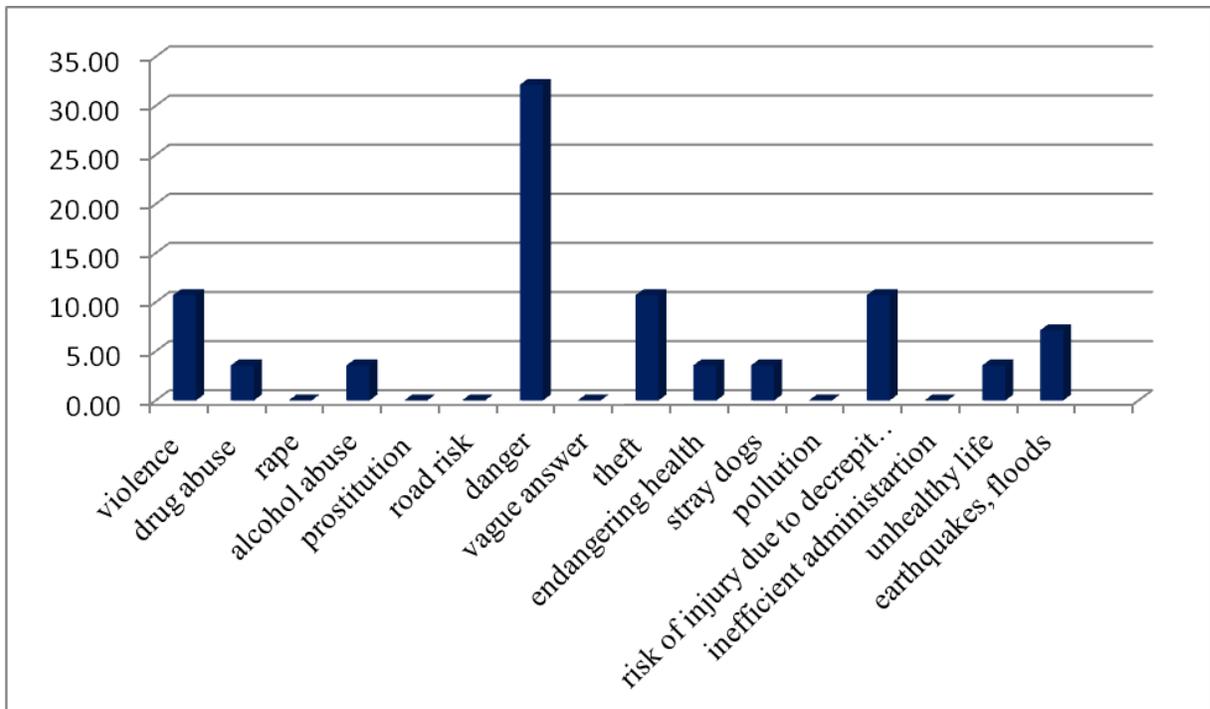


Fig. 7 Adults' risk definitions

The perception on the incidence of the various risk components in the particular case of Timișoara emphasizes the wide spread within the sample of the perception of high and very high risk between several components that have relatively equal shares, on the first places being theft and traffic risk.

Active adults have the same perception but high school students consider violence to represent the highest occurrence risk in their city. Students identify traffic risk to have the most important factor (Fig. 8).

