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Preface

It has been my pleasure to serve as Guest Editor and my thanks to Zaiga Krisjane for inviting me to serve as such. I have enjoyed reading all of the papers that are contained in this volume. It is always a tough decision to decide whether to publish a journal or a particular edition in your own native language or to reach a larger audience by publishing in an international language like English.

It has now been over 17 years since the Baltic States regained their independence from the Soviet Union and a lot has happened during that time period. The articles in this volume reflect some of those changes, especially, but not exclusively in Latvia. It is important that scholars and others have access to research documenting the rapid transition and their consequences in societies that have undergone unprecedented – change since regaining their independence. It is also vital that others have the opportunities to benefit from research demonstrated in this volume.

Some of the same processes that have operated over space and places elsewhere are also evident in a number of articles in this volume, especially migration. The restructuring processes and institutional changes have created opportunities and outcomes, positive and negative, for people and places. The articles on migration cover a wide set of topics, from an overview of migration studies in Latvia during the 20th Century to the effects of circular migration within the context of ongoing transitions in Eastern and Southeastern Europe to the role of amenity migration in the Riga metropolitan area. Amenity migration in particular is a recent phenomenon in post-socialistic countries about which there has been little research, and, as with other articles in this volume, should be of great interest to researchers doing related work in other countries around the world.

Regional change can be quite dramatic under the circumstances of a rapid transition. How well people and places can cope or direct such change is a topic about which we have much to learn. One common strategy is to try and promote tourism, especially as discussed in one article it can help promote clusters of development. Development, whether driven by tourism or other place-specific contexts and identities is often more difficult in rural places as migration is directed towards metropolitan areas. However, we live in a highly interconnected world which brings up issues, as another paper discusses, such as the role of rural place identity within the planning context. These issues are also relevant within a primal city context such as Riga where deconcentration of the population is associated with changing commuting patterns. The consequences of changing population and commuting patterns on the city environment is also uniquely demonstrated in an article that shows the impacts of heavy metal accumulation on trees in Riga.

The decision to publish this issue in English should prove to be a wise one as there is a need as demonstrated by my brief comments to make available to a wider audience the quality research being done by these scholars and others working in these exciting, though also difficult times.

Gundars Rudzitis
University of Idaho, USA

Content

Preface	3
NATURE RESEARCH	
<i>Gunta Cekstere, Anita Osvalde</i> A Study of Heavy Metal Accumulation in Street Greenery of Riga (Latvia) in Relation to Trees Status	7
DEVELOPMENT OF PLACES AND REGIONS	
<i>Andris Klepers, Maija Rozīle</i> The Regional Development of Tourism and the Emergence of Clusters in Latvia: The Example of Sigulda	24
<i>Laila Kūle</i> Rural Place Identity Reproduced by the Riga Hinterland Spatial Planning	38
HUMAN GEOGRAPHY	
<i>Zaiga Krišjāne, Māris Bērziņš</i> Commuting and the Deconcentration of the Post-Socialist Urban Population: the Case of the Rīga Agglomeration	56
<i>Daniel Göler</i> Effects of Circular Migration in the Context of Transition in East and Southeast Europe	75
<i>Pārsla Eglīte</i> A Brief Overview of 20th Century Latvian Migration Studies	81
In Memoriam	
Adolfs Krauklis – a Life Dedicated to Geography	88

A study of heavy metal accumulation in street greenery of Riga (Latvia) in relation to trees status

Gunta Cekstere and Anita Osvalde

Abstract

The aim of the research was to find out the heavy metal (Fe, Mn, Zn, Cu, Pb, Cd, Cr, Ni) status in the street greenery of Riga to reveal the effect of metal accumulation on the physiological status of street trees *Tilia x vulgaris* H., which is one of the most widespread tree species of street greenery in the borco-nemoral zone in Central, Northern and Eastern Europe. Soil and leaf samples were collected from 46 street trees (14 sites) in the Centre of Riga and from a control site located in a park area during the vegetation seasons of 2005 and 2007. The investigation indicated that the ecological status of the studied trees in Riga was mainly affected by decreased accumulation of Mn in lime leaves. For visible deficiency symptoms in *Tilia x vulgaris* H. leaves the critical level concentration for Mn was estimated as 20-22 mg/kg. An increased Fe/Mn ratio was found for the vast majority of lime leaf samples. Our investigation revealed increased concentrations of Zn and Cu in the street greenery. Although, the mean concentrations of Pb, Cd, Cr, and Ni in street greenery were in the background level, several sites with increased pollution were found. A neutral or slightly alkaline soil reaction in Riga's street greenery was one of the factors affecting metal availability for trees. As both the lowest and the highest concentrations of Fe, Cu, Zn, Pb, Cd, Cr, and Ni were found in visually healthy lime trees, heavy metal accumulation was not the main factor affecting the lime tree ecological status.

Key words: ecological status, heavy metals, soil and leaf samples, street trees, *Tilia x vulgaris* H.

Introduction

Trees as one of the greenery element in an urban area have many functions and positive effects on the surrounding environment (Novak et al. 2006). Unfortunately, in cities, street trees commonly are subjected by many factors, such as specific microclimate, application of de-icing materials on roads during winter, insect damages, soil structure and chemical properties, inadequate supply with biogenous elements, soil and air pollution, improper care etc. (Craul 1992; Pauleit et al. 2002; Sæbø et al. 2003). One of the environmental problems is heavy metal accumulation in soils and plants due to transport and industrial emissions. It is well known that a variety of motor vehicles produce trace metals such as Pb, Zn, Cd etc. (Rodriguez-Flores and Rodrigues-Castellon 1982; Park 1997; Goudie 2000; Iqbal and Shafiq 2000; Piczak et al. 2003). Plants require some of these metals in trace quantities but at higher concentrations they can be toxic (Ramirez-Rodriguez et al. 2005). Fe, Mn, Zn and Cu are well-known plant micronutrients, which are essential in different plant physiological processes (Marschner 1995). Fe is involved in synthesis of protein and chlorophyll as well as in the metabolism of nucleic acids (Taiz and Zeiger 2002). It is a component of redox systems: electron carriers, enzymes (catalases, cytochromes etc.). Mn's physiological role is connected with the reduction of nitrates, participation in synthesis of proteins and lipids, facilitation of carbohydrates formation, activation of relatively large number of enzymes. Mn is also a component of some enzymes (manganese-protein involved in photosystem II, or superoxide dismutase) (Denny 2002; Bituckii 2005). Zn as a plant micronutrient is essential for several biochemical processes, such as nucleotide and cytochrome synthesis, chlorophyll production, auxin metabolism and membrane integrity (Marschner 1995; He et al. 2005). Zn also acts as a cofactor at the active site of the antioxidative enzyme CuZn superoxide dismutase (Alscher et al. 2002). Most of the Cu functions are based on the participation of enzymatically bound Cu in redox reactions and has a role in electron transfer. It is the metal component in some proteins and in plastocyanin (Marschner 1995).

The typical concentration of these microelements in plant leaves ranges from 25 to 250 mg/kg for Mn, from 50 to 300 mg/kg for Fe, from 15 to 75 mg/kg for Zn, and from 5 to 15 mg/kg for Cu (Bituckii 2005). Nevertheless, in excess amounts these microelements as well as Pb, Cd, Cr and Ni are phytotoxic to most of the plants and can disturb a wide range of biochemical and physiological processes (Osvalde and Paegle 2005; Marschner 1995). In general, Zn as a heavy metal is not considered being a very phytotoxic element to plants. Its toxic limit depends on species, and on average is 300-400 mg/kg according to Kabata-Pendias and Pendias (1989) or 100-300 mg/kg according to Bituckii (2005). The toxic critical limit for Mn is 200 mg/kg (Bituckii 2005). For other heavy metals, the critical concentration in plants ranges from 10-50 mg/kg for Ni (Bituckii 2005), 30-300 mg/kg for Pb, 5-30 mg/kg for Cd (Kloke et al. 1984). It was shown, that high concentrations of heavy metals in plants can reduce chlorophyll content and photosynthesis, disturb transport of assimilates, upset plant mineral nutrition, change the status of water and hormones, decrease growth, damage cell membrane integrity (Kuznecov and Dmitriyeva 2005) and mitochondria, inhibit enzyme activities (Ramirez-Rodriguez et al. 2005) etc. It leads to an appearance of visible toxicity symptoms of heavy metals in the foliage: intercostal stippling, necrotic spots along veins, edge and tip necrosis (Vollenweider and Günthardt-Goerg 2005; Osvalde and Paegle 2007).

The accumulation of heavy metals in soils and plants in different countries has been studied worldwide (Linde et al. 2001; Tsikritzis et al. 2002; Piczak et al. 2003; Bratanova-Doncheva 2004; Gateva 2004; Yurukova 2004; Madrid et al. 2004; Kosheleva et al. 2005; Baycu et al. 2006; Liu et al. 2007; Oleksyn et al. 2007; Trocha et al. 2007; Unterbrunner et al. 2007). According to a number of researches (Hagen-Thorn et al. 2004; Hagen-Thorn and Stjernquist, 2005; Yoon et al. 2006; Mertens et al. 2007) there are differences in nutrient and heavy metal accumulation between tree species growing even in the same soils, as well as differences due to regional variations, sampling time, pollution etc. The impact of metals depends on the pollution level, the resistance of different species (Punshon 2001) and particular individuals, duration of impact, the physiological stage of the plants (Gateva 2004).

One of the most widespread tree species of street greenery in Central, Northern (Sæbø et al. 2003; Bengtsson 2005) and Eastern Europe (Sander et al. 2003) is the lime tree *Tilia x vulgaris* H., known also as *T. x europea* L., *T. intermedia* DC., *T. x hollandica* K. Koch. (Bengtsson 2005). *T. x vulgaris* is also one of the main species of street greenery in Riga, Latvia, located in the boreo-nemoral zone. However, deficiency, optimal and excessive concentrations of plant nutrients as well as toxic levels of heavy metals for *T. x vulgaris* H. in urban greenery (in soil and leaves) has not been investigated sufficiently. Especially scarce information is available on heavy metal status of *T. vulgaris* in the boreo-nemoral zone. Our previous work (Čekstere et al. 2005; Osvalde and Čekstere 2005) on chestnut and lime in Riga showed a severe imbalance in the mineral nutrition of urban trees. Nevertheless, there is little information on the heavy metal accumulation in roadsides soils and their availability to plants as well as on the phytotoxic impact of heavy metals on street trees. It is a topical issue as street greenery is a relevant element of the urban environment and their ecological status influences their functions. The aim of this investigation was to find out the heavy metal (Fe, Mn, Zn, Cu, Pb, Cd, Cr, Ni) status in the street greenery of Riga to reveal the effect of metal accumulation on the physiological status of street trees *T. x vulgaris*.

Materials and Methods

Study area. The study was conducted in Riga, which is situated along the Baltic Sea at the southern part of the Gulf of Riga in the boreo-nemoral zone. The climate of the city is moderately warm and humid. Winters are relatively warm with frequent thaws, the average temperature in January is -4.7 °C. The mean annual amount of precipitation is 700-720 mm. Summers are relatively cloudy and cool. The average temperature in July is +16.9 °C (Anonymous 2005). In Riga, parks, gardens, squares and other greenery form 8 % of the centre of city (Nikodemus et al. 2003). There is an ever rising traffic intensity in Riga. In 2001, there were 270 cars registered per every 1000 people (Čekstere et al. 2005), but in 2005 there were approximately 330 cars per 1000 inhabitants (Osis 2006).

Sampling. During the time period of March 2005 to August 2007, soil and leaf samples were collected from 14 sites (45 trees) in the central part of Riga, and from a control site (three lime trees) located in a park area – Viestura Garden (Fig. 1, Table 1). The concentrations of Fe, Mn, Cu, Zn, Pb, Cr, Cd, Ni, as well as soil pH were determined.

Table 1

Characterization of sites

Sampling site No	Characterization of site, status of trees (August 2005 and 2007)
Site 1: Viestura Garden (3 trees, L1-L3)	Park territory. Distance from lime trees to the nearest street more than 50 m, from sidewalk – more than 30 m. 3 lime trees older than 128 years. Condition of trees – healthy.
Site 2: Hanzas 1 (3 trees, L4-L6)	Hanzas Street. 3 lime trees older than 94 years, between street buildings and pavement. Condition of trees – damaged.
Site 3: Hanzas 2 (3 trees, L7-L9)	Hanzas Street. 3 lime trees older than 95 years, between the road and pavement. Condition of trees – medium damaged.
Site 4: Elizabetes (5 trees, L10-L13)	Elizabetes Street. 5 lime trees older than 62 years, between the road and pavement in 2005. Condition of trees in 2005: 3 – damaged, 2 – healthy; in 2007 – 2 damaged, 2 healthy, 1 – dead.
Site 5: Kr. Valdemara (3 trees, L14-L16)	Kr. Valdemara Street. 3 lime trees 40-43 years old, between the road and pavement. After tree pruning in winter 2005 leaf sampling was not possible in June 2005. Condition of trees – damaged.
Site 6: Stabu 1 (3 trees, L17-L19)	Stabu Street. 3 lime trees older than 53 years, between the road and pavement. Condition of trees – damaged.
Site 7: Stabu 2 (4 trees, L20-L23)	Stabu Street. 4 lime trees 18-55 years old, between the road and pavement. Condition of trees: 3 limes – damaged, 1 – healthy.
Site 8: Basteja 1* (3 trees, L24-L26)	Basteja blvd. (*) 3 lime trees approximately 79 years, old between the sidewalk and underground parking lot. Condition of trees – healthy.
Site 9: Basteja 2* (3 trees, L27-L29)	Basteja blvd. (*) 3 lime trees older than 98 years, between the road and pavement. After tree pruning in winter 2005 leaf sampling was not possible in June 2005. Condition of trees – damaged.
Site 10: Raina 1 (3 trees, L30-L32)	Raina blvd. 3 lime trees older than 100 years, between the pavement and park. Condition of trees – healthy.
Site 11: Raina 2 (3 trees, L33-L35)	Raina blvd. 3 lime trees older than 100 years, between the pavement and park. Condition of trees – healthy.
Site 12: Brivibas 1 (3 trees, L36-L38)	Brivibas blvd. 3 lime trees older than 100 years, in the first line of four lines alley, located in the middle part of the carriageway. Condition of trees – medium damaged.
Site 13: Brivibas 2 (3 trees, L39-L41)	Brivibas blvd. 3 lime trees older than 100 years, in the second line of four lines alley, located in the middle part of the carriageway. Condition of trees – healthy.
Site 14: Brivibas 3 (3 trees, L42-L44)	Brivibas blvd. 3 lime trees older than 100 years, in the first line four lines alley, located in the middle part of the carriageway. Condition of trees – medium damaged.
Site 15: Brivibas 4 (3 trees, L45-L47)	Brivibas blvd. 3 lime trees older than 100 years, in the second line of four lines alley, located in the middle part of the carriageway. Condition of trees – healthy.

* Since 2008 – Z. A. Meierovica blvd.

Soil samples were collected from the tree-rooting zone (road side) with a soil probe to a depth of 35 cm in March (the end of winter), June and July 2005, and June and August 2007. For each soil sample three sub-samples were obtained and thoroughly mixed to form one sample. Soil samples in the control site (Viestura Garden) were collected under the perimeter of the crown of trees and leaves from several branches of the crown.



Figure 1. Site locations in the central part of Riga. (Sites: 1 – Hanzas 1; 2 – Hanzas 2; 3 – Elizabetes; 4 – Kr. Valdemara; 5 – Stabu 1; 6 – Stabu 2; 7 – Basteja 1; 8 – Basteja 2; 9 – Viestura Garden; 10 – Raina 1; 11 – Raina 2; 12 – Brivibas 1; 13 – Brivibas 2; 14 – Brivibas 3; 15 – Brivibas 4)

Leaf samples were taken with telescopic scissors from leaves just reaching maturity and full size. For each sample 50 leaves were collected from different branches of trees along road sides during the vegetation season of 2005 (June, July and August) and 2007 (June and August).

Samples of wood were collected with a Presler drill at 1.3 m high and tree rings were counted for each tree using a special apparatus *LINTAB 4* and a computer program *TSAPWIN* to determine their age.

Laboratory analysis. Sample preparation. The soil samples were stored at +4 °C, then dried at +35 °C for two days and sieved <2 mm. Leaves were washed with distilled water, dried at +60 °C and ground.

Soil extraction and plant tissue ashing. Fe, Mn, Cu, Zn, Pb, Cr, Cd and Ni in the soil samples was extracted with 1 M HCl solution (soil – extractant mixture 1:5). This solution is universal and quite aggressive. The findings characterize not only the easily available level of elements to plants, but also a potential amount of elements available to plants during a vegetation period. Soil pH was determined in 1 M KCl (soil – extractant mixture 1:1.25). Leaf samples were dry-ashed in concentrated HNO₃ vapour and re-dissolved in HCl – distilled water mixture 3:100 (Rinkis et al. 1987).

Chemical analysis. Fe, Mn, Cu, Zn, Pb, Cr, Cd and Ni concentration in soil and plant samples was estimated by an atomic absorption spectrometer (*Perkin Elmer Analyst 700*, acetylene-air flame). Soil pH was detected by pHmeter *Sartorius PB-20* (Rinkis et al. 1987). The analysis was repeated three times.

Statistical analysis. The level of statistical significance of heavy metals and pH results for each site were determined using *Microsoft Excel*. To compare the significance level of heavy metals in street greenery with the background level in Viestura Garden a *t-Test Two Sample Assuming Unequal Variances* was used. *t-Test Paired Two Samples for means* was used for testing differences between soil and lime leaves chemical results in 2005 and 2007. The correlation coefficients (Pearson) between heavy metal concentrations in soil and leaves and their significance levels were found using *SPSS 14.0 version* and were classified as follows: $r < 0.5$ – weak correlation, $0.5 < r < 0.8$ – medium correlation, and $r > 0.8$ – high correlation. Principal component analyses were done for the average results of 2007 using *Pcord-4*.

Results

To find out the heavy metal status in the street greenery of Riga Fe, Mn, Cu, Zn, Pb, Cr, Cd and Ni concentrations in soil and leaf samples of *T. x vulgaris* were estimated.

The concentrations of Fe in the soil samples of the street greenery did not exceed the background level (Fig. 2), except Site 8 and Site 9, where Fe level was on average 1.3 and 1.4 times, respectively, higher than in the park samples. A marked increase in the concentrations of

Fe occurred from spring 2005 to August 2007. Fe contents in the leaves of the examined trees varied from 113 to 1075 mg/kg, with a tendency to increase during the vegetation season (Fig. 3). Similar to the soil results, higher Fe values were found in the plant samples at site 8 and 9 where trees are located along the street with tram traffic. No visual Fe deficiency or toxicity symptoms for *T. x vulgaris* leaves were observed.