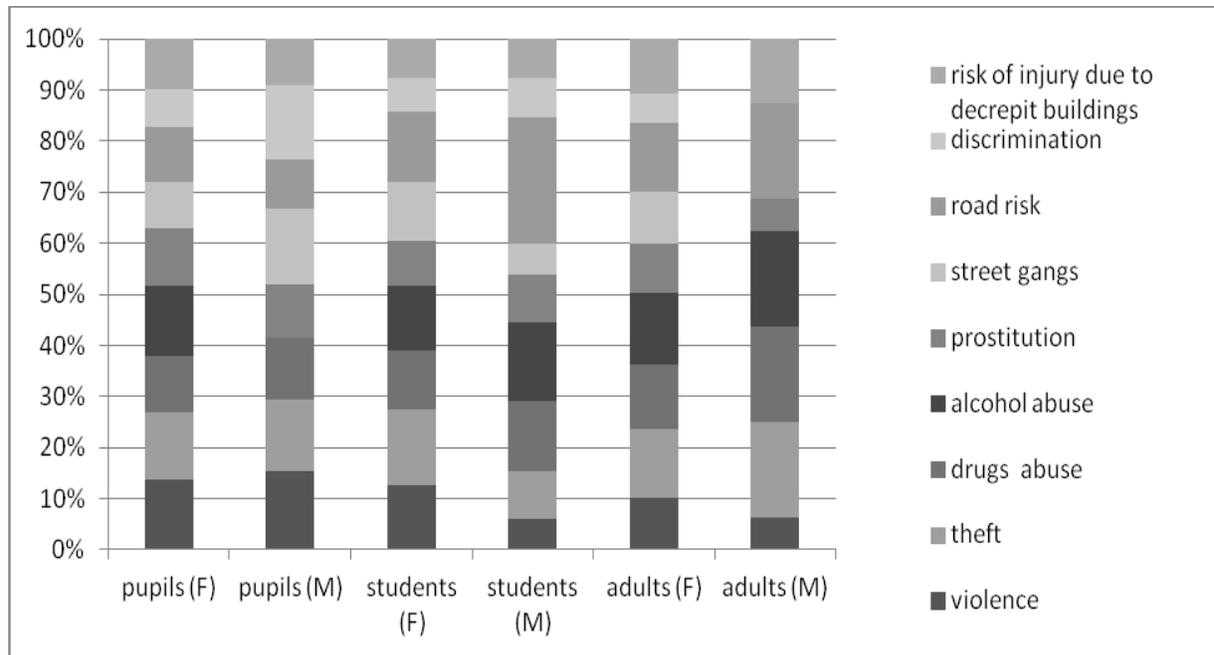


Fig. 8 The perception on the incidence of the various risk components in the particular case of Timișoara

The analysis of different urban areas after their degree of risk emphasizes the inexistence of stigmatized morph structures as repulsive, dangerous. High and very high security risk have peripheral districts (14.34% of quotations),

followed with approx. equal shares by backstreets, areas with uninhabited buildings but also by bars, clubs or stadiums (with shares of 11-12%) (Fig. 9).

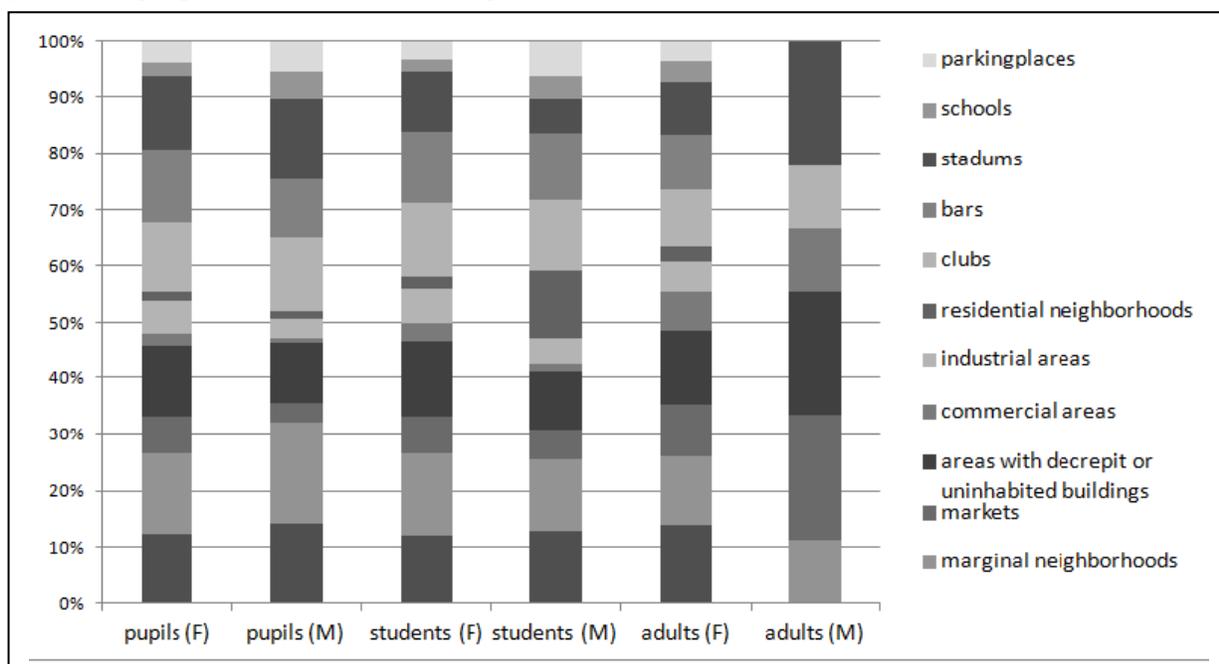


Fig. 9 Spaces perceived as presenting high and very high risk

The perception of the risk and, respectively, of the security offered by the districts of the city corresponds to the logic emphasized by the answers to the previous question. The mainly negative perception corresponds to the peripheral districts and confirms the importance of some of the risk categories identified as risk premises within Timisoara (social content with social risk, decrepit and degraded built

patrimony, precarious utilities, de-structured areas). The predominantly positive perception corresponds to central districts or well-connected to the center of the city and which have important functional areas for daily life (public, administrative, religious, cultural and educational institutions, modern commercial areas, socializing and leisure areas) (Fig. 10).