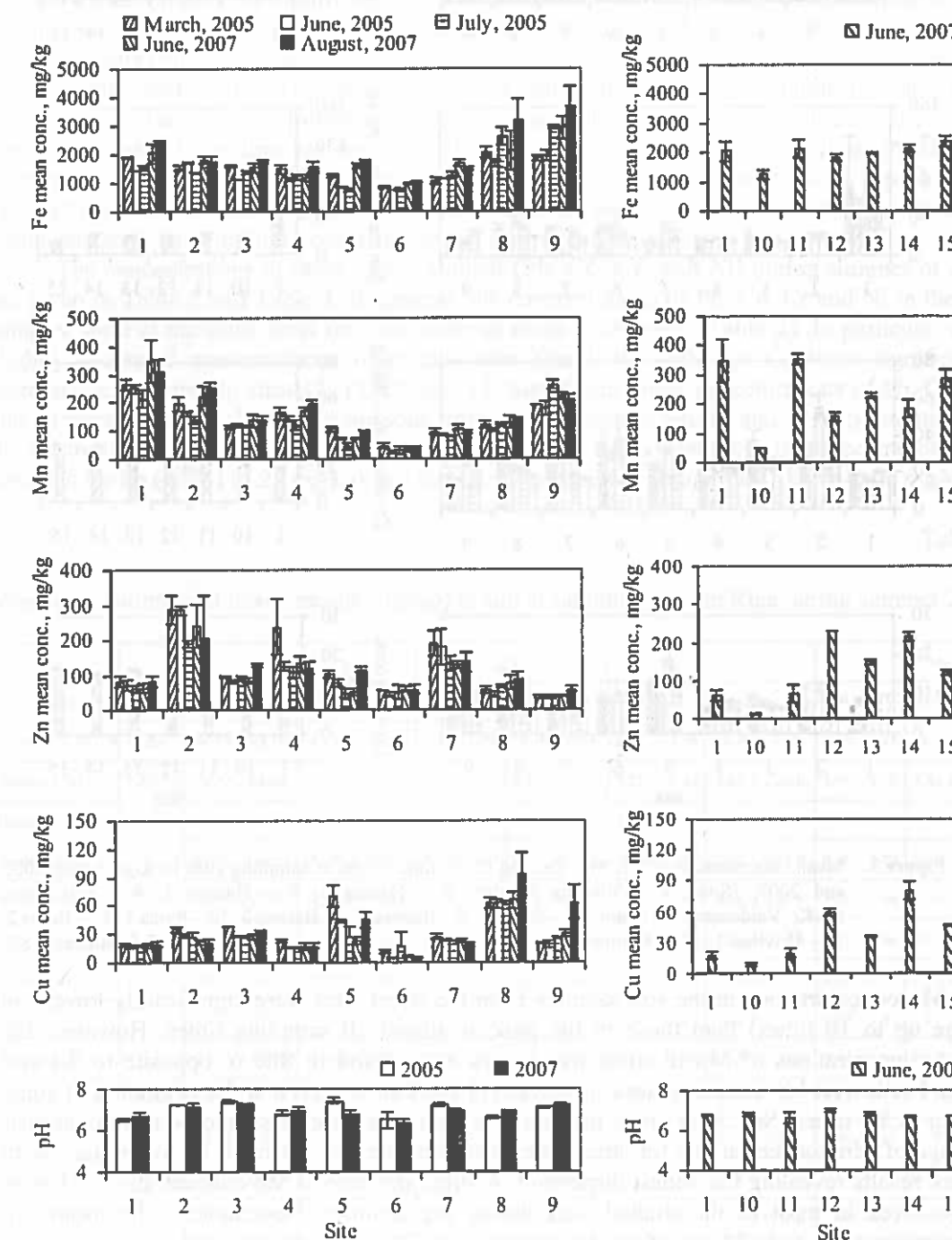


Figure 2. Mean concentration of Fe, Mn, Zn, Cu (mg/kg) in soil, and soil reaction at sampling sites in Riga during 2005 and 2007. (Sites: 1 – Viestura Garden; 2 – Hanzas 1; 3 – Hanzas 2; 4 – Elizabetes; 5 – Kr. Valdemara; 6 – Stabu 1; 7 – Stabu 2; 8 – Basteja 1; 9 – Basteja 2; 10 – Raina 1; 11 – Raina 2; 12 – Brivibas 1; 13 – Brivibas 2; 14 – Brivibas 3; 15 – Brivibas 4). Means from 3-5 samples \pm SE for heavy metals, and means from 9-15 samples \pm SE for pH 2005-2007 sites 1-9, and 3 samples \pm SE for sites 10-15

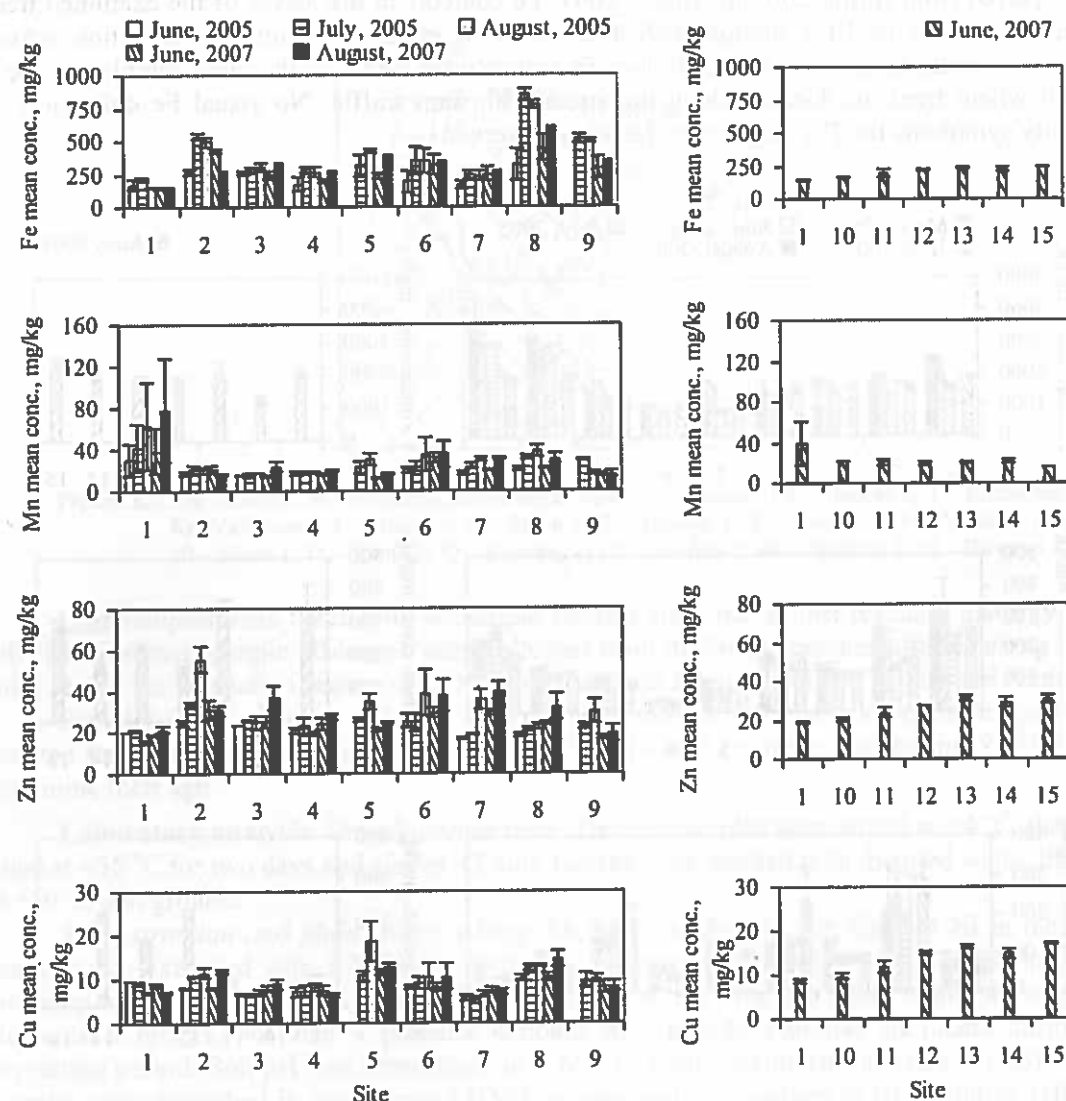


Figure 3. Mean concentration of Fe, Mn, Zn, and Cu in lime leaves at sampling sites in Riga during 2005 and 2007. (Sites: 1 – Viestura Garden; 2 – Hanzas 1; 3 – Hanzas 2; 4 – Elizabetes; 5 – Kr. Valdemara; 6 – Stabu 1; 7 – Stabu 2; 8 – Basteja 1; 9 – Basteja 2; 10 – Raina 1; 11 – Raina 2; 12 – Brivibas 1; 13 – Brivibas 2; 14 – Brivibas 3; 15 – Brivibas 4). Means from 3-5 samples \pm SE.

Mn concentrations in the soil samples from the street sites were significantly lower (on average up to 10 times) than those in the park at almost all sampling times. However, the highest concentrations of Mn in street tree leaves were found in Site 6, opposite to the soil results. The lowest Mn concentrations in leaves (11 mg/kg), observed at the beginning of June, were up to 3.5 times (Site 5, 9) lower than on average in the park. It should be mentioned that the range of Mn concentrations for street trees was considerably narrower in comparison with the park results revealing the widest dispersion. A slight increase of Mn concentration in leaves was observed in most of the studied sites during the summer. Nevertheless, the mean Mn concentration per site in 34 out of the 50 cases was 20-22 mg/kg or less, and in most of them there were symptoms of Mn deficiency.

For half of street sites (seven) Zn concentrations in the soil were at the background level or lower. However the highest concentrations in street soil samples were up to 5 times greater than in the control site. There was a tendency in 2005 for the concentrations of Zn to decrease from March to July in several sites. The increase in soil Zn levels from June to August was stated in 2007. The concentrations of Zn in leaves showed a tendency to increase during the vegetation seasons and on average were up to 1.9 times (August of 2007) and 3.6 times (August of 2005)

higher in comparison with the mean concentration found for Viestura Garden. The status of trees in sites with elevated Zn concentration in soil and leaves could be characterized as optimal.

The Cu concentration results at the control site revealed relatively stable contents during 2005-2007. The highest concentrations of Cu in street soil samples for 2005 were found in March, which was up to 4 times higher than the background maximum. The widest range of Cu concentrations (3.9-133.3 mg/kg) was found in 2007, mainly in sites located in close vicinity to intensive tram (sites 8, 9) and trolley bus traffic (sites 5, 12-15), and the maximum value was 5.6 times higher than the maximum found in Viestura Garden. In general, the changes in Cu concentrations from March to August could be characterized as insignificant for half of the sites during 2005 and 2007. The decrease in Cu concentrations from March to June with accumulation during the following summer was found for the remaining sites. The concentrations of Cu in lime leaves collected in June were at the same level as those in the park, or even a little lower. Similar to Fe, Mn and Zn, the increase in Cu concentrations was observed in street lime leaves during summer. In general, both the lowest and the highest values of Cu in plants and soils were in lime trees with optimal ecological status.

The concentrations of other metals studied (Pb, Cd, Cr, and Ni) during summer of 2007 are given in Table 2 and Table 3. In general, the concentrations of Pb, Cd, Cr and Ni in the soil samples were at the same level or even lower as those in the park (Table 2). In particular sites, slightly increased concentrations of metals were found, but only for Cd were significantly increased level found in sites 12, 13, 14, and 15. Significant lower concentrations of Pb, Cd, Cr, and Ni were in almost all cases in the soils from the tree beds in Site 10 and 11, concentrations of Pb, Cd in Site 9; Pb, Cr in Site 5, and Ni in Site 4 and 7. The widest range of concentrations was obtained for Pb (4.82-118.27 mg/kg), but the narrowest one was found for Cd (0.04-3.00 mg/kg).

Table 2

Mean concentration of heavy metals (mg/kg) in soil at sampling sites in Riga during summer 2007

Site (amount of samples)	Time	Pb		Cd		Cr		Ni	
		Range	Mean \pm SE ¹	Range	Mean \pm SE ¹	Range	Mean \pm SE ¹	Range	Mean \pm SE ¹
Viestura G. (6)	June, August 2007	30.13 – 93.19	63.89 \pm 10.51	0.15 – 0.26	0.20 \pm 0.02	6.57 – 11.29	8.19 \pm 0.68	1.39 – 2.11	1.71 \pm 0.13
Hanzas 1 (6)		28.52 – 84.00	53.25 \pm 9.87 b	0.20 – 0.37	0.26 \pm 0.03 b	3.25 – 11.44	8.66 \pm 1.26 b	1.06 – 1.79	1.46 \pm 0.12 b
Hanzas 2 (6)		32.83 – 61.58	44.99 \pm 4.27 b	0.08 – 0.30	0.18 \pm 0.04 b	7.34 – 11.62	9.71 \pm 0.60 b	1.24 – 1.92	1.57 \pm 0.09 b
Elizabetes (8)		48.20 – 118.27	82.39 \pm 9.39 b	0.15 – 0.52	0.30 \pm 0.04 b	4.86 – 9.98	7.18 \pm 0.62 b	0.68 – 1.29	1.02 \pm 0.07 a
Kr. Valdemara (6)		18.37 – 85.96	52.65 \pm 11.61 b	0.11 – 0.28	0.18 \pm 0.03 b	6.75 – 9.99	8.06 \pm 0.48 b	1.18 – 1.94	1.56 \pm 0.13 b
Stabu 1 (6)		29.61 – 38.88	33.98 \pm 1.26 a	0.10 – 0.28	0.18 \pm 0.03 b	3.66 – 6.74	5.06 \pm 0.47 a	0.49 – 0.96	0.73 \pm 0.07 b
Stabu 2 (8)		35.77 – 68.38	51.90 \pm 3.86 b	0.16 – 0.27	0.21 \pm 0.02 b	5.71 – 12.70	8.14 \pm 0.83 b	0.50 – 1.38	1.00 \pm 0.09 a
Basteja 1 (6)		25.03 – 60.65	44.64 \pm 5.62 b	0.11 – 0.23	0.16 \pm 0.02 b	6.47 – 14.54	9.56 \pm 1.30 b	0.95 – 1.97	1.37 \pm 0.15 b
Basteja 2 (6)		26.97 – 47.09	34.65 \pm 3.99 a	0.09 – 0.19	0.13 \pm 0.02 a	8.27 – 14.96	10.60 \pm 1.06 b	1.14 – 1.80	1.45 \pm 0.13 b
Viestura G. (3)	June 2007	30.13 – 85.31	63.71 \pm 17.02	0.20 – 0.22	0.21 \pm 0.01	8.08 – 11.29	9.28 \pm 1.01	1.47 – 2.11	1.73 \pm 0.19
Raina 1 (3)		4.82 – 5.26	5.05 \pm 0.13 a	0.04 – 0.08	0.06 \pm 0.01 a	2.98 – 3.89	3.36 \pm 0.27 a	0.50 – 0.62	0.57 \pm 0.03 a
Raina 2 (3)		5.45 – 31.03	21.70 \pm 8.15 b	0.05 – 0.15	0.11 \pm 0.03 b	3.77 – 7.67	6.21 \pm 1.23 b	0.59 – 1.62	1.14 \pm 0.30 b
Brivibas 1 (3)		37.36 – 42.29	39.68 \pm 1.43 b	0.46 – 0.49	0.48 \pm 0.01 a	6.90 – 7.81	7.20 \pm 0.31 b	1.49 – 1.93	1.70 \pm 0.13 b
Brivibas 2 (3)		32.75 – 38.98	36.32 \pm 1.85 b	0.45 – 0.53	0.49 \pm 0.02 a	6.96 – 7.32	7.09 \pm 0.12 b	1.66 – 1.84	1.76 \pm 0.05 b
Brivibas 3 (3)		52.36 – 67.72	62.50 \pm 5.07 b	0.50 – 3.00	1.34 \pm 0.83 a	6.62 – 8.46	7.74 \pm 0.57 b	1.68 – 1.99	1.84 \pm 0.09 b
Brivibas 4 (3)		31.02 – 59.46	41.37 \pm 9.08 b	2.04 – 2.37	2.16 \pm 0.11 a	7.15 – 9.79	8.33 \pm 0.78 b	1.59 – 2.08	1.82 \pm 0.14 b

¹ SE, standard error

a – significant difference from the background Viestura Garden ($P < 0.05$)

b – not significant difference from the background – Viestura Garden ($P > 0.05$)

Table 3

Mean concentration of heavy metals (mg/kg) in lime leaves
at sampling sites in Riga during summer 2007

Site (amount of samples)	Time	Pb		Cd		Cr		Ni	
		Range	Mean \pm SE ¹	Range	Mean \pm SE ¹	Range	Mean \pm SE ¹	Range	Mean \pm SE ¹
Viestura G. (6)	June, August 2007	3.40 – 8.20	6.03 \pm 0.85	0.10 – 0.60	0.22 \pm 0.08	1.80 – 5.40	3.70 \pm 0.61	0.40 – 1.20	0.80 \pm 0.13
Hanzas 1 (6)		3.40 – 5.00	4.30 \pm 0.24 b	0.10 – 0.60	0.20 \pm 0.08 b	3.00 – 8.60	5.70 \pm 0.82 b	0.40 – 2.00	1.00 \pm 0.27 b
Hanzas 2 (6)		3.60 – 5.60	4.60 \pm 0.27 b	0.10 – 1.00	0.30 \pm 0.14 b	5.20 – 8.00	6.30 \pm 0.43 a	0.40 – 1.40	0.87 \pm 0.19 b
Elizabetes (8)		2.80 – 4.20	3.43 \pm 0.14 a	0.10 – 0.60	0.35 \pm 0.06 b	0.60 – 14.40	5.78 \pm 2.16 b	0.60 – 7.40	2.60 \pm 1.05 b
Kr.Valdemara (6)		3.60 – 9.20	5.80 \pm 0.81 b	0.10 – 0.20	0.15 \pm 0.02 b	4.40 – 9.80	7.07 \pm 1.03 a	0.80 – 1.20	0.97 \pm 0.06 b
Stabu 1 (6)		1.20 – 6.20	3.50 \pm 0.72 a	0.10 – 0.40	0.29 \pm 0.04 b	4.80 – 10.20	7.27 \pm 0.86 a	0.60 – 1.20	0.87 \pm 0.08 b
Stabu 2 (8)		2.00 – 4.40	3.38 \pm 0.35 a	0.10 – 0.40	0.28 \pm 0.05 b	1.80 – 10.40	6.95 \pm 1.00 a	0.40 – 1.80	0.88 \pm 0.20 b
Basteja 1 (6)		4.20 – 7.20	5.70 \pm 0.47 b	0.10 – 0.20	0.12 \pm 0.03 b	4.00 – 7.80	5.67 \pm 0.73 b	0.60 – 1.60	1.07 \pm 0.19 b
Basteja 2 (6)		3.00 – 8.00	5.57 \pm 0.79 b	0.10 – 0.60	0.18 \pm 0.09 b	2.40 – 6.60	3.60 \pm 0.64 b	0.40 – 1.40	0.97 \pm 0.16 b
Viestura G. (3)	June 2007	7.40 – 8.20	7.87 \pm 0.24	0.20 – 0.60	0.33 \pm 0.13	1.80 – 2.80	2.40 \pm 0.31	0.60 – 1.20	0.93 \pm 0.18
Raina 1 (3)		4.80 – 5.60	5.20 \pm 0.23 b	0.60 – 0.80	0.73 \pm 0.07 b	0.80 – 1.40	1.20 \pm 0.20 a	0.60 – 1.40	1.07 \pm 0.24 b
Raina 2 (3)		5.80 – 9.00	7.00 \pm 1.01 b	1.00 – 1.20	1.07 \pm 0.07 a	0.40 – 1.20	0.93 \pm 0.27 a	0.80 – 1.80	1.20 \pm 0.31 b
Brivibas 1 (3)		5.40 – 6.40	5.80 \pm 0.31 a	0.10 – 0.20	0.17 \pm 0.03 b	2.20 – 2.80	2.47 \pm 0.18 b	1.00 – 1.20	1.13 \pm 0.07 b
Brivibas 2 (3)		6.80 – 7.20	7.00 \pm 0.12 a	0.40 – 0.40	0.40 \pm 0.00 b	2.40 – 2.80	2.67 \pm 0.13 b	1.00 – 1.40	1.20 \pm 0.12 b
Brivibas 3 (3)		6.80 – 9.00	7.53 \pm 0.73 a	0.60 – 0.80	0.73 \pm 0.07 b	2.40 – 2.80	2.53 \pm 0.13 b	0.60 – 1.60	1.13 \pm 0.29 b
Brivibas 4 (3)		4.60 – 8.80	6.27 \pm 1.29 b	0.10 – 0.80	0.37 \pm 0.22 b	2.40 – 3.20	2.67 \pm 0.27 b	1.00 – 1.80	1.53 \pm 0.27 b

¹ SE, standard error

a – significant difference from the background Viestura Garden ($P < 0.05$)

b – not significant difference from the background – Viestura Garden ($P > 0.05$)

A somewhat different situation existed for lime leaves (Table 3). In general, the concentrations of Pb, Cd, Cr and Ni could be characterized as being at the same level or slightly elevated in comparison with the background concentrations. Significantly higher or lower mean concentrations of Pb and Cr were found in several sites. These two metals also have a marked tendency to increase in leaves during summer. Only in one site was the mean concentrations of Cd significantly higher (Site 10) and in another site significantly lower (Site 8) compared with the park results, but differences of Ni concentrations in lime leaves between street sites and the park can be characterized as insignificant. The widest range of concentrations in lime leaves was found for Cr (0.40-14.40 mg/kg), but similar to soil results the smallest one was stated for Cd (0.10-1.20 mg/kg). The highest concentrations of Pb, Cd, Cr and Ni as well as the lowest amounts were found in healthy lime leaves, e.g., sites 1, 4, 8, 10-15.

The mean soil pH values in the street sites in most cases were neutral to slightly alkaline (pH_{KCl} 6.54 \pm 0.15 to 7.60 \pm 0.04) and could be characterized as raised compared to the background level (Fig. 2). Changes of these values during the vegetation period and from 2005 to 2007 were insignificant.

The results of correlation matrixes between element concentrations in soil and leaf samples are given in Table 4. The current research did not reveal a close correlation ($r > 0.8$) between the concentrations of the studied heavy metals in soil and leaf samples in 2005 and 2007. Only, Fe results in 2005 and Cu results in 2007 showed a medium correlation ($0.5 < r < 0.8$). Significant medium close correlation was found between the concentrations of heavy metals in soil samples for Fe and Mn in 2005, and Fe-Cu, Fe-Cr, Fe-Ni, Cu-Ni, Cr-Ni in 2007, as well as between the results of soil and leaf samples for Cu and Fe in 2005 and Cd-Cu in 2007. A

medium correlation was also found between the concentrations of Cu and Zn in leaves of 2005, and Cu and Pb concentrations in leaves of 2007.

Table 4

Correlation coefficient matrix (Pearson Correlation) for parameters determined in soil
and leaf samples of greenery in Riga, 2005 (n=60), 2007 (n=76)
(significant correlation coefficients: * – $P < 0.05$; ** – $P < 0.01$)

Parameter	pH	Fe s	Fe l	Mn s	Mn l	Cu s	Cu l	Zn s	Zn l	Pb s	Pb l	Cd s	Cd l	Cr s	Cr l	Ni s	Ni l
2005																	
pH	1.00																
Fe s	0.17	1.00															
Fe l	0.16	0.60**	1.00														
Mn s	0.18	0.60**	0.08	1.00													
Mn l	-0.10	0.28	0.22	0.32*	1.00												
Cu s	0.34**	0.47**	0.53**	-0.02	0.04	1.00											
Cu l	0.03	0.36**	0.66**	0.16	0.29*	0.44**	1.00										
Zn s	0.31*	-0.05	-0.10	0.08	-0.29*	-0.04	-0.27*	1.00									
Zn l	0.25	-0.09	0.34*	-0.08	-0.02	0.00	0.51**	0.08	1.00								
2007																	
pH	1																
Fe s	0.26*	1.00															
Fe l	0.16	0.34**	1.00														
Mn s	0.15	0.42**	-0.26*	1.00													
Mn l	-0.18	0.06	-0.06	0.26*	1.00												
Cu s	0.19	0.65**	0.47**	0.06	-0.14	1.00											
Cu l	-0.12	0.22	0.23*	0.14	-0.11	0.52**	1.00										
Zn s	0.17	0.03	0.03	0.11	-0.14	0.25*	0.18	1.00									
Zn l	-0.02	-0.15	0.45**	-0.24*	0.08	0.01	0.28*	0.25*	1.00								

The concentrations of Fe and Mn in soil samples collected in June 2007 were significantly higher in comparison with the results of June 2005 ($p < 0.05$). The leaf chemical results revealed statistically significantly higher levels of Fe, Mn and Cu in June 2007 ($p > 0.05$) than during June 2005.

The principal component analysis (PCA, varimax rotated solution) of individual soil sampling sites (individual trees) of 2007 (Fig. 4) revealed that the main part of individual sampling sites, int. al. control, according to their chemical results were located in the central part of ordination space in a relatively compact cluster. Ordination with PCA showed 40.83 % variance with Axis 1 and 15.46 % with Axis 2. The spatial distribution of studied soils could be characterized as rather structured. Soil samples of sites 10 and 6 formed a separate cluster mainly due to a low concentrations of all heavy metals studied. Located relatively far was the individual soil sampling points from sites 8 and 9 due to high Fe, as well as L44 due to high Cd concentration.

PCA of chemical results of tree leaves revealed a relatively high dispersion of individual trees in the ordination space for most of the sites due to heterogeneity of the heavy metal results. Ordination with PCA showed a low variance with Axis 1 (33.11 %) and Axis 2 (22.91 %), and consequently a low structured spatial distribution of the studied trees. Similar leaf chemical

composition to control limes was characteristic for some trees of sites 4, 9, 10, 11. It should be noted that healthy tree leaves were located in different points of the ordination quadrants. The results of the PCA of lime leaves differed from the soil PCA results.

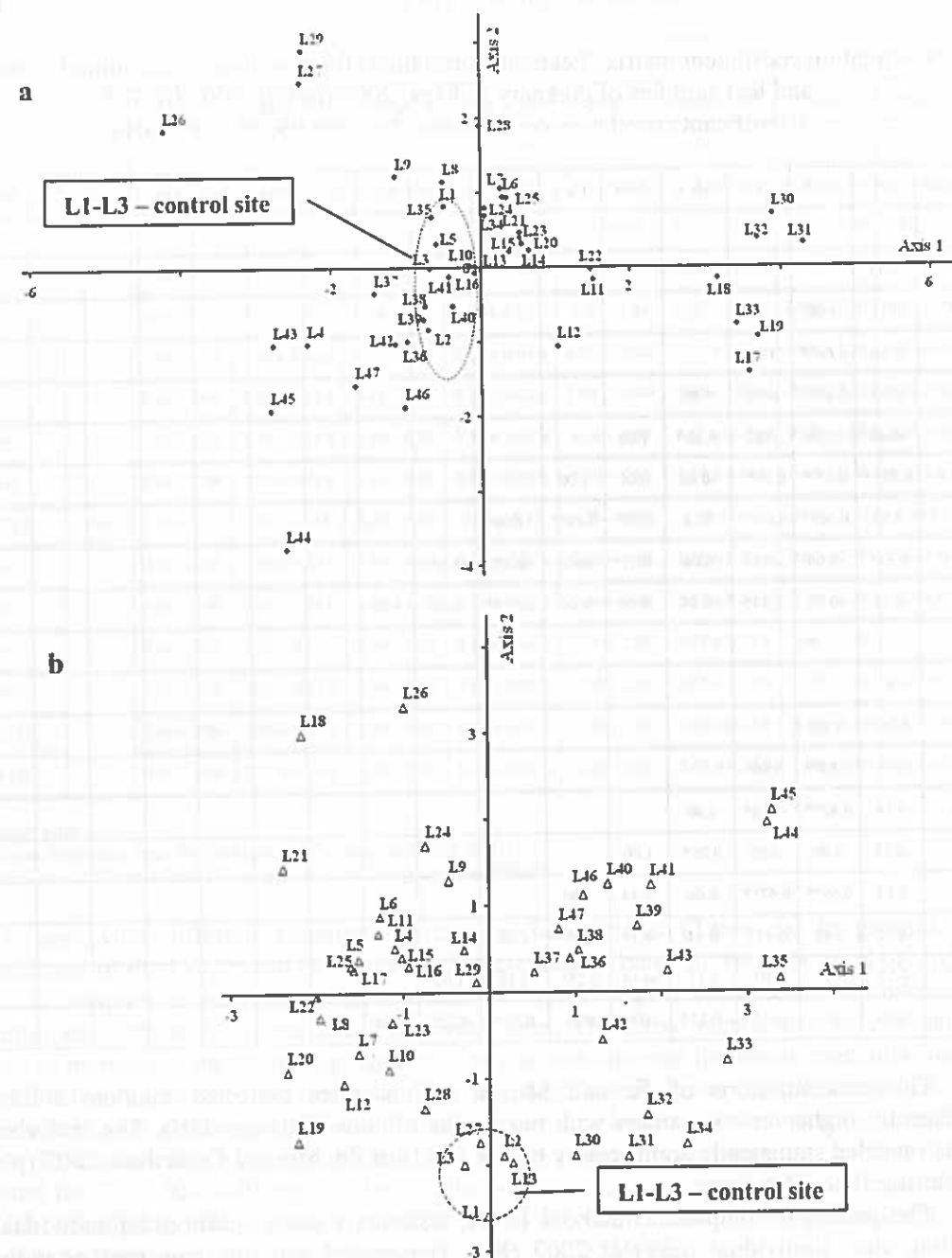


Figure 4. Principal component analysis of mean soil (a) and leaf (b) sample chemical results in Riga, 2007

Discussion

The results on heavy metal levels in soils and lime leaves of Riga's greenery in 2005 and 2007 revealed several problems and tendencies in metal accumulation and their impact on the status of trees in the city.

The study results suggest that one of the most serious problems is related to plant micronutrient and at the same time heavy metal Mn supply. In general, the obtained range of Mn concentrations in greenery's soils corresponded well with the levels of Mn common to natural soils in Riga's district (35-199 mg/l) (Rinkis and Ramane 1989) using the same extract (1 M HCl). However, there were considerably reduced concentrations of Mn in several street

sites in comparison with the park results. This is contrast to the studies of Bitjukova et al. (2000) in Tallinn, Estonia, who found elevated levels of Mn in urban compared to rural soils. Usually, Mn concentrations in soils correlate well with Fe and organic matter content (Kabata-Pendias and Pendias 1989). Our study revealed a weak (2007) to medium close (2005) correlation between the concentrations of Fe and Mn in the soil samples. It could be explained by the high Fe levels in the greenery soils, which were much higher (Fig. 2) compared with Mn due to anthropogenic emissions from metal wearing-off, especially from tram traffic (sites 8, 9).

On the one hand, the stated reduced Mn concentrations in lime leaves could be explained by neutral soil reaction as the lowest concentrations of Mn in leaves were found in plots containing the highest Mn values. Such soil conditions promotes oxidation of Mn^{2+} into Mn^{4+} , which is hardly available for plants (Bergmann 1988). Although, in alkaline soil Mn can form anion complexes and complexes with organic ligands, which are available to plants (Polevoi 1989) it was not sufficient for optimal plant uptake. As a result, the lime leaves in some sites contained only 11 mg/kg Mn. On the other hand, according to our previous studies (Cekstere et al. 2008), the soils of Riga's street greenery contain high levels of de-icing materials (sodium and chlorides), especially in spring time. Thereby, Na^+ in soil could act as an antagonist and thereby reducing Mn uptake by plants. High levels of other metals, especially Fe, also could act as antagonist to Mn.

Consequently, well-evident interveinal chlorosis of the foliages was observed in the leaves with a content of Mn less than 20-22 mg/kg. Consequently, lime trees in Riga have serious disturbances in the physiological processes. The threshold levels found for well-evident Mn deficiency symptoms in *T. x vulgaris* leaves are in good agreement with the findings of Kabata-Pendias and Pendias (1989). Some differences were stated from Göransson (1994) and Marschner (1995), who estimated the average physiological requirements and the critical deficiency contents of Mn for plants in the range of 10-20 mg/kg. These differences can be due to the various species studied and the inter-specific differences in the uptake process itself, as well as the particular situation in the rhizosphere of trees, as well as the growing conditions and physiological status of plants.

It should be mentioned that visible deficiency symptoms were not observed for all leaf samples containing Mn less than 20-22 mg/kg. It could be explained by the fact that visual symptoms of element deficiency usually appear after a latent period of deficiency. At the same time plant growth and development could be seriously inhibited (Bergmann 1988). This means that the optimal concentration of Mn in *T. x vulgaris* leaves, which provide lime tree physiological functions, should be even a little more than the threshold level of 22 mg/kg from the dry weight of leaves (at least 25-30 mg/kg).

Our observation that lime leaves of street greenery have reduced concentrations of Mn compared with the park is in good agreement with findings on *Tilia cordata* Mill. in Moscow, Russia (Kosheleva et al. 2005), and on *Aesculus hippocastanum* L. in Poznan, Poland (Oleksyn et al. 2007). The highest amounts of Mn did not exceed the critical toxic content (200 mg/kg) for some plant species as mentioned by Bituckii (2005). There were no visible symptoms of Mn toxicity in Riga. Therefore, the elevated concentrations in lime leaves (up to 178 mg/kg) in Riga could be characterized as non-toxic to *T. x vulgaris*.

In general, the Mn concentrations found in *T. x vulgaris* leaves in Riga could be characterized as lower compared with the results of the green system in Sofia (Bulgaria) on deciduous trees, int. al., *Tilia cordata* Mill. and *Tilia tomentosa* Moench. (Gateva 2004), as well as lower than those found in Wroclaw (Poland) for *Tilia platyphyllos* (Piczak et al. 2003) and other deciduous tree species as *Betula pendula* Roth. (Trocha et al. 2007) during the vegetation season. This could be explained by differences in such important factors as mycorrhizal activities, soil organic matter content, soil humidity and concentrations of other ions, which influence the availability of elements in the soil and the ability of plants to uptake elements.

Fe, Zn and Cu in greenery soil samples were in the range of values (mainly the upper level) common to natural soils of Riga's district (Rinkis et al. 1989), using the same extract. Our results on Zn and Cu amounts in greenery soils could be characterized as elevated in comparison with data of different investigations done in other countries on acid turf podzolic soils using 1 M HCl extract. Such soils on average contain 0.12-20.00 mg/kg Zn and 0.05-5.00

mg/kg Cu, but neutral and alkaline soils have even lower concentrations of these metals (Bituckii 2005). The especially high concentrations (Fig. 2) revealed in sites 4, 8 and 9, could be explained by trolleybus (site 4) and tram (sites 8 and 9) wires as well as rail wearing-off and the accumulation of dust in the surrounding environment. However the results of Zn in Riga were almost the same as the total amount of Zn in Hong Kong soils (Jim 1998). Therefore, Zn deposition by the wearing out of vehicle bodies along with the common galvanizing of steel surfaces was more intensive in Riga.

Although the concentrations of Fe in the soil samples of the street greenery did not exceed the background level, the highest concentrations of Fe in lime leaves were significantly higher than on average found in plants. For normal plant growth, a very important factor is not only Fe concentration level, but also its ratio to other elements, especially Mn (Polevoi 1989). Normally, the Fe level in plants should be twice as high as Mn. In Riga, the Fe/Mn ratio was much wider (up to 42.5:1), and most likely the Fe ratio relative to other elements was also elevated. Therefore, there could be serious disturbances in physiological processes, as well as additional stress factor to trees in the urban environment.

The stated Zn and Cu levels in *T. x vulgaris* leaves were in the range, which did not cause visible symptoms of physiological disturbances. The concentrations of Zn could be characterized as elevated compared with the values of *A. hippocastanum* leaves in Poznan, Poland (Oleksyn et al. 2007), probably due to species peculiarities and leaf sampling differences. In Poland, leaf chemical analysis was done on sunlit foliage, but in Riga – on foliage collected at the carriageway side of the tree crown. Besides, plant species can also affect metal availability by promoting low-molecular-weight organic acids through root exudation or litter decomposition, which act as ligands (Jones and Darrah 1994). However, the amounts of Zn found in lime leaves are in good agreement with those Zn concentrations, found as non-toxic to *Populus nigra* L., *Acer negundo* L., *A. hippocastanum*, *Fraxinus angustifolia* Vahl. and *Robinia pseudoacacia* L. in Stambul, Turkey (Baycu et al. 2006).

In general, the concentrations of Pb, Cd, Cr and Ni in the soil samples were at the same level or even lower as those in the park site. These plant available concentrations of Pb, Cd, and Ni in Riga were lower than total concentrations of heavy metals found in the urban soils of Hong Kong (Jim 1998) and Pb, Cr, Ni concentrations in Sevilla (Madrid et al. 2004) mainly due to methodological differences in chemical analysis. It should be stressed that total concentrations of metals are useful for environmental research but hardly suitable for evaluating the phytotoxic impact of heavy metals on street trees.

Lead is considered to be as one of the main and most dangerous toxins for living organisms. However elevated concentrations of Pb in soil did not cause a simultaneous high accumulation in plant leaves mainly due to soil conditions, especially neutral and alkaline soil reaction in Riga. On the other hand, most of heavy metals as cations in leaves form hard deliquescent components; thereby, they are not available for reutilization in young leaves. Thus autumn trees dispose these elements when leaves fall. As a result, in spring the young leaves contain lower amount of heavy metals in comparison with autumn results. This tendency differs from research done in Moscow on the leaves of *T. cordata* and *Populus balsamifera* L., where reductions have been found in the concentrations of Pb from May to the beginning of September (Kosheleva et al. 2005). This contrary finding might be explained by various methods used for leaf sampling and the level of leaf maturity – factors that substantially affect the chemical composition of leaves.

The tendency of an increase in the metal concentrations in leaves during summer corresponded well with other research on metal accumulation in deciduous trees (Piczak et al. 2003). In Riga, this could be due not only to uptake by roots from the soil, but also because of air pollution accumulating into leaves. It is well known that plant chemical composition can be influenced by air pollution, as it is possible for plants to take up elements from the atmosphere through leaf stomata (Novak et al. 2006; Onder and Dursun 2006). Gateva (2004) found a positive correlation between the amount of particular elements in dust and their values in leaves. Consequently, correlation coefficients between the stated concentrations of metals in soil and lime leaves in most of cases were statistically weak. Such an observation could be also because

of neutral and slightly alkaline soil reaction and the antagonism of elements, which inhibited heavy metal uptake by tree roots from the soil.

The stated Pb and Cd concentrations in *T. x vulgaris* leaves in Riga corresponded well with values found in Beijing, China in studies on deciduous trees (Liu et al. 2007) and Poznan to *A. hippocastanum* (Oleksyn et al. 2007). The amounts of Pb, Cd, and Ni found in lime leaves are in good agreement with those concentrations found as non-toxic to *P. nigra*, *A. negundo* L., *A. hippocastanum*, *F. angustifolia* and *R. pseudoacacia* in Stambul, Turkey (Baycu et al. 2006).

Increased amounts of Cu, Zn and Pb in the soil samples collected in the first tree line in Brivibas blvd. compared with the second line results clearly revealed the accumulation of transport pollution in the surrounding environment. This is in agreement with research done on heavy metal accumulation in the soils with increased distance from the carriageway (Nyangababo and Hamya 1986). Also in Seville (Madrid et al. 2004) and Stockholm (Linde et al. 2001) the highest concentrations of Zn, Cu and Pb were found in soils located more closely to historical areas and in the city's centre due to increased human activities and more intensive transport traffic. However, such a tendency was not found in lime leaves. In Brivibas blvd. lime trees have high formed crowns and the sampling of leaves was done at the lowest part of the crown at 5-6 m height.

Our research showed a large variance in the concentrations of heavy metals in urban soil and lime leaf samples. The results of soil and leaf PCA revealed a wide variability of heavy metal concentrations of street greenery in Riga. The heterogeneity of leaf chemical results even in one site can also be explained by the different ages of the studied trees and the possible accumulated level of metals in the wood and branches. It is well known that different parts of plants can accumulate varying amounts of elements. At the same time the leaf PCA revealed similar leaf metal content in healthy lime trees growing in the park and in the damaged street trees. Such findings indicate that the street trees were subjected to some other factors having more negative impacts. According to our previous studies on street greenery in Riga, one of these is high de-icing material accumulation in the urban environment (Cekstere et al. 2008).

It was interesting that the concentrations of the studied heavy metals in soil and leaf samples did not correlate closely ($r > 0.8$), and only the Fe results of 2005, and Cu results of 2007 showed any medium correlation ($0.5 < r < 0.8$) (Table 4) suggesting that leaf analysis provides an accurate picture of the nutrient and heavy metal status of *T. x vulgaris* in Riga at a particular point in time resulting from all factors affecting plant growth. Soil testing is very important in detecting the character of metal deficiencies or toxicities and their soil content.

In general, the concentrations of all studied heavy metals in soils of Riga's greenery can be ranked in the following order: $\text{Fe} > \text{Mn} > \text{Zn} > \text{Pb} > \text{Cu} > \text{Cr} > \text{Ni} > \text{Cd}$, but the stated concentrations of metals in lime leaf samples can be ranked: $\text{Fe} > \text{Zn} > \text{Mn} > \text{Cu} > \text{Pb}$, $\text{Cr} > \text{Ni} > \text{Cd}$. Thereby, there are differences between the ranks. The investigation revealed that Pb in Riga's soils was higher than Cu mainly due to intensive using of leaded petrol until the end of the 20th century. As a result, Pb could have formed compounds in greenery soils, which were not so soluble as to leach out from the upper soil layer for plant uptake. Our research revealed that the concentrations of Zn were higher than Mn in leaf samples in the most of the street sites in Riga. According to various investigations (Gateva 2004), normally the amounts of the heavy metals in tree leaves are of the following order: $\text{Fe} > \text{Mn} > \text{Zn} > \text{Cu} > \text{Pb} > \text{Cd}$. Higher concentrations of Zn than Mn in lime leaves of Riga could be because Zn is one of the most soluble heavy metal in soil (Polevoi 1989), as well as Zn accumulation on the leaf surface from air pollution entering into leaves through stomata.

The most important factor, which affected the metal accumulation in tree leaves, was soil reaction. The neutral and alkaline reaction of anthropogenic soils and air input of alkalizing elements (Takagi et al. 1997) often observed in urban environment (Craul 1992) is considered as one of the main factors responsible for tree growth and ecological status (Fostad and Pedersen 1997; Jim 1998). High substrate pH can lead not only to lower nutrient availability for plants, but also to depression of microbial activities and mycorrhizal decline (Oleksyn et al. 2007). Therefore, some efforts should be undertaken to reduce soil reaction in Riga's greenery in order to improve the physiological status of *T. x vulgaris*. Mulching or acid peat addition could decrease soil reaction, but at the same time elevate heavy metal uptake by plants, as the

transport of heavy metals into roots and accumulation in different parts of plants is increased in acid soils (Ramirez-Rodriguez et al. 2005). Based on our results, we would suggest reducing soil pH up to 6.0-6.5. According to our studies (Cekstere et al. 2005), such a level will not facilitate a rapid heavy metal uptake by trees, but will increase Mn availability to *T. x vulgaris*, since in Riga it is not allowed to use foliar fertilization to eliminate nutrient deficiency.