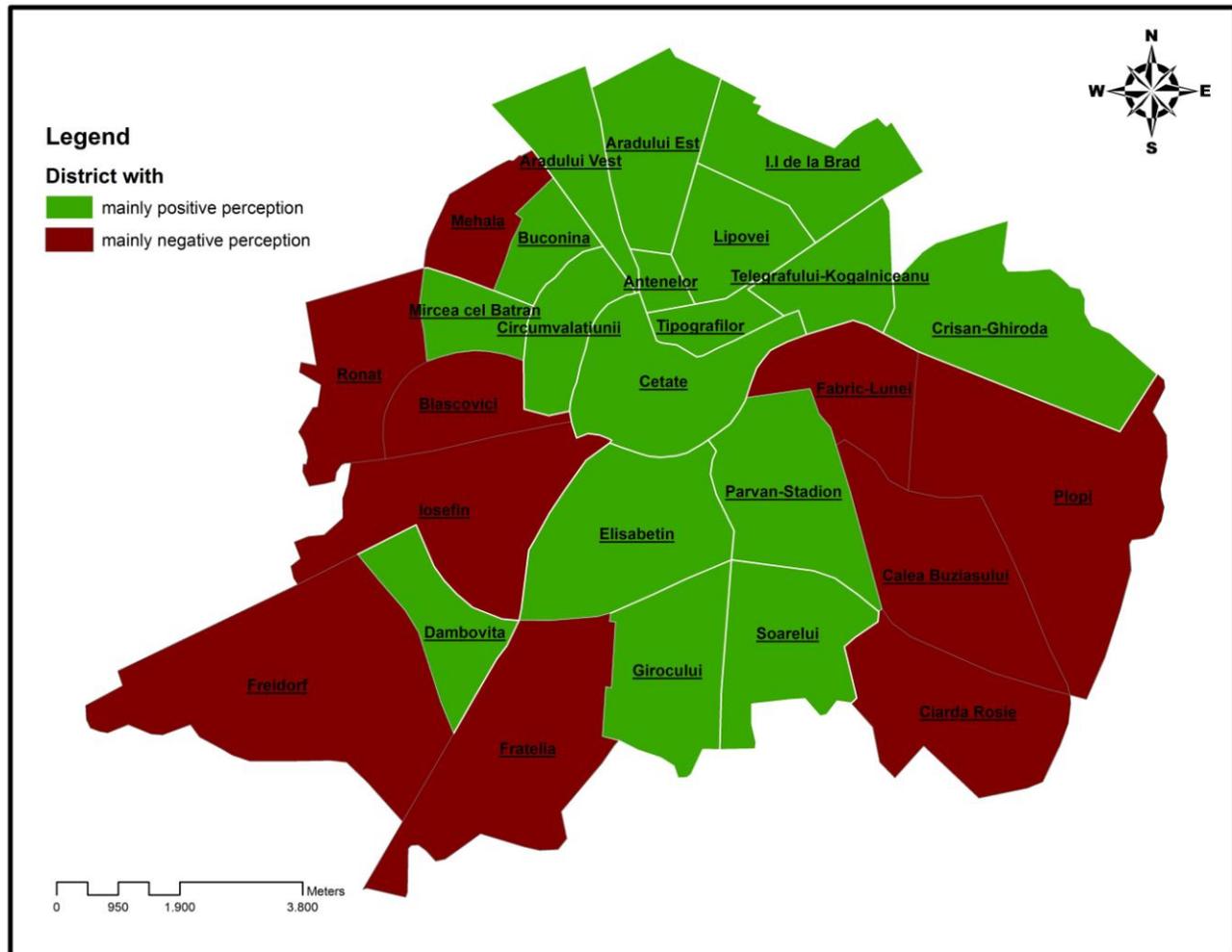


Fig. 10 Risk perception in Timișoara city

I. CONCLUSION

The analysis of urban risk is a current issue of major interest for urban planners and local administrations. The integrated approach of the phenomenon of risk implies the evaluation of the multiple components of the risk, as well as the inclusion of the subjective aspects connected with the perception of risk. The city of Timisoara, as a consequence of the particular context of its evolution has a complex urban risk. The assessment of urban risk emphasizes the importance of objective factors (traffic risk, e.g.) as well as of subjective risks (related to spatial behavior or preconceptions). The institutions responsible for urban risk management may

consider these perceptions in establishing sustainable strategies that can determine social cohesion.