Conclusions

Our investigation indicated that the ecological status of the studied trees in Riga was mainly affected by decreased accumulation of Mn in lime leaves. For visible deficiency symptoms in *T. x vulgaris* leaves the critical level concentration for Mn was estimated to be 20-22 mg/kg. An increased Fe/Mn ratio, unfavourable for plant optimal growth, was found for the vast majority of lime leaf samples. Our investigation also revealed increased concentrations of Zn and Cu in the street greenery. The elevated concentrations of Fe and Cu were found mainly in close vicinity to electrical transport. Although, the mean concentrations of Pb, Cd, Cr, and Ni in the street greenery were at the background level, there were several sites with increased pollution. Neutral or slightly alkaline soil reaction in Riga street greenery is one of the factors affecting metal availability for trees. As both the lowest and the highest concentrations of Fe, Cu, Zn, Pb, Cd, Cr, and Ni were found in healthy lime trees, heavy metal accumulation was not the main factor affecting the lime ecological status. Further studies on environmental factors impacting the lime tree ecological status should be continued.

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The Regional Development of Tourism and the Emergence of Clusters in Latvia: The Example of Sigulda

Andris Klepers and Maija Rozīte

Summary

The goal of this research by the authors is to evaluate the role of tourism in regional development in Latvia. They have focused on the identification and mapping of spatial structures in Latvia, choosing the Sigulda region as a textbook example of such territories. The authors review various theories concerning economic and regional development, also focusing on their application when analysing the development of tourism whilst emphasising the particular role of social factors therein. The concept of clusters has been chosen as the most appropriate theory for evaluating the spatial structure of tourism. Focus group interviews and content analysis methods were used to identify the cluster and to evaluate its structure and its webbing. In order to define the spatial boundaries of the cluster, the authors mapped the region of perception and calculated indices related to compactness and connectivity. The result of the research was the identification of a tourism cluster – the radial contour of a radius of 20 kilometres around the distinct centre of Sigulda, one which is characterised by a high index of compactness (0.89) and connectivity (0.71). The authors have identified primary and supplemental elements, their interaction and webbing, and the Turaida Museum Reserve as an engine for the cluster. The development of tourism-related enterprises and the introduction of innovations indicate that the cluster in the relevant territory is operating on the basis of the proposed principles. This research has confirmed the advantage of a cluster – the ability to attract new business innovations despite existing competition in the area.

Keywords: Tourism cluster, regional development, spatial structures of tourism, creative milieu.

Introduction

Tourism is a sector which is often seen as an opportunity for regional development. This is particularly true in areas where there is an attractive environment, with interesting aspects of culture and history, as well as local residents who are full of initiative. There are many such locations in Latvia, and most local governments are involved in supporting the tourism sector. This depends on the relevant duties, competences and priorities. Practice in other countries, however, shows that it is not rational to organise tourism efforts in a single local government territory and in isolation from contiguous territories. This is seen in the co-operation which exists among entrepreneurs at various levels, including those which extend beyond the territories that have been identified on an *a priori* basis. Competition in the tourism sector is becoming more severe, and for a long time now, the "battle" has been not among individual companies, but rather among alliances, regions and entire countries. National tourism policies have become increasingly important. What is the reason why some regions flourish, while in others, development is still described in the context of the word "potential"? How is tourism in Latvia developing in the surrounding geographic space? In seeking answers to these questions, the authors researched the development of tourism in the Sigulda region, where in addition to administrative and territorial reforms, there have been strategic decisions vis-à-vis the development of the tourism sector in future.

Materials and discussion

Significant theories concerning the development of economic geography can be applied in the context of spatial understanding when analysing the role and nature of tourism in regional development. The tourism sector is mostly made up of companies in the services sector, which means that processes of industrial manufacturing are less important in this

regard. In contrast to raw materials that are needed for manufacturing, the more significant role here is performed by social sectors. That is specifically why the spatial structures of tourism are not deterministic, and they cannot be described exclusively on the basis of physical parameters, even if their cornerstone is made up of natural, cultural and historical resources. This would be a one-sided approach, because tourism is also based on social relationships and the values created therein.

This concept has been applied to all manufacturing sectors by the German geographer Schamp, who argues that the social sciences have a great role to play in explaining the contemporary processes of economic geography today. This, writes Schamp, requires particular attention now, when we are living in the age of information and communications [Schamp 2000: 5].

Technological processes and new research into the interaction between various areas have helped to enhance perceptions about geographic locations, emphasising the networking of people and the goods and services which they create as a means for organising modern production and for enhancing regional development. Various modernisation theories in this regard date back to the 1960s, when capitalist countries were developing more rapidly. Rostow developed the theory of economic growth stages, arguing that any society must pursue growth on the basis of the proper example set by the developed West. The highest stage, argued Rostow, was the emergence of an age of high mass consumption [Rostow 1960: 20-21]. As Ford-type manufacturing flourished at the time, mass tourism also developed, and in Europe this particularly was characterised by the development of chains of huge leisure resorts. The creators of the theories of modernisation, however, accepted a non-modern society as being traditional, one which was not prepared for innovation. This view was later criticised [Addicks & Bünning 1979: 11-14; Pearson 1969: 156; Winter 2004: 5, et al].

Nevertheless, even in the criticised theory of stages of economic growth, one can find the thought that internal processes in a society can serve as a foundation for growth even if they are not completely listed [Rostow 1960: 20-21]. The authors who created the theory of economic dependency (Prebisch, Frank, Cardoso, Senghaas) criticised theories about modernisation and pointed to the dominance of central locations, which had been proposed before. Mostly this was applied to the economic relationship between developed and developing countries [Senghaas 1977], but the nucleus of the idea about the "unequal development of a broader territory" can also be applied at the regional level. In tourism, this is manifested in the fact that there are distinctly dominant tourist locations, the popularity of which changes in accordance with the tourism destination life cycle that was described by Butler [1980; 2006], but which have poorly developed regions in their periphery (e.g., South Africa and Mozambique). The dependency theory was criticised by supporters of the neo-classical principle of returning, at the regional level, to the concept of *homo oeconomicus*. This concept claims that under conditions of competition, the interaction of push and pull factors will mean that excess capital in developed zones and mobility of the labour force will promote an evening out of the development of regions that are at different levels. The roots of this theory date back to the 1950s, and it was promoted by authors such as Solow, Phelps, Siebert and others [see, e.g., Siebert 1969]. Various institutions are attempting to implement similar solutions to this very day, but not always with much success. The human factor can be blamed here. Those who are involved in tourism cannot be characterised as examples of *homo oeconomicus*, because they do not always act rationally, in line with market principles, predictably or logically. Myrdal [1957], for instance, has argued that regional inequalities are a permanent thing and are dependent on levels of development. In accordance with Myrdal's model, these manifestations are seen far more broadly in Latvia than just in the context of the tourism sector. Many young people are moving from peripheral regions to the capital city of Rīga. The labour force in the peripheral areas ages, and that limits opportunities for new activities to emerge. The result is that the inequality between the capital city and the periphery becomes even worse.

It is hard to accept this thinking, however. Despite increasing internationalisation in manufacturing, for instance, there was also further development of the idea of the dominance of endogenous factors in economic development. The origins of these ideas date back to the

early 20th century, according to Sombart [1987]. The export-basis theory speaks to the identification of dominant sectors in a region. It seeks to explain the multiplier effect, arguing that a basic sector can maintain several secondary sectors. If tourism is a basic sector in economic output in a region, then each person working in tourism creates two jobs in other service sectors. If we assume that each of these people is providing for a family, then we see that the number of people who benefit increases considerably.

The concept of endogenous development was developed by Giersch [1963] and then supplemented by Hahne and others. The main idea is that the endogenous potential of a location is a foundation for economic growth. Endogenous potential was identified as the whole set of developmental capabilities in a region, as described through areas of activity that are limited in time and space [Hahne 1984]. Authors have sought solutions to problems related to regional development and emphasised the identification and activation of development potential. They have pointed to methods such as investments so as to improve weaker areas, regional specialisation and emphasis on regional advantages, and promotion of internal interaction within a region [Giersch 1963; Hahne 1984].

This correlates to the concept of growth poles which was developed in the 1960s by Paelinc and Lasuén. They tried to deal with links between economic growth and spatial structures. One of the most fundamental claims in this context is the concept of growth poles, along with the idea that innovations are interrupted in time and space [Paelinc 1977; Lasuén 1969]. In essence, this is in line with manufacturing clusters, which were described later, and with much precision, by Porter [1990]. These authors believe that growth is possible in those areas where there is sufficient population density – something which basically coincides with population structures. Richardson [1980] points to the reciprocal nature of polarisation, which shows growth opportunities for smaller centres in the periphery of the main centre. The cluster concept in particular emerged as one solution to facilitate economic development outside of major centres and to strengthen regional structures as such.

Porter referred to the British economist Marshall, who 100 years ago (in 1890) proposed ideas about the local relationship among companies which carried out different functions. The example which Marshall used was the manufacturing of knives and the manufacturing of equipment to process wool. This was a new shift in the development of the relevant concept. Porter defined a cluster as a group of companies, suppliers, service providers and institutions that are interrelated in a single sector, are in geographic proximity, and engage both in mutual competition and co-operation [Porter 1990]. The European Commission's regional policies particularly emphasise the principle of clusters. A cluster is defined in more general terms – it is any concentration of interrelated companies in a single sector or in adjacent sectors in a small geographic space, thus leading to the emergence of a network which has potential for joint innovation [EC 2002: 14]. The German researcher Kiese [2008] has pointed to the broad interpretations that are found in various sources as to the scope and structure of cluster. Clusters can be described through three elements – spatial proximity, networking and external accessibility [Genosko 2006]. Growth-based cluster policies include spatial and economic conditions, the specific conditions of a cluster, as well as regional organisational capacity within the framework of the cluster [Porter 1990, 1998]. The specific requirements for a cluster emphasise an identification of the initial size and the level of development, the level of interaction among strategic companies, and the intensity at which new companies emerge. So-called *cluster machines* are among the prerequisites. They are major companies which *turn on* the cluster [Malmberg et al 1996].

Other authors have described a cluster as an entity which more applies to the primary manufacturing sector, calling it an industry district [Pyke, Becattini, Sengenberger 1990; Pyke, Sengenberger 1992]. These authors attribute the following characteristics to such a cluster:

- 1) It is a set of many small and medium companies in a specific location – ones that are interrelated in a vertical production chain and a succession of industrial technological processes;
- 2) Companies and businesspeople in the cluster are large interrelated, but only some of the companies have access to the broad markets of the world. These are nucleus companies. They disseminate information about new products and make new

design requirements vis-à-vis existing products, thus transferring knowledge to local suppliers and partners, as well. This zone emerges as a unit for joint learning. The way in which market access is organised becomes the key factor for success in the industry district;

- 3) Clusters seek markets of limited scope, but they typically involve a high level of product change, whether in design or in technique. In these markets, the products of small and networked companies become competitive with the output of larger manufacturers because of specialised strategies and market niches;
- 4) There is a unified approach to the common product, which means that "collective entrepreneurship" in the industry district becomes a necessity.

Networks among businesspeople become a "socioeconomic system" [Becattini 1990] – one which demands common values, behaviours and intentions, one which emerges from related structures, neighbourly relations, and other forms of co-operation and collectivism [Schamp 2000]. Courlet and Soulage [1995:290] have spoken about the unique mixture between the "archaic" (tribe or clan relations) and the "modern". Others refer to this as a creative or cultural environment which creates community in social, political and economic activities. The concept of the creative milieu seeks to explain why some economic regions are more successful than other ones. The emphasis here is on the idea that the most important factor for positive regional development is a special level of quality in co-operation among the senior officials of different companies and organisations in the relevant area. Of particular importance are informal contacts that are based on mutual trust, as well as relations among individuals. When this kind of a contact network is established, the exchange of regionally necessary information occurs more quickly, and the innovation potential of companies is based on social relationships [Brunotte, Gebhardt; Meurer et al 2002]. A creative milieu is defined as a set of close socio-informational relationships which emerge among qualified decision makers. This shapes a positive image both in internal and external terms, and it leads to a sense of community and belonging at the regional level. Those who are involved in such a system pursue collective learning processes and enhance opportunities for local innovations [Brunotte, Gebhardt; Meurer et al 2002].

Porter, referring to the work of other authors, as well, expresses the view that regions which have established clusters in specific sectors develop more successfully than others do [Porter 2003]. In general authors cite a series of positive benefits from clusters:

- Increased productivity and competitiveness for enterprises;
- Better market access;
- Better survival rates for newly established enterprises;
- Quicker diffusion of knowledge;
- A stronger sense of location and belonging;
- Easier marketing for the location;
- A more attractive regional job market.

[Porter 1990, 1998, 2003; Genosko 2006; Schamp 2000; Kiese 2008]

The cornerstone for the cluster concept is the idea that the potential strengths of the relevant region must be studied, the cluster must be identified, and then every effort must be made to promote the cluster (i.e., to strengthen the strong). This enhances the attractiveness of the region as an economically active location, and it also helps to strengthen the businesses which are already in the region [Maier et al 2006]. The principle of clusters is most often viewed in the context of the manufacturing of goods, but the literature also offers a review of various examples of tourism-related clusters in places such as China, Australia, South Africa, Germany, and other countries. The tourism technology cluster of the Balearic Islands is often cited as a purposefully created and successful example [TIC Turístico Balear 2008]. More often, however, authors argue that it is very complicated to create an entirely new cluster. It is far more effective, they suggest, to support the further development of existing structures [Genosko 2006; Kiese 2008].

These are the interrelated elements which shape the structure of a cluster. They are also the supply factors in the tourism industry:

- 1) Attractions and activities for tourists;
- 2) Accommodations for tourists;
- 3) Other tourism facilities and services such as tours, dining, shopping opportunities, etc;
- 4) Institutional elements such as tourism information centres, regional associations of enterprises, professional education centres, etc.;
- 5) Transportation and accessibility;
- 6) Other infrastructural elements such as telecommunications, electricity, etc. [WTO 1994].

There are business relationships among these various elements, and management and organisation of the system are basically ensured by social factors. These, naturally, are influenced by demand and the market. There are links at a wide variety of levels among the elements, and these are both vertical and horizontal. The links, however, are characterised by co-operation and transfer of information and knowledge in a manner that is localised and limited to the local space.

At the same time, there is little in the literature about methods to define the size and external borders of a cluster. This suggests that a cluster is dynamic, that it shifts in time and space.

The concept of clusters encouraged these authors to conduct research in the Latvian town of Sigulda and its environs. **The goal: To identify the spatial structure of the tourism sector and to map it out in the context of the cluster theory in the Sigulda region.** The authors identified as their hypothesis the assumption that if tourism is one of the leading economic sectors in Sigulda, then there must be a network of tourism companies which are typical of a cluster, and it must be possible to identify the spatial boundaries of this structure.

Methods

The authors used a combination of several methods in order to study the spatial structure of tourism in Sigulda. These included both qualitative and quantitative methods.

First there were seminars with the previously established initiative group in relation to tourism in the area – the Sigulda Region Tourism Association. One of the initial research methods involved two sequential focus group interviews, the aim being to identify the internal factors of the development of the regional tourism sector. Next there were partly structured interviews with local businesspeople. The methodology in this research was based on recommendations about qualitative research in the field of tourism that were developed by the Australian researcher Jennings [2005] and the British researcher Thomas [2004]. Participation in the introduction and development of regional tourism innovation (magnetic regional tourist privilege card) in this area allowed the authors to use the observation method which has been described very well by the British researcher Cole [2005] in terms of its advantages in comparison to other methods. A total of 48 businesspeople from the area of tourism took part in the two sections of the research. In order to simplify the extraction of data, businesspeople were surveyed via the method of a structured interview. These data were not processed in mathematical terms. Rather, they served as a correlation of agreed viewpoints as to those issues that are of strategic importance to the local businesspeople in regard to the implementation of mentioned innovation. In order to identify co-operation among businesspeople to a greater extent, partly structured interviews were also conducted with entrepreneurs (12 in all) in contiguous Līgatne town, which is in the middle between to large tourism centres – Sigulda and Cēsis.

Cartographic methods were used to define the cluster. Perceptual regionalisation was based on the work of Gunn and Worms [1973, cited in Smith 1995]. This allowed the authors to study the views of local businesspeople about their spatial understanding, as well as about the possible boundaries of the Sigulda tourism region. Each respondent was given a map of Sigulda and its surrounding area (a radius of approximately 40 kilometres) and asked to draw the boundaries of the tourism region as he or she saw it. Then the maps were used to calculate

the average boundary, and this made it possible to identify the region. Then the region's compactness index and connectivity index were calculated. The contour of the region is of substantial importance, because it characterises mobility and accessibility. The more compact the region, the easier it is to ensure interaction in terms of communication and tourism services. Calculation of the compactness index made use of parameters such as the size of the region and its comparison to an ideal circle obtained by determining the longest diagonal between the two most distant border points of the region. The values of the index range between 0 and 1, with the two extremes representing a line or a circle respectively [Coffey 1981, cited in Smith 1995]. The connectivity index was then calculated to supplement the characterisation of the territory's contours, and this was based on the graph theory [Taylor 1977, cited in Smith 1995]. Here the point is to come up with a quantitative characterisation of the relationship between populated areas in the region and the roads which link those areas. This index does not take qualitative indicators into account (type of road, driving times), but it is significant in that it makes clear the level of intercommunication that is possible in purely physical terms [Smith 1995]. Here, again, the values of the index range between 0 and 1. The more roads to link populated areas, the higher the value of the index, and that means that physical communication in the region is more possible.

The dynamics of the establishment of new companies were used as an indicator to describe the structure of the cluster [Pantazis 2006; Schricke 2007, cited in Kiese 2008]. Information from the Commercial Register database [Lursoft 2008], was collected and updated with interviews and calls to the relevant businesspeople. The new companies were mapped with the assistance of GIS methods, thus showing their spatial distribution in relation to the year in which each business was established.

The authors analysed the Internet homepages of these various tourism service providers to see how they provided cartographic, graphic and written information about their location. This made it possible to identify interregional relationships and the linkage between the various businesses and the space in which they exist. This is a derived aspect of content analysis [Hall, Valentin 2004] – one that is based on the selection of information of a geographic nature. Virtually any homepage which focuses on a provider of tourism services will include information as to the location of that provider. Usually there is a map or diagram, and less often a written description to offer precise information about the population centres with which the business associates itself, thus showing how the company positions itself vis-à-vis adjoining regions and in what direction the linked location is found from the main target market.

The data were supplemented with qualitative information from the development plan for the Sigulda Region, which was being developed at the time. The authors also reviewed the strategies of tourism organisations in the region.

The results

Sigulda and its surrounding area have long been known as one of the most popular tourism destinations in Latvia, but in order to obtain the results which are discussed below, the background context was important – the spatial foundations for the research. The question was whether these foundations corresponded to the physically characterised indicators that have been cited in the literature as prerequisites for a region's internal growth [Lasuén 1969; Porter 1990].

In terms of population structure, the population of Sigulda increased by more than tenfold over the course of the 20th century. In 2006, there were 16,679 registered residents in the Sigulda Region – nearly 2,000 more than in 2005. This was the most rapid population increase since the establishment of the region in 2003. A total of 56% of these residents are of working age [Sigulda.lv 2008]. This description applies to one part of the research territory, but it does indicate that the socio-demographic characterisation of the centre is one which suggests a high level of potential for economic development in the region.

Several of the region's strategic planning documents cite tourism as a priority sector in economic development, and this suggests that there is a favourable political environment for the further development of the sector. In the spatial territorial plan of the Rīga planning region

[2007], Sigulda is cited as the only city (apart from Rīga) which includes tourism as one of its fundamental functions. The Sigulda Region development programme for the period between 2007 and 2019 [2007] particularly emphasises the development of tourism and sports centres that would be of international and national importance, along with conference and seminar facilities and tourism education centres.

Indicators from the tourism sector confirm the origins of the aforementioned political decisions. Sigulda is a tourism centre with a high level of economic activity. In 2007, 34 286 tourists spent the night in Sigulda [Siguldas TIC 2008]. The most popular tourism destination – the Turaida Museum Reserve – was visited by 244 982 people in 2007, and that was an increase of 17.7% over the previous year [the 2007 annual report of the reserve]. The Turaida Museum Reserve and the Gauja National Park are among the 10 most popular tourist destinations in Latvia [TAVA 2008].

As noted in the description of clusters, the transfer of innovation and knowledge are localised, and it is necessary to activate this potential to a greater degree. That is why the authors studied co-operation among tourism companies in Sigulda and the extent to which this co-operation has been organised and manifested in terms of spatial considerations.

Co-operation among these types of enterprises is indicated by the establishment of an NGO in 2000 that is called the Sigulda Region Tourism Association [Sigulda.lv 2008]. The name of this organisation indicates that its initiators wish to involve a wider range of participants, irrespective of the administrative boundaries of the region (there are 48 members, most of whom are businesspeople; others are representatives of local governments and non-governmental organisations). The association's basic goal is to facilitate growth in the tourism sector in qualitative and quantitative terms. Of the 23 businesspeople who are members of the Sigulda Businessmen's Club, eight work in the tourism sector, and this once again demonstrates the activity and proportions of this sector in the region [Sigulda.lv 2008].

The focus group interviews with businesspeople allowed the authors to determine the most important internal factors which are of key importance in the development of tourism in the region. One of the frequently stated thoughts focused on the need for innovation in terms of tourism products and the tourism infrastructure. Respondents said that this would bring businesspeople together to deal with some of the problems that have been identified and to create new foundations for co-operation. One innovation is a project involving magnetic privilege cards which allow visitors to Sigulda region to enjoy various discounts. Known as the "Cane of Sigulda," this project was organised by the Sigulda Region Tourism Association. Initial questions were both academic and of a business nature. The operating zone for the innovation had to be determined, and there were questions about who would be involved. Initially the project involved those tourism businesses (including members of the association) who spotted unified marketing goals in the process. Advertising in three media outlets of regional importance (Sigulda Radio, *Rīgas Aprīnka Avīze* (a regional newspaper), and the homepage of the Sigulda tourism industry) led to a response from a series of other companies which wanted to become involved both in the new project and in the overall activities of the association.

The businesspeople who were involved in the process of identifying the project's operating zone marked the boundaries of the Sigulda tourism region on a larger map of the territory, thus indicating their understanding of the zone for co-operation and creative milieu. The perception mapping method was used to define the average boundary, as identified by the entrepreneurs (see Figure 1). Figure 1 also shows the broadcasting range of Sigulda Radio, which is one of the principles related to the functional region that is used to define spatial structures [Smith 2005]. The broadcasting range of the radio station was surprisingly similar to the boundaries that were indicated by the businesspeople, however there was not interconnectedness, that it would be the most popular media among entrepreneurs.

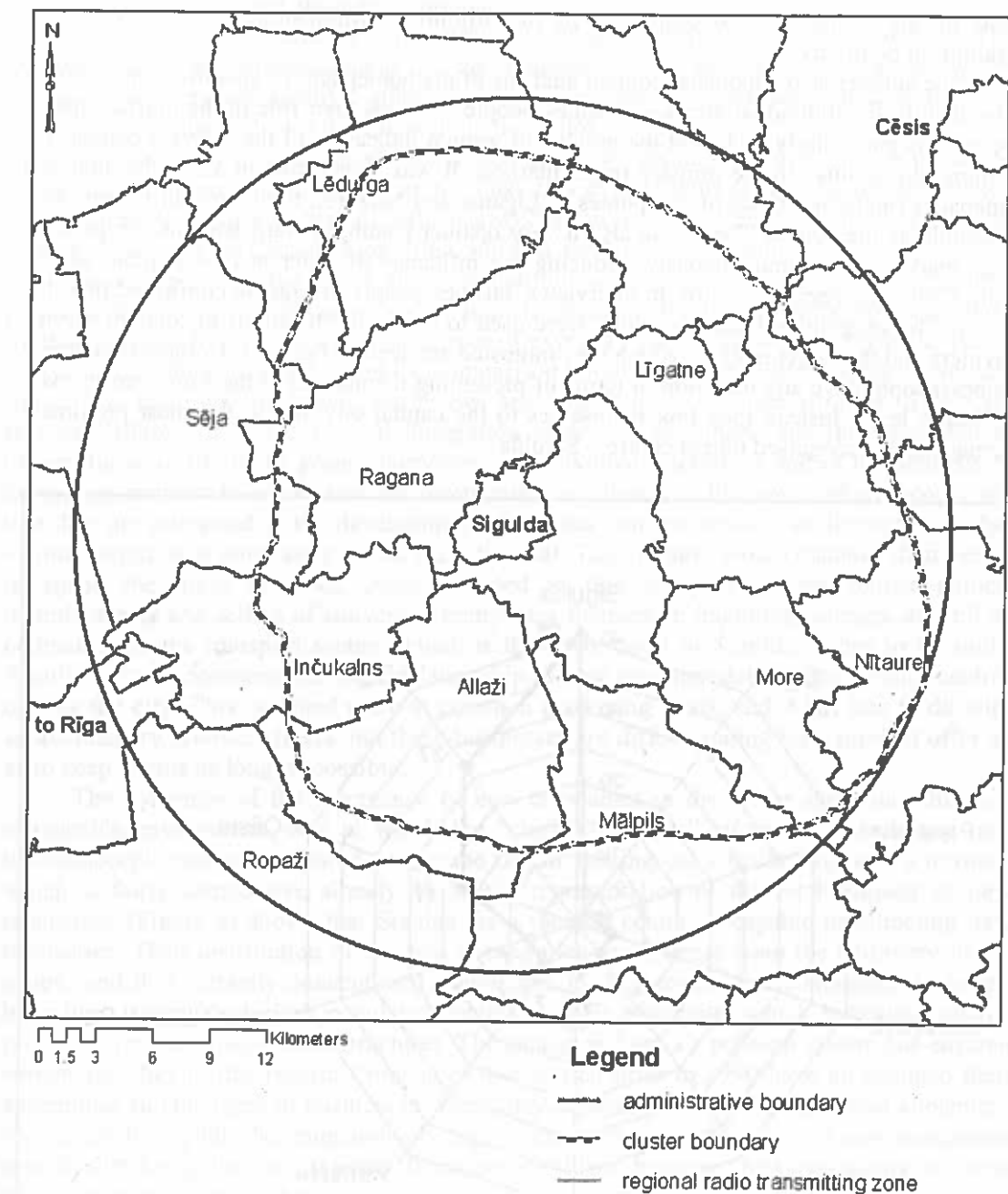


Figure 1. The zone of cluster space defined by tourism entrepreneurs in Sigulda

The defined zone of operations has a radial contour with the distinct centre of Sigulda itself. The high value on the compactness index (0.89) shows that this is an optimal form for the territory – one which make it more possible to engage in physical communication and to expand the availability of interrelated tourism services. This is confirmed by the high value on the connectivity index (0.71). This indicates that there is a fine road infrastructure in the region. The value of the connectivity index was lowered by the fact that the Gauja River flows through the region, but this enhances the role of Sigulda as the centre. The roads which connect it to surrounding populated areas are more concentrated. In terms of road quality, the biggest problems, as defined by local businesspeople, are with the road from Sigulda to the villages of More and Nītaure. The average co-operation zone defined by businesspeople proved to be a bit more narrow than the spatial structure in which the entrepreneurs who wanted to take part in the innovative project were actually located. Additional discussions, particularly among representatives of local governments, were the

result of the desire of businesspeople in the adjoining administrative region (Nītaure, Līgatne), to be involved.

The authors also conducted content analysis of the homepages of specific companies so as to identify the individual views of businesspeople vis-à-vis their role in the tourism space. The authors particularly looked at the graphic or written indication of the relevant company's location and its links to the primary target markets. It was shown that in all of the analysed homepages (including those of companies in Līgatne and Nītaure), the dominant linkage was to Sigulda as the centre. There was also a very distinct leaning toward Rīga as the primary target market, thus, simultaneously, reducing the influence of other nearest popular tourist target centre Cēsis as a regional centre. In interviews, businesspeople in Līgatne confirmed that this was so. The geographic locations which were used to define the locations of tourism service providers and the target markets which they indicated are seen in Figure 2. Comparatively few businesspeople have any ambition in terms of presenting themselves at the European or even pan-Baltic level. Instead they link themselves to the capital city and to the most proximate internationally recognised tourist centre – Sigulda.

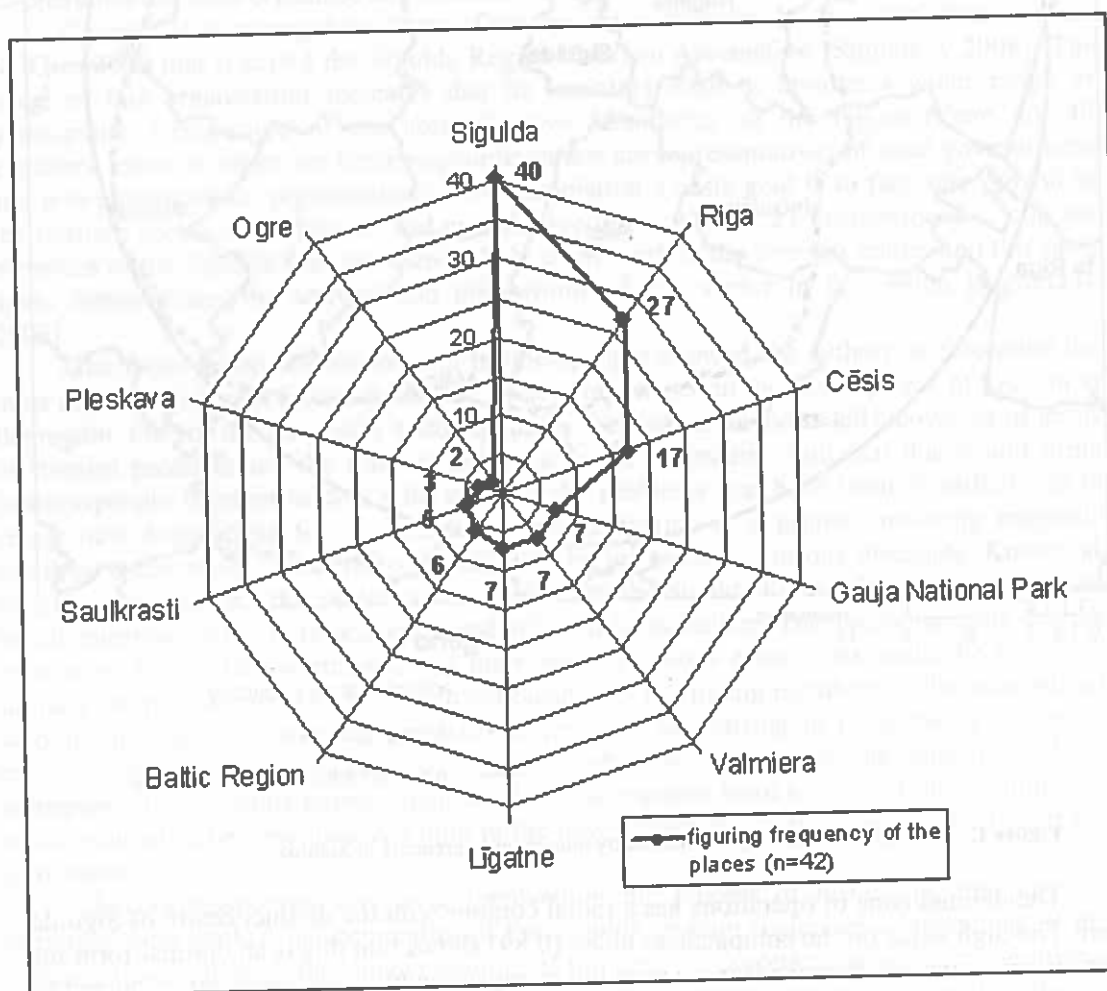


Figure 2. The location and target market positioning between major centres and regions among Internet homepages of tourism service providers

Surprisingly few businesspeople take advantage of their proximity to the Gauja National Park (GNP). The name of the park is avoided in various ways, with business homepages talking about the ancient Gauja River valley, etc. This is in contrast to a survey of tourism professionals that was conducted by the National Tourism Development Agency in which it was found that the GNP was defined as one of the 10 most popular tourist destination in Latvia. The observational method showed that the level of corporate co-operation between

many businesspeople and the administration of the GNP was very weak, indeed, and one reason for this is that the territory of the park is closed to some types of economic activity. The creative milieu of businesspeople in the tourism sector, however, can generally be characterised as mostly positive, although there were a few disagreements on tactical issues and the general directions for development in the sector.

The survey of businesspeople confirmed the views about location that were presented on the Internet homepages, as well as the links that existed with competing regions (which were defined as different zones of influence with a lower level of intensity in co-operation). Among these were the Cēsis Region, Rīga, Jūrmala, the Vidzeme shoreline, etc.

Businesspeople also agree that competition among these zones is not a critical problem, because in many cases co-operation is based on the pursuit of common goals in foreign markets. More distinct are the zones of everyday processes, which recalls the thesis of Courlet & Soulage [1995] about the comparison with the territorial perceptions of ancient tribes. The relationships among businesses are continuing to become stronger. There are sectoral differences in the vertical integration of service providers, and this was seen in observations, in the focus group interviews, in individual interviews and in the analysis of homepage content. Most focused on co-operation are hotels in the town, where people say that they are interested in the development of various tourism services in the region so that visitors might have more activities at their disposal. This, in turn, would enhance their desire to spend the night in town. Also included in this co-operation are tourist guides, manufacturers and sellers of souvenirs, companies focused on incoming tourism, as well as companies in the transport sector (which is the weak point in Sigulda, it has to be said). Another area of co-operation is the relationship among accommodations and leisure centres outside the city. This is aimed more at common marketing goals, and it has less to do with supplementary product effects, but these businesses are differentiating their product offer so as to keep clients as long as possible.

The dynamics of the emergence of new companies in the sector show that this is a changeable environment, one in which the "cluster principle" attracts new and ever new businesspeople who are prepared to take the risk of seeking out a market niche in a territory which is fairly competitive already. A spatial representation of the establishment of new companies (Figure 3) shows that Sigulda, as a tourism centre, is capable of attracting new businesses. Their distribution in the area is becoming more dense from the periphery to the centre, and it is certainly concentrated specifically in the centre. New companies, however, have been appearing in less populated centres or their proximity, which indicates that the process is linked to population structures. The change in Latvia's political system has ensured certain specifics in this regard. Companies that existed prior to 1990 have all changed their appearance and the types of business in which they engage; many have disappeared altogether. This helps to explain the comparatively high intensity in the appearance of new companies specifically during the last 10 years. It is clearly evident, however, that the location of these new companies is no accident.

Among the companies that have proven to be most stable over the course of time is the Turaida Museum Reserve, which has existed since 1948 and was expanded after a change in status in 1988 [TMR 2008]. This is the company which is mentioned most often by regional tourism businesses on their Internet homepages. Because of the large and regular flow of tourists at the reserve, it best corresponds to the concept of the "cluster machine" that was identified by Malmberg et al [1969]. It is the entity which "turns on" the cluster and allows many new companies to emerge around it. Apart from so-called "floating" souvenir retailers who have no stationary location, there have been at least 12 new tourism enterprises in a 3-kilometre zone around the Turaida Museum Reserve. The influence of the location is also seen in the aforementioned broader radius, where there are even greater numbers of new tourism locations.

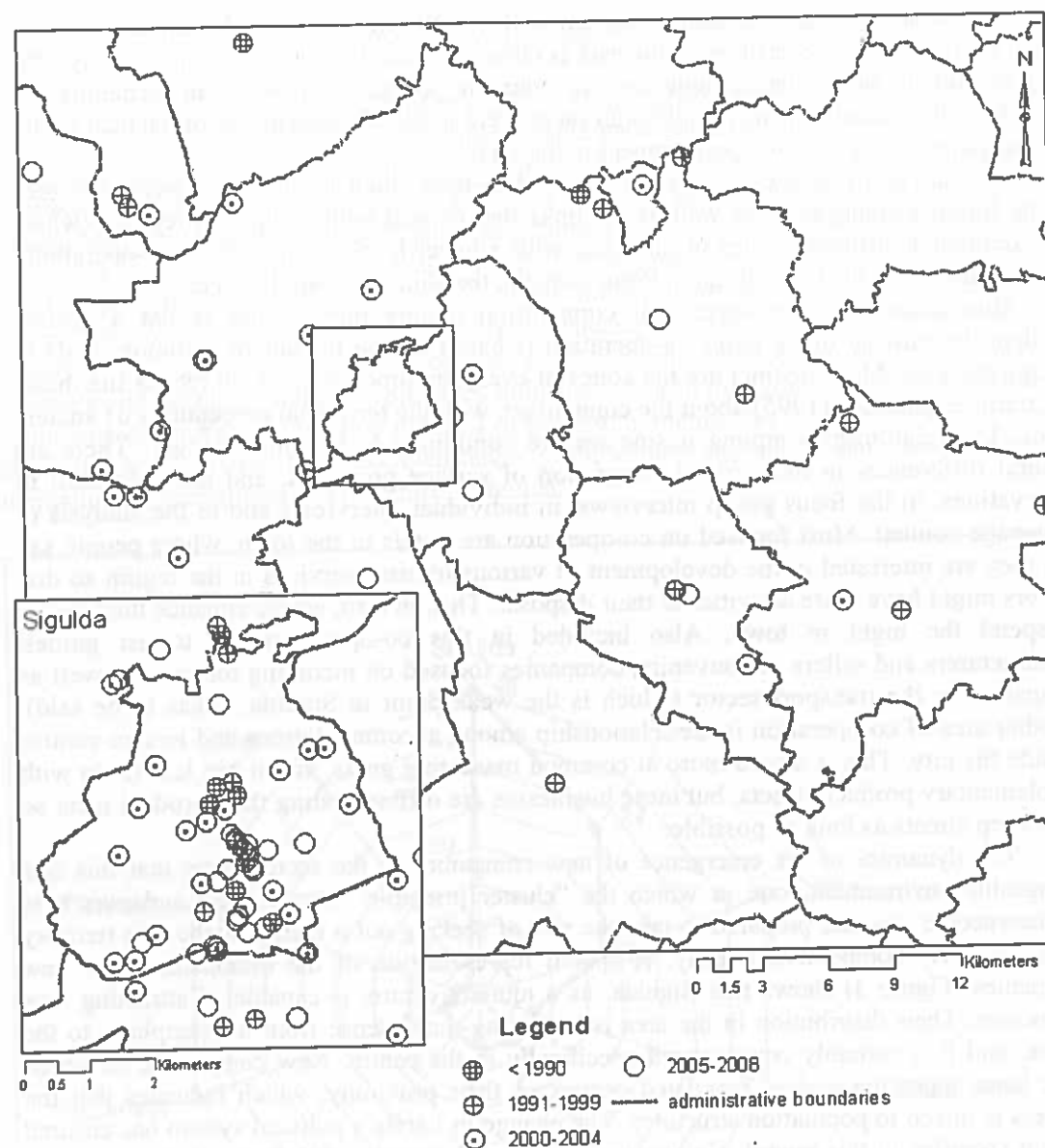


Figure 3. The dynamics of the emergence of new tourism companies in the Sigulda tourism cluster

Research into how companies choose their location is continuing so as to determine whether this is a process based on individual subjective factors, as opposed to objective factors which make one place better than another. The trend already is one in which successful businesses open up other enterprises in the same sphere and in the nearby region. This has been seen in at least four situations. Competence and knowledge about the management of tourist accommodations, for instance, will allow a business to open a second tourist facility in the region, perhaps one with different or specialised services so as to find a new market niche or to offer additional services in the existing market.

Conclusions

1. Latvia does not have striking natural or cultural resources of the type that establish tourism centres and regions with distinct boundaries. That is why the cluster method can be used to study the territorial structures of the tourism industry and to draw the boundaries of same.

2. The Sigulda region is one in which there is a high level of business activity, and tourism is one of the leading sectors in the territory. This is in line with the prerequisites for the emergence of a cluster. The cluster has been activated by the innovation of a 24/7 privilege

card, the "Cane of Sigulda", and the existing structure is one in which there is potential for other innovations, too.

3. The results of the research confirmed the hypothesised theory – that the creative milieu in which businesses operate – interrelationships and co-operation – are an important prerequisite for the development of tourism in the region. This was evidenced by the ability of businesspeople to use the existing product base to develop and introduce a new and joint tourism project in the region, as well as by the stronger level of co-operation in the direction of vertical integration. All of this confirmed the hypothesis of the authors. The Turaida Museum Reserve can be defined as a cluster engine which is the driving force behind the cluster.

4. It is too early to evaluate the importance of the jointly introduced innovations in promoting economic growth in the region, both because this co-operation is fairly recent and because there is a lack of data about this co-operation in relation to the economic benefits for each involved business and for the entire region. There must be additional qualitative research of vertical integration in the region with companies which operate in other sectors of the economy.

5. Although theoretical descriptions of clusters speak to different scopes and dynamics, the fact is that it is possible to identify the approximate boundaries of this particular cluster at the regional level. This partly confirms the authors' hypothesis about the possibility to define precise boundaries. The research has defined a tourism structure – a radial structure covering a 20-kilometre radius around the distinct centre that is Sigulda. Here we find a high value in the compactness and connectivity indexes – 0.89 and 0.71 respectively. More research will be needed to determine the potential of border zones in terms of creating and developing new companies. More precise methodologies for the determination of boundaries will be needed.

6. The research confirmed the theoretical claim – one that is particularly made by researchers in the United States and Germany – that despite comparatively dense competition, a cluster creates opportunities which serve as a magnet for new business initiatives, and these increase in the direction from the periphery to the centre. This will require further analysis in tandem with other related indicators – business effectiveness and choice of location.

7. The study shows that attempts to organise tourism within the boundaries of a single local government territory will be too weak to ensure effective development of companies and the surrounding region. Tourism companies are established in spatial terms in a network shape. Businesses are interrelated in the promotion and offer of tourism products, and so administrative boundaries cannot fragment these processes.