ACKNOWLEDGMENT

The authors would like to thank to the anonymous reviewers for their thoughtful suggestions. Also, the authors wish to thank Mr Chief Inspector Tiberiu Pistrui, from Timiș County Police Inspectorate, and Mr Inspector Petrică Rumeaga, from Timiș County Traffic Police Department for their support in the achievement of this study.

REFERENCES

- [1] C.-M. Ene, A. Gheorghiu, A. Gheorghiu, "A theoretical approach for dynamic modelling of sustainable development" in *Proc.*, 6th IASME /WSEAS Int. Conf. on Energy & Environment, 2011, pp. 261 – 266.
- [2] A. K. Lopes, F. Rodrigues, V. Ferreira, R. Vicente, "A sustainable urban center refurbishment" in *Proc.*, 6th IASME /WSEAS Int. Conf. on Energy & Environment, 2011, pp. 272 - 277
- [3] A. Ardelean, A. Pisoschi, A. T. Bogdan, V. Pau, B. Covaci, M. Covaci, "The ethical dimension of the Romanian scientific research for sustainable development" in *Proc.*, 6th IASME /WSEAS Int. Conf. on Energy & Environment, 2011, pp. 255 – 261.
- [4] V. Surd, V. Puiu, V. Zotic, *Demographic risk in Apuseni Mountains/Riscul demografic în Munții Apuseni*, Cluj Napoca: Presa Universitară Clujeană, 2007.
- [5] I. Konstantinou, F. Batzias, A. Bountri, "Integrating reliability, risk analysis and quality management in wastewater treatment facilities" in *Proc.*, 6th IASME /WSEAS Int. Conf. on Energy & Environment, 2011, pp. 111 – 117.
- [6] I. Mac, *Normative geography/Geografie normativă*, Cluj Napoca: Presa Universitară Clujeană, 2008.
- [7] I. Ianoș, *Territorial systems/Sisteme teritoriale*, Bucharest: Editura Tehnică, 2000.
- [8] O. Bogdan, E. Niculescu, *Climate risks in Romania/Riscul climatic în România*, Bucharest: Romanian Academy, Institute of Geography, 1999.
- [9] World Economic Forum, *Global risks seventh edition*, on line available: <http://www.weforum.org/reports/global-risks-2012-seventh-edition>
- [10] The World Bank, *Urban risk assessment*, on line. Available: <https://www.citiesalliance.org/ca/sites/citiesalliance.org/files/UnderstandingUrbanRisk8-4-2011web.pdf>
- [11] C. Ancuța, *Geographical study of territorial disparities in Romanian Banat/Studiul geografic al disparităților teritoriale din Banatul românesc*, Timișoara: Editura Mirton, 2008.
- [12] E. Stanciu, *Precipitations in Banat/Precipitațiile din Banat*, Timișoara: Eurostampa, 2005.
- [13] R. Munteanu, I. Munteanu, *The monograph of Timișoara city/Monografia orașului Timișoara*, Timișoara: Editura Mirton, 2002.
- [14] C. Ancuța, "The urban-rural relationships and their approach in the territorial planning of the post-communist Romania. Case study - the municipality of Timișoara/ Les relations urbaines -rurales et leur approche dans la planification du territoire de la Roumanie post - communiste. Étude de cas – le municipes de Timișoara" in I. Ianoș, N. Popa, L. Cercleux, *Elements of territorial planning and regional development/Elements de planification territoriale et développement régional*, București : Editura Universitară., 2011, pp. 247-263.
- [15] Mayoralty of Timișoara, Integrated plan for the development of Timișoara Growth Pole/Planul integrat de dezvoltare al Polului de creștere Timișoara, on line. Available: http://www.primariatm.ro/uploads/files/caracterizare_generala.pdf
- [16] C. Sanry, "Understanding risk: the planning officers' perspective" in *Urban Studies*, vol. 41, No. 1, 2004, pp. 35-55.
- [17] U. Vilsmaier, "Crossing borders: transdisciplinary approaches in regional development" in *Geographica Timisiensis*, vol. XVII, No. 1, 2008, pp. 33-43.
- [18] E. F. Jones, *Our urban future*, 2003, on line available: http://www.prcdc.org/files/Our_Urban_Future.pdf
- [19] D. Lupton (ed.), *Risk and socio-cultural theory*, Cambridge University Press, 1999.
- [20] C. Starr, "Social benefit versus technological risk: what is our society willing to pay for safety?" in *Science*, 1969, No. 165, pp. 1232 – 1238.
- [21] P. Pretti-Watel, *Sociology of risk/La sociologie du risque*, Paris: Armand Colin, 2000.