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Rural Place Identity Reproduced by the Riga Hinterland Spatial Planning

Laila Kūle

Abstract

This paper examines the national discourses of 'rural' and 'urban' and their impact on region-building and the spatial policies in the city region of Riga, Latvia. As one of the city-regions in the post-socialist country the rural-urban discrepancies are path-dependent. The discourses are based on elements of Socialist ideology as well as on the features of a much longer settlement history. Despite strict political and administrative division of rural and urban populations and physical planning at the local level since the 1960s within the framework of Soviet regional planning, the Riga City functional region had a variety of physical and socio-economical plans although implementation procedures and governing institutions were not established. During the Soviet period urban hinterland planning was subordinated to the central city master plan, and was prepared mainly for the needs of the Soviet central and republican government, and only partly served the needs of the central city. With the adoption of the new municipal law in 1994 all local level municipalities, both rural and urban, received the same rights and responsibilities, including the responsibility to prepare and implement local spatial policy.

Since the mid 1990s regional and local municipal institutions of Riga city and its hinterland cooperated informally and focused on solving environmental types of problems. This cooperation was formalized along the initiation of the regional level government reform with the aim of adjusting the scale of Latvian regions to those of the European community. The creation of the Riga Planning Region in 2003 was driven by the rural-urban discrepancies. The dominant role of Riga in the Latvian urban system and the specific role of rural areas were perceived as part of a national identity, with each having a particular role. That led to spatial development policies permitting development of rural spaces where these new residences ignored the communal aspects of urban living and ignoring the needs of the central city's inhabitants to use the space in the city's hinterlands. In 2007 new spatial planning policies have been prepared at all levels. Despite an anti-urban bias in formal political discourses, at the local level, rural identities and their spatial elements are not preserved against the unplanned urbanization of the city's hinterlands remaining rural spaces.

Keywords: urban-rural, Latvia, city-region, spatial planning.

Introduction

This paper examines how national discourses of 'rural' and 'urban' have made an impact on region-building and the spatial policies in the city region of Riga, Latvia. Rural and urban discourses are path dependent, particularly for those who perceive rural and urban as place identities and for years influence the spatial policies of the urban region. This article is based on interviews with planners as well as the authors own observations observing numerous planning process. As part of the research for this article a variety of spatial planning documents and other municipal information was read and carefully studied. The first part of the article provides short information on the specifics of the Latvian settlement pattern and the characteristics of Riga's urban fringe. Statistical information as well as rough estimations by municipal councils is used to calculate the spatial pattern of change in the population in Riga's adjacent municipalities between 1989 and 2007. The next part provides insights into the development of the urban pattern of the city's hinterland, and what it means in various time-periods. The last part is devoted to explaining the course of development in the Riga planning region. Planning documents produced by local and regional municipalities are studied to identify if they contain policies concerning the development of rural areas in the city's hinterland. The conclusion considers the role of rural as a place identity concept within the context of Riga's hinterland planning.

Rural and urban as regional identities

There are many studies by geographers and sociologists on conceptualizing rural and urban spaces. There continues to be academic discussion between those who see rural-urban as a dichotomy of contrasting concepts and those who see rural-urban as a continuum where rural elements gradually fragmentize change with urban ones (Mann, 1965; Pahl, 1966; Tuan, 1978; Gilbert, 1982; Harrington and O'Donoghue, 1998; Cloke and Johnston, 2005). Urban and rural as a bipolar concept is being exposed to other bipolar concepts such as society and nature. Rural and urban are complex, fluid and blurred concepts where both are ideal abstractions or simplifications of the real world, still important as metaphors for communicating among social actors, particularly in the context of policy preparation and implementation. This is based on the assumption that there are fundamental differences between people who live in cities or towns and those who live in the countryside or the populated territories thereof. On this assumption rural and urban stereotypes are created and widely used (Wirth, 1938; Wiggins and Proctor, 2001; Hugo, et al., 2003; Champion and Hugo, 2004) and they incorporate such issues as physical environment, housing, accessibility, human and natural resources, type of economical activities, governance, innovations, quality of life, communications, values, opportunities and other aspects. Rural and urban stereotypes are rooted in the traditional development preconceptions and thus can create obstacles to employing innovative spatial policies that tackle the underlying causes of the problems despite location in either the formal rural or urban space.

In recent decades rural and urban have been studied as mental constructs or social representations or imagination, the meaning of actual space and social community. Rural as a concept has been studied in more detail, especially as being exposed to social change that the majority of social groups consider as part of modernity and growth related. Rural sociologists particularly see rural as a social representation of space (Hoggart, et al., 1995; Halfacree, 1993, 2004; Brown and Cromartie 2004). As social representations are created by distinct social groups, each of them has different rural and urban discourses – the most studied ones are discourses by lay persons, academicians, mass media, land agents, politicians and other decision makers. As activities of social agents are affected by the abstract meaning of rural and urban the gap between social and physical reality can be observed (Eyles, 1987; Hopkins, 1998; Kellerman, 1996).

Rural and urban also is seen not only as metaphor but also as a place identity (Tönnies, 1887; Huigen and Meijering, 2005; Groote and Haartsen, 2005). In this discourse the setting, meaning and activity (Relph, 1976; Aitken, 1990) are central notions that constitute the distinctiveness of places. As place identity's categories, rural and urban are contextual – distinctive spatial and socio-cultural contexts are characterised by prevailing societal norms and values. Place identity is based on the past since the future is unknown; it is always possible to get from selected readings information about past events. The past is important in creating such social notions as nostalgic sentiments and rural idyll. Current situations are rooted in the past: "many social phenomena can only be adequately explained in terms of path dependency" (Gartland, 2005). However, since the reading of past events is done by various social actors a wide variety of meanings can be created. As social actors are involved in various activities at the same time and also share the locality it is possible to identify several identities of the place, with dominant actors creating more dominant place identities (Huigen and Meijering, 2005). Thus the constitution and re-constitution of rural and urban as place identities is a continuing process, where identities are always being constructed and reconstructed by social agents.

Latvian settlement pattern features and the present specifics for Riga City hinterland

Latvia with 2.29 million inhabitants has a monocentric urban system with Riga being a dominant capital city containing 32% of the total countries population in 2006. The city of Riga is a two-tier level municipality and within its administrative boundaries there were 728,000 inhabitants in 2006. The second largest city in Latvia – Daugavpils with 109 thousands inhabitants has only one-seventh of population than Riga; and the third largest Liepāja, in west Latvia, had 86,000 persons in 2006. Seventy percent of the 77 towns in Latvia had fewer than 10,000 inhabitants in 2006. Riga is currently shrinking, decreasing in population, despite its

central role in the national settlement system and an ongoing suburbanization process. Indeed, all of Latvia is characterised by depopulation processes. The population within Riga's administrative borders has since 1989, when it had its peak population 910,455 inhabitants, decreased by 20 percent.

Agglomeration processes, and in particular daily commuting in Riga have been studied since the 1960s, especially by geographers at the University of Latvia. These studies showed that Riga and its hinterland constitute a clearly defined metropolitan region. The Riga metropolitan area is home to nearly one-half of Latvia's residents on less than 10 percent of its territory. It is estimated that in the Riga daily commuting region live 1,148,000 residents on 6,984 km² (Krišjāne and Bauls, 2004). There are two large cities within Riga's metropolitan area – Jelgava with 66,100 inhabitants and Jūrmala with 55,600 inhabitants. There are some twenty smaller satellite settlements in the metropolitan area – Ogre, a town with 29,000, Salaspils with 21,000, Tukums with 20,000, Sigulda with 15,000, Olaine with 13,000 residents and other smaller towns and larger villages in adjacent districts (2006).

Riga District is the first level regional municipality (expected to be reformed in 2009), including local municipalities adjacent to the Riga City municipality – satellite towns and rural municipalities, now with numerous suburban villages, “greenbelt’s” forests (forests, wetlands, waters cover 62 percent of the Riga District's territory) and agricultural land, a high percentage of which is abandoned, particularly closer to the city borders due to land speculation and conversion for subdivision and construction purposes. The Riga District municipality with 167,700 registered inhabitants at the beginning of 2008 had the highest population increase in Latvia – more than 10% since 1989. This increase was caused by population inflow from other parts of Latvia.

The planning community agrees that current population growth can be characterized as having distinctive sprawling tendencies – that new housing is being built and new inhabitants are settling in the rural area at the fringe of the city. Population data support this tendency for some rural municipalities but for others it shows that municipalities cope with increased population growth by locating people within the formal boundaries of villages – although the number of villages has increased as well, the area within the formal boundaries of existing villages has been extended outward. New migrants make up from 10 to 50 percent of all inhabitants in Riga's urban fringe rural municipalities. The highest population increases are found in adjacent formerly agricultural areas – with the highest increase in Garkalne. This rural municipality with 6,000 registered inhabitants on the border of Riga had a total population increase of more than 114 percent between 1989 and the beginning of 2008 (data of Latvian Statistical Board). There was an approximately 240 percent population increase outside formally defined villages in the previously agricultural areas where 40 percent of all Garkalne residents live (data provided from municipal council in the framework of Riga District spatial development plan preparation, 2007). In 1989 25 percent were living in rural areas outside the formal Garkalne village borders (data of Latvian Statistical Board; Turlajs and Milliņš, 1998).

Other rural municipalities with population increases during the same time period are located in close proximity to Riga – first and second circle neighbours or with natural amenities like the sea coast. These include Ogresgals, now incorporated in Ogre town (with a population increase of 58%), Mārupe (32%), Stopiņi (26%), Babīte and Sala (together 25%), Ķekava (25%), Olaine pagasts (25%), Ādaži and Carnikava (together 18%), Daugmale (18%), Inčukalns (16%), Ikšķile (14%), Ropaži (8%) and Engure (6%). There are within the daily commuting area of Riga three towns that had positive population increases – Baloži (24%), Saulkrasti (10%) and Ķegums town (18%). The rest of the urban municipalities in the Riga functional region had small or negative population changes. There was a 10 percent population growth in a rural area that is now incorporated in the Sigulda town municipality – the central town itself, however, did not experience population growth.

Stopiņi, a rural municipality with 9,000 officially registered residents in the beginning of 2008 had greater growth in the rural areas outside the formally defined villages – in the order of around 135 percent. As a result, now more than 20 percent live outside the formal village borders than did in 1989 when only slightly more than 10 percent did so (municipal council

data, 2004 and 2007). While not all rural municipalities have higher proportional population growth in former agricultural areas – for instance, Mārupe, a rural municipality has its population growth concentrated in two central villages – although the borders have been extended. Mārupe village had a population increase of 284 percent while Jaunmārupe village was at 39 percent and during the same period a former military village, Skulte had a population loss of 30 percent and another village, Tīraine suffered a loss of 10 percent. There was observed also 10 percent loss of the population living in rural areas outside formally defined village borders (municipal council data, 2007). Ādaži and Carnikava, rural municipalities in rural areas outside formal village borders had a population decrease of 20 percent in the same period. Currently Ādaži has 9,000, and Carnikava 6,000 residents. In 1989 Ādaži and Carnikava together in what had been one administrative unit had 16 percent of its rural population living outside village borders. By 2007 the respective percentages were 10 percent in Ādaži and 13 percent in Carnikava. The same pattern is evident in Babīte and Sala rural municipalities that have about a 10 percent increase in former agricultural areas outside formal village borders. The data are given together as these towns also were one administrative unit in 1989. Today Babīte has 7,000 residents and Sala slightly more than 1,000. Currently the Babīte rural municipality has about 7 percent of their residents outside formal extended and new villages' borders compared to 1998 when and this percentage was twice as large.

Obtaining data on population change within rural municipalities was very challenging given that there have been municipal and village border changes over the period examined – some local entities were split while others were amalgamated. Neither the national statistics board nor other national authorities, or local or regional municipalities are keeping comparable records on long term population changes. The delimitation of village borders is the exclusive right of local municipal councils except for those located on the Baltic Sea coast. In recent years in adjacent municipalities of Riga city the borders of villages have been extended over former agricultural areas providing investors and developers opportunities to bring new inhabitants to their localities. Latvian national policies do not distinguish between measures based on such categories as either concentrated or diffused spatial development. It is up to the regional and local governments to design their policies in favour of certain spatial development type or areas.

The Riga Planning Region is the second level regional municipality that includes Riga City (with an area of 307 km²), Jūrmala City (100 km²), Riga District (3132 km²) as well as three of next circle adjacent districts of Tukums (55,000 residents in an area of 2457 km²), Ogre (63,500 /1843 km²) and Limbaži (38,000/2602 km²). The Riga Planning Region covers 16 percent of Latvian territory and had 1,097,000 or 48 percent of all Latvian inhabitants in 2006. The Riga Planning Region includes distant rural areas and settlements that are outside Riga's daily commuting area and thus does not correspond to the Riga functional region that is the slightly more compact in territory. Daily commuting has been monitored in the Riga city region since the 1960s, and for example in 2004 a total 26 percent of the working population from the urban fringe commuted to work purpose in Riga (Krišjāne and Bauls, 2004). The functional Riga city region also includes the city of Jelgava, the centre of another planning region – Zemgale. Consequently, Jelgava has the dual role being a part of the Riga functional region while also serving as the administrative centre of the southern Latvia. This can be seen by the spatial distribution of Jelgava employees which in 2006 was follows – 13,942 or 32 percent of the working age population of Jelgava worked in Riga and only 15,287 or 35 percent in Jelgava itself. Another 13 percent of Jelgava's labour force worked in districts in Bauska, Dobele, Jelgava and Rīga. Information on where the remaining 20 percent of employees worked was not available (data from Jelgava City administration, 2007).

In Latvia after the structural reforms in the 1990s more than 60 percent of employees are in the services sector, and in all regions the number of employees in agriculture and industry has decreased. In total, per country the tertiary sector (G-Q) has 641,200 employees, the secondary sector (C-F) 294,300 and the primary sector (A-B) 110,500 employees (2006). At the same time, Riga's city tertiary sector has 264,300 employees, or more than 70 percent, the secondary sector 97,700 and the primary sector 2,500 employees. The area adjacent to Riga, or Pierīga statistical region has 92,100 in the tertiary sector, less than the national average, but there is a

higher than the national average in the secondary sector with 50,300 employees and the primary sector has 21,900 employees (the data source is the Central Statistical Bureau of Latvia).

In total the Pierīga statistical region accounts for almost 20 percent of all employees in the country in agriculture, forestry and fisheries and it is second largest concentration of employees in industry and services after the city of Riga, despite the recent suburbanization processes. Given the abundance of vacant agricultural land in the hinterland of Riga, agriculture plays an important role by producing products and employing people in smaller areas in a more intensive manner. As a consequence Riga and its hinterland contain not only the concentration of population and employees, but also wealth. The city of Riga had a GDP of 20,219 Euros per person in PPP in 2005 (data from Eurostat), while the national average was 11,180 Euros. The Pierīga statistical region which is Riga's hinterland was the 3rd highest at 7,795 Euros after the Kurzeme region with 8,862 Euros and which has two important port cities. Other are less wealthy regions include – Vidzeme 6,562, Zemgale 6,230 and Latgale with 5,428 Euros GDP per inhabitant in PPP. In terms of total GDP percentage wise the city of Riga City contributed 57,3% in 2005, the Pierīga statistical region 11,1%, Kurzeme region 10,7, Latgale region 7,6%, Zemgale region 7% and the Vidzeme region 6,2%.

The development of the urban pattern of Riga City's hinterland and its meaning

Riga was founded in the 13th century as a trading post. As a sign of its wealth and power, the city of Riga has since the early 14th century owned a hereditary region outside the city borders. In the 19th century it was 750 km² and included farming areas and forests. In 1940 the city owned slightly less, with 701 km² of forests since agricultural areas were exchanged during the national agrarian reforms with lands inside the city's borders (Lejnieks, 1989). After restitution in 1995, the city of Riga now owns 561 km² of forests outside its current administrative borders (2004).

Despite Riga's wealth its administrative borders were limited and the extent of its local rights controlled by powers outside the city, most often by foreign powers. The discrepancy between the wealth and the opportunities of urban expansion was particularly acute during the period of rapid industrialization and after the liberation of the rural serfs when population increased from 193,000 in 1881 to 517,000 in 1913 (Mierīņa, 1978). New suburban settlements for affluent urbanites were established outside its administrative borders but mainly on city owned land – the satellite settlements of Ogre, Jūrmala, Baldone, Sigulda were established in the second half of the 19th century, especially after the construction of railway lines. The sandy beaches of the Baltic Sea, the rolling rural landscapes with dry pine forests and the sublime glacial origin of the Gauja River valley provided natural amenities for affluent early suburbanites (Berziņš, 1978). In 1905 Latvian architect Pēkšēns wrote that each Latvian inhabitant if he wanted to could have a piece of land with a small house no larger than two stories and in such a way would improve urban hygiene following the English housing tradition (Krastiņš, 1992).

Suburbanization started during the independence period of the Latvian Republic (1918-1940) despite the strong political support given to agriculture, even as older and new satellite settlements in the Riga hinterland grew. The Riga city administration responded by preparing a Large Riga regional plan in 1926. The leading planner was Lamze who was heavily influenced by English regional planning ideas. In the draft plan of 1924 the city's borders were projected as containing 718 km² in a radius of 25 km with a population of 1,500,000 inhabitants in 50 years time. By comparison, the present day Riga municipality has less than half of this area within its administrative borders. The Lamze draft plan would have created new satellite-type garden cities with a density of 70 inhabitants per hectare as far as Ropaži, Babīte, Dole and Ķekava (Lamze, 1927, 1932). Latvian planners believed that the population and economical stagnation of Riga in the interwar period was only temporary. They expected that, given its good geographical position, Riga would develop as projected by the Lamze plan (Krastiņš, 1992).

Lamze argued that these low density new suburban areas should have the same planning regulations as the central city's outer zone in order to prevent low quality growth. He also pointed out that wetlands should be exempted from suburbanization due to technical restrictions, and forests because of environmental and recreation considerations, since a "city

needs to breathe" (Lamze, 1927, 1932). Due to the active participation against the new grand plan of Riga's expansion, particularly from the Riga Suburbanites Union, the draft city plan was not adopted until 1936 when the plan projected population was reduced to a maximum of 750,000 residents, and still landowners considered such a plan too grandiose for such a small country (Krastiņš, 1992), especially one with rural ideals embedded as national ideology.

During the Soviet Period, with centralized planning codes and norms, the emphasis was shifted to concentrated urban development in both urban and rural environments, particularly since the 1960s when the new ideology was centrally approved for all-Soviet territory, although implementation differed just as the existing settlement patterns differed in various parts of the Soviet Union. In theory, Soviet planning was designed to support the development of polycentric settlements by restraining spatial development in larger centers with more than 200,000 inhabitants and by creating new satellite towns in the hinterlands of large cities. In the Riga region during the Soviet period several new satellite towns, agro-towns and villages were created or old ones were extended. These satellite settlements differed from those established during the capitalism era because they were not only places for new residences, but also where new enterprises were built in order to provide new settlers with places to work – urban types included Vangaži (building industry), Baloži (peat extraction), Olaine (chemical industry), and rural types associated with agroindustry – Salaspils (also scientific institutes), Ķekava, Valdlauči, Mārupe, Jaunmārupe, Tīraine, Ādaži, Carnikava, Ulbroka, Saurieši (also building industry), Jaunolaine, Babīte, Piņķi, Silzemnieki, Lapmežciems and others. Some of new satellite settlements were places where people were employed in the military sector, like Skulte, Kadaga, Silakrogs and Mucenieki.

During the Soviet period the Latvian planning community still was influenced by and highly valued the pre-war spatial development ideas of the garden city, and suburban style single housing despite official Soviet ideology directives from Moscow and St.Petersburg that stressed other values such as the efficient use of resources derived from living in high-rised compact urban-type settlements. Melbergs (1969, 1979) leader of the Riga master plan preparation during the Soviet period wrote academic articles stressing that Latvia had no scarcity of space since new land was created from land drained for agricultural purposes. Consequently, new dispersed houses could be built. Soviet urbanites in the high-rise prefabricated buildings were using garden allotments and second houses in Riga's hinterland and thereby increasing transport problems. He concluded that the solution was suburbanization, as Lamze originally proposed in 1920s.

A national rural discourse was still evident in the Latvian planning and geography community in spite of the official rurality discourse directives following official Soviet ideology (Tisenkopfs, 1999; Shubin, 2006) and implemented by physical planning and urban development statutory norms. Latvian national identity was identified in rural settings and a rural life style. In this way it has been continually produced and reproduced in various contexts and particularly emphasized during national awakening periods showing strong path-dependent characteristics. The discourse of seeing rurality as part of the national identity of Latvia since 1970s has since been supplemented by the environmentalist rurality discourse. In this discourse rurality is seen as a contrast to urbanity, particularly as represented by densely built parts of Riga (Grava, 1993). This discourse emphasizes quality of life values, access to nature, particularly to forest and waters, cleaner and healthier environment (air quality, light and noise). The nongovernmental groups and mass media that deliver and communicate this discourse see it as being fulfilled in an environmentally sound life style and best realised in single detached residences in the countryside where there is abundant vacant land and other nature resources; and until now travel costs, the full impacts of transportation, lack of other infrastructural investments and services, as well as the polluting aspects of intensive agriculture were not considered as obstacles in this environmentalist discourse of rurality.

The concept of rurality as the core of national identity is particularly strong – "Latvian national identity based on rural and natural symbolism" (Bunkše, 1978, 1992, 1999; Unwin 1999, 1997; Melluma, 1994; Schwartz, 2007). Individual family farms surrounded by gardens, trees and cultivated mosaic type landscapes are in the centre of this narrative of rural space. There always have been villages in Latvian rural space but these do not have such strong

notions and symbolic meaning in the national classical literature and art as do single farmsteads. This symbolic rural landscape was romanticised even further under the complicated political and socioeconomic conditions of the Soviet period, thus becoming a particular source of nostalgia for nationalist movements in the end of 1980s. For both rural and urban inhabitants the countryside is perceived as an important aspect of Latvia and a contributor to the sense of identity (Bell, et al., 2007: 360).

After fifty years (1941-1991) of the development realities during the Soviet period this symbolic rural landscape left the space of physical reality to the nether region of the mindscape, and increasingly, the gaps between the reality of rural life and Latvian national rural values become more and more apparent. With the reestablishment of national independence there was a turn towards the institutionalization of the national identity values; the rural became a part of national policies in such a way that there was an emphasis in favour of rural values where single farmsteads and scattered inhabitation of rural space was once again at the core of political decision-making.

In reality these national policies of the 1990s did not face the reality of rural spaces where large settlements had been built and inhabited as centres of socialist-type agro-industry, supported by other activities in order to diversify employment opportunities in such settlement centers. In rural spaces new and old, actors appeared having both different values and identities of place. All these diverse social actors need to be considered if a post-socialist rurality is to be created (Tisenkopfs, 1999: 427).

Latvian national policies during the last two decades with a focus on spatial outreach unites rural space in its symbolic meaning, while often avoiding the realities of rural space and how people are living there. This is particularly visible in the rural areas on the fringes of Riga, where as well as the transformation of rural space, its activities and meanings, these areas are exposed to the influence of a large urban center like Riga which continues to transform their economic base and activities by the inflow of migrants who use this former rural space as a residential area where rural plays only the role of an amenity. These formerly rural places are now often perceived as nature spaces or suburban spaces, regardless of the formal administrative or planning approaches which continue to classify these new residential villages as rural space.

Rural and urban in Riga region building and spatial policy planning context

As mentioned above, regional planning was begun by the Riga city building and planning authority in 1920s. This type of planning can be characterized as a development-led city centered view on its hinterland. It was led by Riga's planning and building authority, and highly influenced by the personalities of leading planners, although land owners of the impacted rural areas had opportunities to take part in the political discussions on the future of rural areas in proximity to the capital city.

In the early Soviet period coordinated spatial activities were focused on rebuilding areas that suffered most from the ravages of the war years. In later decades it was admitted that the self-construction activities of the population was not up to 1960 adequately controlled, although because of the low economical status of the population, as well as by the oppression of formerly wealthy and creative local population groups, such residential building activities were relatively small in volume. During the 1960s with a certain softening of the autocratic regime and efforts to modernize Soviet spatial planning, more emphasis was devoted to regional planning, particularly in resource rich areas and large metropolitan regions like Riga. Soviet planning in all of its periods was characterized by strong top-down approaches, even though just what was the top was confusing since although formally it was the Soviets, – in reality, the councils of representatives of local people as appointed by the one dominant communist party play a major role. Power was split among the communist party, leaders of the military sector, the dominant industries, as well as the executive power of larger urban settlements. There were closed room discussions among these power sectors with planners as mediators. However, the public was not involved and spatial plans and policies were a secret to most of the population.

The Riga city-region boundaries since the 1960s have been defined on the basis of research by the central physical planning and building institutes as well as by decisions of the

communist party and what programs are economical. The implementation of spatial policies were controlled and coordinated by the central government authorities. Riga as a capital city and Jūrmala as a resort town had all-Soviet Union relevance, and special directives concerning their spatial development. The Soviets treated urban localities differently from rural areas as their ideology differed towards the population involved in the agriculture, industry and services – the policies and legislation including planning and building norms were diverse, although the general principles were common. The introduction of regional planning set the policy framework over urban and rural areas within which the region was created.

In 1966 the Latvian SSR State Urban Building and Planning Institute prepared the Riga Suburban Zone Plan. The plan was adopted and later re-approved in 1972, 1976 and 1978. This plan and its later versions provided political justification for building new satellite towns around Riga. The Soviet hinterland plan was a top-down control-led plan and a way to partly ensure more equal access to the recreational and agricultural values for a large part of Latvian society while ensuring that the top down priorities of the Soviet Union, military, industrial and transportation needs were taken into account. The rural areas of the city's hinterland had been seen as providing space for agriculture and recreation, and its use were intensified – collective and state farms' centers were improved and urbanized with central utilities, single and high-rise residential buildings built, agricultural land drained and improved, coastal and spa resort areas and sanatoria intensely used, gardening associations established for urban and rural residents by subdividing land into numerous tiny lots. In 2007 Riga district planners account some 29 thousands gardening and second homes lots spread out in almost 60 areas in the administrative district. Tammaru (2001: 1346) emphasizes that people in the context of central planning tried to take advantage of both urban and rural ways of life, although the causes and pattern of suburbanization under socialism were wide-ranging, and "in the former Soviet Union, the result was the growth of more compact and often industrially based satellite towns".

Since the end of the 1980s the Soviet Union leaders began a process of democratization and openness. This process re-introduced democratic and open elections at regional and local levels, delegating more powers to these municipal-type authorities. This resulted in the diversification of spatial development policies and making them more in line with the aspirations of the local population. During this transitional period the rural idyll as a part of national identity was stressed particularly strongly. With the regaining of national independence the policy towards re-establishing pre-war agricultural production was based on the myth of economically strong farmers in scattered farmsteads. Up to 1994 urban and rural spaces had diverse policies enforced by legislation, including land ownership, restitution, privatization and spatial planning regulations separated from the formal rural and urban areas. The cities of Riga and Jūrmala during this period became equal to other districts and cities and towns as Soviet legislation making them special were abolished.

Under the Soviet settlement classification scheme there were cities, towns and villages, including urban-type villages, as intermediate forms in the urbanization of space. Under national legislation by the early 1990s local municipal councils of these urban-type villages had to decide to become either urban or rural settlements – if they were located in Riga's urban hinterland, they became purely urban (Balōži, Vangaži) or urban settlement with incorporated adjacent rural areas if located in the hinterland (Saulkrasti, Ikšķile, Ķegums, Lielvārde, Baldone), while outside Riga's hinterland there were cases where these semi-urban settlements became purely rural municipalities.

The 1994-1997 period, can be characterized with a deeper democratization and the launching of voluntary municipal cooperation. The turning point was the adoption of the Law on Self-Government (1994), which as amended, is still in the force. The law provided general principles for municipal work and the distribution of power, handed over definite rights and less clearly defined responsibilities at both the regional and local levels. This law abolished the split between rural and urban spaces in the legislative context and removed any normative particularities for a capital city. Since 1994, despite a large size and the respective political and economical power of Riga City, it was treated equally to all other local municipalities. However Latvian legislation still contains some traces of the former split in rural and urban areas in the normative documents adopted before 1994 such as the legislative documents on land reform and

environmental protection. The first version of the municipal law kept direct elections, at both local and regional municipal levels, as granted some years before. In 1994 following a newly established municipal system the first spatial planning regulations and documents were adopted by the national government, and later replaced by laws in 1998 and 2002.

Municipalities that have been more powerful and equipped with human and financial resources were among the first to prepare new spatial plans. In 1995, the cities of Riga City and Jūrmala, and then in 1997, the Riga District adopted comprehensive spatial plans within the framework of the new planning regulations, including such new requirements like public participation and open consultations with neighboring municipalities and state authorities. This was done both to solve common infrastructure problems and as a result of the advice of foreign consultants. One result was that Riga, Jūrmala, and the Riga District started to formalize their cooperation in 1994, and signed agreements in 1996-1997.

The first decade after regaining independence, rural space and values were commonly perceived as a core of national identity, and supported by the political will to focus policies on rural areas – as with the national rural development program that had been prepared and involved large national consultation and public involvement. Many measures that were proposed, or even adopted, were not implemented due to the lack of finances and more urgent needs during this transition period. This nationally important rural image and its preservation, was not transferred from the “mindscape” and “powerscape” to the “matterscape” (Jacobs, 2004). In such a political context the 1997 Riga District Spatial Plan included spatial policies to protect agricultural areas from residential development. A specific role was given to planners of the Riga District Council that had Soviet regional planning experience. A District Spatial Plan was adopted, even as the difficulties of controlling spatial development, and the opposition of local municipal councils was later to increase.

However, a variety of problems emerged such as the lack of implementation and coordination of these spatial plans among administrative levels. Also that spatial development control was in the hands of local municipalities, and that building permits were issued for former agricultural lands with land use transfer taking place in many places even while the regional plans were prescribing other spatial policies with the goal of preserving agricultural lands. Forest and areas with high amenity values were not as threatened since often these areas were preserved by nature protection and forest laws with stronger enforcement instruments.

The forwarding of spatial development activities outside capital city borders to formal rural ones was supported by the dominate belief during that time that the city of Riga's municipality was too large within the Latvian development context, and that its growth should be controlled. Another aspect that played an important role is that land restitution and privatization brought numerous new actors – land owners and users into the land development game, and that neither local or regional municipalities, or national institutions did not have the knowledge to deal with land control in such a new socio-economic context.

The period after 1997 is characterized with persistent disputes over the role of the regional municipal level. With the amendments in the municipal law, the district level direct elections were abolished as too costly activity for such small country as Latvia. As leaders of local municipalities now constituted the district council, they required amendments to the Riga District Spatial Plan, and this new amended regional plan was adopted in 2001. With these amendments some control over transfer of agricultural areas and construction in rural areas was removed. This was a period when Latvia municipal authorities for the first time were faced with opportunities by transnational activities that were perceived as providing opportunities for bringing new economical activities to the regions. Foreign consultants also were helping to integrate Latvia institutions into the European Union institutional framework, and consequently national institutions were warned against having a fragmented municipal space characterized by having numerous small players. As a result in 1997 the Riga Regional Development Council is established by the cities of Riga and Jūrmala and Riga District. Due to lack of formal national regulations for municipal collaboration a nongovernmental organization was established and registered under title “Riga Region Development Council” in 1998. In 2001 a development agency for the region was also created as a non-profit organization.

In these nongovernmental organizations all local and district municipalities, both small rural and small, and extremely large and urban are members. In 1999 other adjacent districts – Ogre, Tukums and Limbazi joined this voluntary municipal organization, and Bauska District had a cooperation agreement. As this cooperation is based on the common goal to foster the growth of the city-region, the Riga Region Development Strategy was prepared and adopted in 2000. As building activities were still at a low level in the 1990s, the local municipalities supported almost all of the proposed investments, even on former agricultural areas. Land speculation was increasing but was not visible since it took the form of land subdivision and rarely did actual construction activities take place. As agricultural land was abandoned in all parts of Latvia such visible signs of the ongoing speculation processes was not noticed in Riga's hinterland.

In the couple of years just before its accession to the European Community, the Latvian national government fostered the institutionalization of voluntary created planning regions and their administrative bodies. By the example of Riga such “planning regions – nongovernmental organizations” were also created in other parts of the country. The national government emphasized the tasks of the planning regions related to socio economic planning and coordination for the purpose of obtaining EU assistance. By the recommendations of the national government, the new planning regions were made on a voluntary basis out of local level municipal representatives while district level municipalities were neglected. For the Riga functional area the decision making body was renamed as the Riga Planning Region Development Council (2002) and its members were all local municipalities that are still today in the planning region, except for two. More applications were submitted by other distant rural municipalities as the Riga name provided the branding perceived as bringing more economical power and activities to even remote places. This pre-accession period can be characterized with a reassessing of the role of rural spaces in modern economical activities since it was recognized that farmers from Latvian rural past could not compete with the modern European agriculture industry. A narrative was begun, and spatial policies promoted to perceive the rural as a part of the national identity in order to better connect to aspects of the rural lifestyle not associated with economic policies.

In 2003 the central government intervened and stopped the voluntary process of region building by issuing national regulations on the composition of the planning regions. The main reason for this government involvement was that the form of these voluntary planning regions was not always rational. Despite the fact that debate on needed municipal reform started as early as after the regaining of independence in 1991, and that the law on the municipal reform was adopted in 1998, the political decision was reached only recently on the issue of whether district municipalities will be abolished starting in 2009. However, it is not clear yet, how the functions of the present districts will be subdivided among national, regional, and local municipal levels, particularly on how control of spatial development in both rural and urban areas will be implemented. On the local level, the task of municipal reform is to ensure an improved management structure by creating larger sized local level municipalities by amalgamating territories that are better defined, and it is expected that this will be finalized in 2009, before the coming municipal elections. In general, this amalgamation process ignores the rural and urban split – national guidelines on how to prepare the amalgamation process require an assessment of existing settlements without specifying their particularities, such as their rural or urban identity.

There are local municipalities that are not satisfied with the national government intervention into the voluntary amalgamation process, and the constitutional court processes are expected to solve these conflicts. As rural/urban has been a strong identity aspect for some of the localities in Latvia, it might be the cases that are characterized by the ongoing municipal reform's ignorance about rural-urban discrepancies that might have caused some of the conflicts between the local communities and national government. Except for Riga and Jūrmala, all other satellite towns in Riga city's hinterland are planned to be incorporated with their surrounding rural areas, and getting a new title as a reformed municipality, *novads*, in Latvian means ‘vernacular region’. After the completion of the municipal reform the title *pilsēta* meaning ‘city/town’ in Latvian officially will be used only for 9 cities – Daugavpils, Jēkabpils, Jelgava, Jūrmala, Liepāja, Rēzekne, Rīga, Valmiera and Ventspils. The implementation of the 2007

national policy of the municipal reform does not foresee any incorporation of rural areas in them. The territorial-administrative reform includes creating Ogre *novads* with almost 39,000 inhabitants in the hinterland of Riga, where an enlarged Ogre will be larger than the municipalities of Jēkabpils, Rēzekne and Valmiera, but will lose the title *pilsēta*. "Naming is power – the creative power to call something into being, to render the invisible visible, to impart a certain character to things" as Tuan (1991: pp.688) wrote, and who underlined the connection between language and place making, and also noted that only huge sociopolitical changes will "bring about a change of name". If title *pilsēta* and the size of municipality is a part of identifying spatial power, these are arguments that self-government reform in Latvia has a strong anti-urban character.

The regulations of 2003 legally defined the shape and institutions of the planning regions. The Riga Planning Region Development Council, consisting of 18 deputies is voted on in a general meeting of the chairmen of the municipalities of the Riga planning region. The members are all local municipalities although larger cities that are two-tier municipalities got more political power than other ones: Riga city is represented by 3 deputies, Jūrmala city – by 3 deputies, the rest of local municipalities by one deputy. In this way, power sharing, from the population point of view, the city Riga is extremely underpowered. Then the planning regions' development agency changed its status and became a foundation. In 2004 the Riga planning region opened an office in Brussels and commenced its work to attract EU funding. In 2005, for the same reason, the new Riga Planning Regional Development Program 2005-2011 was adopted.

As the economical situation improved, the municipal competition became more visible. With the EU accession, funding for building became available and properties values increased, as for instance, flats in prefabricated multi-story residential houses in Riga suburbs prices increased by an average of 40 percent per year, from 2000 to 2006 (Beņkovska, 2008). The new member states' farmers are now receiving European subsidies, although not on full level; the agriculture is still declining, as negative aspects are still substantial – national agricultural products have difficulty in reaching attractive foreign markets. This created the perception that agricultural land is worthless, and should be converted to other more profitable, particularly to residential areas, since such a change would not be in conflict with the rural environmentalist discourse.

Rural and urban dimensions of Riga's hinterland in spatial plans

Policies supporting suburbanization are legitimized in local municipal comprehensive spatial plans in Riga's hinterland, although as explained above there are different models on how local municipalities coped with the spatial aspects of population growth. Riga's planners and politicians recognized that there exists the perception in Latvia that the capital city is too large and powerful, and that it does not need support at the national level. Riga's politicians and executive authorities argued that this perception is harming the development prospects of the urban territory where almost a half of Latvian population lives.

The Riga City Council adopted a new comprehensive spatial plan in 2007 that contains incentives to concentrate residential areas within the city municipality boundaries. Under this plan certain areas were designated for single family housing building in order to keep up with the competition with urban fringe rural municipalities who by releasing agricultural land for residential development, each year attracted more migrants from Riga. The Riga City Spatial Plan ignores any notion of rural – both 1) inside the boundaries of the city – even as there are still vast un-built and not-forested areas that need to be managed, and 2) outside the city boundaries, even as common interest areas list nature protection, and a wide spectrum of infrastructure needs. The Latvian national planning legislation requires municipalities who are planning their development to identify the common interest areas with adjacent municipalities. The Riga City Spatial Plan of 2007 includes a section on Riga city's border, and proposals for possible changes. The explanation part of the comprehensive plan contains such arguments as the importance of Riga functional area and the fact that, of the taxes paid by the employers located within the urban borders, less than 60 percent stayed in the municipality of Riga, since a population income tax follows the employees to their registered place of residence. This

planning document states that one of the reasons why suburbanization started so intensively in Riga's hinterland is that the capital city had stronger planning and building control that exceeds the regulations in the adjacent rural areas, since these rural areas only obtained their planning rights and building controls very recently – only a decade ago.

In the comprehensive plan it is emphasized that even Riga's politicians are actively reconsidering administrative boundary changes of their municipality. There also have been also publications in the national daily press on this issue. Riga politicians and authorities pledged to improve the urban morphology within the city borders by releasing new areas for housing, both high-rise and single family, and to use existing land in more rational manner – such that brownfield developments will be supported. There is an argument that the territorial expansion of the Riga municipality would not bring expected results as more investments would be needed to develop these new incorporated territories equally to other parts of the city. There also would be a certain price of such expansion, since adjacent municipalities would be expecting compensation for the loss of their territory. The spatial plan is promoting municipal cooperation over municipal boundaries. In the graphical material of the comprehensive plan, such common interest territories are mentioned as: landfill site Getliņi, expansion of cemetery Jaunciems, noise zone of airport Riga (that is located in Mārupe rural municipality), forest owned by Riga city outside its boundaries, the management of Piejūra coastal nature park (partly located in the city Riga), the development of river transport, railway passenger carriages, main transport roads and arrangements, drinking water intake places and the sanitary state of water catchments basins that are connected to Riga, as well as a five hundred meters zone on both sides of Riga and an adjacent municipalities boundary where all objects to be built would be settled by mutual understanding. Some cases are listed in which a city boundary shift would be acceptable, although only if an assessment of the economical benefits of possible annexation is prepared. These cases are expansion areas for cemeteries and new and existing infrastructure objects, as well where improved boundary alignment between municipalities can be reached in cases where it goes through a shared street. Consequently, there exist measures to coordinate spatial development with adjacent areas, though it is also quite selective as to where and how. These are different from aspects that once used to be coordinated within the framework of Soviet regional planning. Currently such issues as the location of recreational areas including second homes and garden associations, industry and residential areas as well as rural areas are not included in the list of common interest areas and aspects between the city of Riga and adjacent municipalities.

For Riga's city government, value is not attached to the open rural space located on the fringe of the city, where until recently agricultural activities took place. This approach is in contrast to general public attitude towards Riga's hinterland as a high quality food production space that was already developed in the Soviet period by creating brand name food such as Ādaži, Mārupe, Ķekava, Carnikava and others as an indication of high quality food, not only for the region, but for Latvia as a whole. Good example was the case with A/S Latfood Ādaži potato chips factory owned by Chips Apb that after it burned down in 2005, due to the extreme brand popularity, the foreign owners of the plant promised Latvian costumers that the factory will be rebuilt in Ādaži, and during the construction period the potato chips will be produced in Scandinavia plants from Ādaži potatoes.

Recent regional plans – the Riga Planning Region Spatial Development Plan, adopted in 2007, and the Riga District Spatial Plan, adopted in 2008, contain more specific policies towards agricultural areas on the fringe of Riga, however both plans have a weak juridical basis, and authorities do not have sufficient human and financial capacity to follow up and control implementation of these plans. The Riga Planning Region Spatial Development Plan foresees a Riga green ring for recreation and nature protection purposes, and a seaside urban, recreation and nature protection belt, as well as areas with rural as the top priority. This spatial plan is more control oriented but with a weak juridical status, and too general for successful implementation. The Riga District Spatial Plan lists not only nature protection and infrastructure issues but also adds tourism aspects as a basis for cooperating with the city of Riga. Both levels of the regional spatial plans for the Riga area have policies for open space, and that is a new term being now used for formal rural areas. Depending on the distance from both Riga and the

Baltic Sea Coast, the guidelines for permitted spatial development are partly gradually changing, partly fragmented due to "frozen areas" from the development point of view – forest areas, water areas and nature protection areas. In the regional plans 'rural' is perceived as space with diverse activities starting with future urbanization with high rise buildings to strict nature conservation areas.

The Riga Planning Region Spatial Development Plan recommendations for the urban fringe include proposals for spatial development measures such as the inclusion in the local plans areas for the needs of national, Riga and its region and particularly for waste and water, energy and transport infrastructure, logistics and storage facilities, recreation, resorts and other areas relevant to safeguard the quality of life in Riga and the suburban zone. Open, not built up areas, between forested areas, are mentioned in these regional plans while rural activities are not mentioned – so it difficult to imagine in which way these areas will be kept open. The regional spatial plan suggest that new offices, industrial sites and residential housing have to be built by using existing technical and environmental infrastructure and structures. Another policy emphasizes that sprawling type settlements – residential villages or single industrial plants are not permitted, and existing villages have to be provided with adequate infrastructure, services, employment places and recreational possibilities by foreseeing relevant measures in spatial plans. As the regional spatial policy does not define what is meant by sprawling, it is not expected that such guidelines will have any real impact on the policies of local municipalities. Some other measures are mentioned, such as preventing creation of linear type of settlements along major roads, to prevent conversion from seasonal to yearly residents in the former garden associations without detail planning, and constructing an adequate road network and energy and water infrastructure. The policy towards the creation of new farmsteads are stated clearly – that these need to have more than 4 ha of agricultural land and that such are not permitted in forest lands – however the policy towards existing farmsteads – on their size and connection with agricultural activity – is lacking.

The Riga District Spatial Plan (2008) follows and specifies the policies of the regional planning spatial development plan. The term rural is substituted with the term open space, and it is divided between suburban (in Latvian – *Pierīga* – which means 'adjacent to Riga') and other open space. Adjacent areas to city border are fragmented in 1) urban development area, where not only formal urban, but also formal rural settlements are included; 2) nature protection and recreation area and 3) coastal urban, recreational and environmental protection area and 4) coastal environmental protection and tourism area. Other open spaces of the Riga District include the coastal protection area with various conservation regimes, tourism development area in traditionally rural areas and in national parks, nature protection areas, Riga city green belt's environmental protection and recreation areas, industrial and transport and logistics areas and agriculture development areas. For instance, areas with rural as spatial policy priority are delimited further from Riga's border, that are on better quality soils. Both newly adopted regional levels and spatial plans of the Riga region reviewed the state of the development of urban and rural settlements in the descriptive part of the documents, however policies towards housing control are left to the local municipalities' detailed and comprehensive plans. From an examination of some of the spatial comprehensive plans of the rural local municipalities, it seems that they also are not sure how to perceive densely built up villages in close proximity to the border of Riga – their spatial plans described these as urbanized areas, although their spatial policies directives are such that they would equally apply to rural places – the place identity gap can be detected by studying these spatial policy documents.

Concluding remarks

The dominant role of Riga in the Latvian urban system and the specific role of rural areas perceived as a part of national identity have played an important role in national, regional and local policies. In spatial development policies, the planning region building process and governance and its implementation of municipal reform anti-urban values have dominated since the 1990s. Despite an anti-urban attitude in the formal political discourses, at local the level the remaining rural space has weak instruments against land speculation, subdivision of land and unplanned urbanization of the city's hinterlands, as well as the well known food branding of

Riga's adjacent rural areas area, are not seen as values that have to be connected with the agricultural land use of these municipalities. As the power to control spatial development is in the hands of local municipalities – the implementation of recently adopted regional level plans will depend on local level politicians and municipal professionals and their consultants, as well as the higher level planning authority that will control the performance of the local level.

Processes and implications of identity change on the rural-urban interface are well discussed by scholars. However, the emphasis and studies focus on countries in the developed and developing world more than on the post-socialist countries. There is a range of studies that reveal identity change within populations, taking account of their racial, ethnic and class separation in urban, suburban and rural settings (Márquez and Pérez 2008; Martin, 2005). There is also a range of studies devoted to aspects of land value (Mori, 1998) or agriculture production value (Houston, 2005; Gibson, et al., 2005) change. Comprehensive studies that cover various aspects of the transformations from rural to urban space includes aspects of place identity change from rural to urban in the hinterland of large city (Cadieux, 2008; Busck, et al., 2008; Qviström and Saltzman, 2006; Gallent, et al., 2006; Ryan, 2006; Bossuet, 2006; Mariola, 2005; Henderson, 2005; Duncan and Duncan, 2004; Ihlanfeldt, 2004; Corsini, 2004; Westphal, 2001; Daniels, 1999; Spaling and Wood, 1998; Essex and Brown, 1997; Lucy and Phillips, 1997; Bunce, 1994; Sullivan, 1994; Bryant, et al., 1982; Payne, 1963).

Even while researches acknowledge that the change of meaning (Herrschel, 1999) and identity of places (Kuus, 2007; Young, 1999) are so visible in post-socialism countries due to complexities of the transformation, such studies are scarce. The suburbanization process in Central and Eastern Europe is studied more often from a population movement point of view (Boren and Gentile, 2007; Ourdníček, 2007; Kontuly and Tammaru, 2006; Tammaru, 2005) with little reference to a change of place identity, and how it is affected by the changed institutional and planning conditions after 1991. There is a need for more insights from research and studies on post-socialist rural areas within the urban hinterland of large cities.

The review of local spatial plans demonstrated that rural municipalities on the urban fringe of Riga are facing challenges related to identity change. This is most visible in the larger settlements – formal villages that in many cases, as evident from statistics and field studies, resemble other small satellite towns, or if in close proximity to the urban boundary constitute the continuous built-up parts of the Riga functional area. In some cases these are not new phenomena as has already been noted by other Latvian geographers (Turlajs and Milliņš, 1998).

It is up to the local municipalities to recognize that some of rural settlements are now densely built-up and extend over large area, that the economy and the employment of their inhabitants has changed that as well as that the associated place identity has gone from rural to urban. There is a need for discussion and debate about what kind of social, spatial and technical transfers are needed to strengthen the changed status, or conversely to consider what parts of the remaining rural landscape that is left should be preserved.

Future studies should try and find out if local people perceive their places as rural or urban; what these places signify for them; and what attitudes they have toward these settlements that are in transition and in the process of changing their place identity. There also needs to be a focus on how a central city's inhabitants use the city's hinterlands space, including its environmental, economical, transportation and recreational space, especially since Riga and its hinterlands constitute an area that a long time ago recognised its existence in an interlinked space. In such a way the gap between "mindscape", "powerscape" and "matterscape" might be diminished.

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Commuting and the Deconcentration of the Post-Socialist Urban Population: The Case of the Rīga Agglomeration

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Abstract

Socioeconomic and administrative processes over the course of time have affected population mobility. The author's aim is to analyse aspects of the process of urbanisation in the Rīga agglomeration and the elements of commuting which have to do with these aspects. A substantial part of the paper is devoted to a study of how the circumstances of an agglomeration's development emerge under the centralised planning of a Socialist system, examining ways in which populated areas develop along with the processes of suburbanisation, and also comparing available data about commuting flows during various periods in time.

Keywords: Commuting, urbanisation, Rīga agglomeration, post-Socialist.

Introduction

Modern-day society is characterised by increased mobility. The everyday movement of local residents reflects not just the specifics of how the population structure of specific territories has been established, but the level of economic advantages and the development of social and transport infrastructure, as well as links which exist among units in the relevant space. These functional links help to describe people's everyday activities in the space. The diversity, intensity and nature of such links, demonstrate the extent to which local residents seek opportunities related to work, education, services, social contents, entertainment, etc.

The mobility of individuals is linked to developmental trends in cities and their urban regions. Manifestations of urbanisation have a key effect on the scope, directions and motivations for population mobility. That is why migration and commuting are often used to describe elements of urban development.

There has been comparatively little research in Latvia into the various manifestations of the process of suburbanisation. Research work has primarily been focused on the spatial structure and boundaries of the Rīga agglomeration, and this has primarily been done in support of planning needs and in the context of population mobility (see work on the agglomeration conducted by Bauls and Krišjāne). It is particularly important to focus on research into commuting, particularly work-related commuting, which began in the 1970s [Bauls 1973, 1979, 1984]. Commuting and particularly work-related commuting is an indicator that is used to describe links and movement, as well as processes of population concentration and deconcentration in an agglomeration. Their intensity and volumes are often one of the criteria in specifying the delimitation of an agglomeration. Research often suggests that everyday mobility characterises the dynamic nature, complexity and mutability of the territory of an agglomeration, as well as the related processes of transformation. Changes in the Rīga agglomeration which have occurred over the last 15 years have had to do with the process of suburbanisation and the relevant spatial distribution of the population.

The primate urban region in Latvia's settlement system is the capital city of Rīga, and its agglomeration. There are the greatest flows of commuting in Latvia. These flows are closely linked to the placement of people's homes and places of employment, and this is exacerbated by the monocentric nature of the settlement system [Krišjāne 1999]. There is distinct population concentration in the territory, with substantial density in the economic, governance, service-related, transport and social infrastructure. This very clearly differentiates this region from the rest of the country's territory. Social, economic and political processes in such a situation are far more complicated and diverse in their spatial arrangement. People in such territories far more quickly adapt to new socioeconomic circumstances, and they create new and ever new requirements for the quality of life. This, in turn, has a favourable effect on the development of human capital. Another issue that has been addressed in research is the comparison between the agglomeration and the rest of the country's territory, focusing in particular on increasing spatial differences of socio-economic

development. This paper, however, particularly stresses the spatial development of the agglomeration of Rīga and the geographic changes that have occurred in the context of commuting.

The author's aim is to analyse aspects of the process of urbanisation in the Rīga metropolitan area and the elements of commuting which have to do with these aspects. A substantial part of the paper is devoted to a study of how the circumstances of an agglomeration's development emerge under the centralised planning of a Socialist system, examining ways in which populated areas develop along with the processes of suburbanisation, and also comparing available data about commuting flows during various periods in time.

The primary geographic concepts of population concentration and deconcentration

A study of how urban agglomerations emerge is closely linked to the regularities of how settlement systems develop. Here we are referring to geographic concepts such as the placement theory and the hierarchical structure of population centres [Christaller 1966; Bourne and Simmons 1978]. Of key importance in these theories is the spatial arrangement and placement of social and economic activities, along with regionalisation, agglomeration and polarisation [Boudeville 1967; Richardson 1973]. Densely populated territories with a high level of urbanisation, just like agglomerations, are characterised by a concentration of all types of economic and social activities, a high level of organisation in societies, and higher income among local residents [Reissman 1964; Villa-Suarez 1988; Morrill 1992]. The linkage between the various aspects of human activity and the intensity thereof in a specific territory on the one hand, and elements of a settlement system on the other means that agglomerations must be seen as a regional set of several functional elements [Philbrick 1957]. In the literature, such urban agglomerations are described as organised functional spaces which are represented at various levels of residential activity. This depends on the territory's functional, economic, cultural, political and other scope [Friedmann 1972; Karlson and Olsson 2006]. An important element in this agglomeration is the concentration, confluence and interaction of these various activities, thus expanding the area of attraction and influence and ensuring that certain territories have primacy [Richardson 1973]. As a result of this, if we take into account the factors of social, economic and governance placement and cope in specific structures of territorial population, we can study the agglomeration on the basis of the model of the centre and the periphery [Friedmann 1972]. The spatial framework in this concept of the centre and the periphery can be brought together with the functionality of the urban space not only to supplement one another, but also to help in explaining the migration processes and social and economic aspects thereof in densely populated urban regions [Perroux 1950; Prothero 1988; Castells 1996]. Often such functional regions expand beyond administrative boundaries. The theoretical positions that are reviewed here explain urban agglomerations as a specific form of settlement systems, one which brings together a series of economic activities, social opportunities and governance functions [Ciccone and Hall 1996]. When studying settlement systems at the level of an agglomeration, the urban life-cycle model is widely used and very appropriate [van den Berg et al. 1982]. The application of this model does not depend on a socioeconomic or political context, which can influence the chronological sequence of phases in the development of the agglomeration, but not the processes as such. The life-cycle model makes it possible to analyse the development of one Functional Urban Region (FUR) over the course of time. According to the aforementioned basic principles of agglomeration, a FUR is made up of a centre, or the core city of the agglomeration, and commuting hinterland or rings. According to the life-cycle model, the stages of development in the core city are the following: urbanisation, suburbanisation, de-urbanisation and re-urbanisation. The dynamics of this development, in turn, are influenced by three important actors – government institutions, companies, and families or households [van den Berg et al. 1982: 8-23]. Each stage of development is dictated by certain economic and social changes, starting with industrialisation and ending with the emergence of the information and communications sector [van den Berg 1993]. The oscillations of concentration and deconcentration that have been observed in populations since the latter half of the 20th century have been the result of migration between different settlement levels, and this is described as the concept of differential urbanisation. Here, stages of urbanisation are reviewed in a wider aspect than just that of the model of urban life-cycles [Geyer and Kontuly 1993]. In characterising differential stages of urbanisation and of urban life-cycles, it must be concluded that the most important changes in settlement system relate precisely to the processes of deconcentration. These are characterised by a series of theoretical

concepts such as suburbanisation, counter-urbanisation, specification of the peri-urban space, the development of edge cities, etc. [Garreau 1991; Fisher 2003; Champion and Hugo (eds.) 2004; Mitchell 2004]. Since the mid-20th century, there have been radical changes in the placement of populations, with people leaving major cities and densely populated territories in favour of rural areas and small towns [Fuguitt and Zuiches 1975; Gibbs 1963; Beale 1975; Berry 1976; Vining and Strauss 1977]. The main reason for this movement was that the better situated segment of society no longer wanted to live in densely populated territories where there were unfavourable environments and overburdened infrastructures. They chose to move outside of core cities. Places of employment remained in the core, however, and this facilitated the emergence of major processes of commuting. The diffusion of residents from the core city led to an increase in population numbers in nearby towns, satellites and rural areas, because these settlements were more closely linked to the core of the agglomeration. Later the flow of deconcentration also led people to more distant peri-urban small towns and rural centres [Gordon 1979]. This is an interesting aspect of empirical research, because the more visible manifestations of population deconcentration have to do with processes such as housing suburbanisation in "field settlements" (previously undeveloped) territories in the proximity of the core city. It must also be remembered here that the deconcentration of homes later is accompanied by a deconcentration of economic activities (mostly retail centres, warehouses etc.). Taken together, these factors have a substantial influence on the quality of life of people who live outside of core city in the territory of the agglomeration. There are three dimensions to this influence – the economic, social and environmental dimension. The economic dimension refers to the availability of jobs and services, infrastructure and transport costs, as well as taxes [Cervero 1989, 1996; Cervero and Kang-Li Wu 1997]. The social dimension is characterised by the availability and convenience of the aforementioned economic elements [Van Ham et al. 2001]. The indicators of environmental quality of life have to do with the public space, as well as the level of pollution [Davis 1993]. The individual factors of each resident will determine motivations for mobility. These are rooted in everyday life circumstances and socioeconomic relationships. Furthermore, the aforementioned dimensions are of fundamental importance at the individual level, both individually and in combination. The further development of transport infrastructures, information and communications technologies, and free time and leisure opportunities in the 21st century will improve everyday urban systems. This will mean an increasing diversification in the mobility of residents and in the relevant settlement structures.

However, researchers argue that the dynamics of the differential stages of urbanisation exist irrespective of the political or socio-economic background [see Enyedi 1992]. Specialists today do not continue the once extensive scholarly debate about the stages of urbanisation under the circumstances of centralised Socialist planning and of a free market economy [Lewis and Rowland 1979; Szelenyi 1996]. There are some important aspects in the development of urbanisation under socialist system. These are discussed in greater detail in the next chapter of the paper.

Characteristics of urbanisation in a Socialist system

In Socialist countries, there were efforts to regulate the development of cities by introducing centralised planning in all sectors. The primary emphasis was on the placement of industrial sectors and enterprises, and it was stressed that this was the primary prerequisite for economic growth and public welfare [Lewis and Rowland 1979; Szelenyi 1996; Sailer-Fliege 1999; Fuchs and Demko 1978]. Forced industrialisation facilitated the growth of major cities, and that is why the Soviet Union was often known as a country of large cities [Harris 1970]. Until the 1960s, the development of the settlement system in Socialist countries took place in a more or less accidental way. That is because during the initial period of establishing Socialism, rulers had little time to establish strategies concerning urban planning. The main thing was to establish a centralised and hierarchic administrative system, as well as to pursue rapid and mass industrialisation [Enyedi 1987]. The first development of strategies for urban development began in Socialist countries in the 1960s. Essentially, this process conformed to the central place theory that was developed by Christaller. Centres of different levels were identified, as were their surrounding areas. There were proposals to limit the growth of large cities by promoting decentralisation in industry. For the first time emerged suburban settlements as transitional semi-urban settlement type. Here it has to be said, however, that the decentralisation of industry in the different Central Eastern Europe (CEE) countries occurred at

different periods of time. It began as early as in the 1930s in the USSR [Musil 2005]. The re-localisation of industry favoured lower settlement levels – small and medium towns, as well as semi-urban townlets [Wegner and Drury 2001]. In 1956, the Soviet government approved a resolution which said that the construction of new industrial enterprises and the enlargement of existing ones would be limited in 48 major cities, including Rīga [Chorev 1975]. In Rīga, these limitations were not fully observed, however, and the city continued to develop, with increased population numbers as a result of migration [Eglīte 2002; Krišjāne 2008]. In later years, there were efforts to expand the limitations with respect to educational and scientific institutions, too. Essentially these administrative regulations affected migration flows, ensuring a process of under-urbanisation that is typical only in the settlement systems of post-Socialist countries [Sjoberg 1992; Szelenyi 1996]. Under-urbanisation is typified by the incommensurate development of industry in cities. Inappropriate distribution of investments facilitated only industrial development, but not improvements to the urban environment or the development of acceptable living and service infrastructures. Furthermore, industrial development was based on an increase in invested resources, not by enhanced productivity. Thus there were various extra-urban settlements which sprang up in the settlement system alongside large cities [Konrad and Szelenyi, 1974]. It has to be noted that the limitations on urban growth did not apply to cities that were closed for military purposes. That is the subject for a different study. Efforts to regulate urban development influenced the aforementioned stages of urbanisation. For the most part, there were certain delays, as well as difficulties in evaluating the true scope of urbanisation. There were also significant transformations in rural and urban settlement [Nefedova and Treivish 2003; Tammaru 2003; Tosics 2004]. Despite the strict institutional foundations for urban planning (i.e., the influence of government institutions), the fact is that ministries governing certain industrial sectors, as well as companies within those sectors, were awarded substantial economic advantages [Kornai 1992]. Under the typical Socialist situation in which goods and services went missing, "priority economic sectors" did far better than others [Sjoberg 1999; Gentile 2004]. Industrial companies which were at a higher level of priority (i.e., the so-called "all-Soviet" companies) had more flexible budgets. They could provide employees with better housing and social infrastructures. Thus it was that factors typical of the market economy were in place under the centralised system of a planned economy – larger and better homes, better placement, etc. This was a violation of the Soviet policies of economic and territorial placement [Shaw 1985; Golubchikov 2004]. The shortage economy that was typical of the Socialist system was essentially regulated by limited migration into large cities, as well as by the distribution of the labour force among industrial sectors. This allowed local residents to avoid limitations by taking advantage of the system's loopholes. Massive industry requires masses of workers, and this means ongoing labour deficits [Kornai 1992]. People had no problem in joining the labour market in those sectors in which better and larger homes were available [Konrad and Szelenyi 1974]. The system of registering people's places of residence characterised the right to live in a specific home, as opposed to any true movement among regions and countries. Under a situation of housing shortage, this fact could be put to use in registering a relative in a home who had never, in fact, lived there, because that reduced the floor space per resident, and then the family could join the queue for better housing. A similar situation existed among those who were living in dormitory conditions in Rīga – after 10 years, they had the right to receive a separate flat [Eglīte 2002: 98]. The system of registration (internal passport registration system – *propiska* in Russian) in the Soviet Union was a far more effective way of regulating migration than any administrative limitations would have been, because the system influenced social guarantees and the distribution of housing among towns and cities [Buckley 1995]. In her work, Cynthia Buckley has described regulations of migration processes under the circumstances of centralised Socialist planning "a myth." Referring to the urban life-cycle theory of van den Berg (1993), the choice of housing in a market economy encourages population deconcentration. In a Socialist system, by contrast, the choice of housing often was linked to a job in a specific area of industry.

In the context of further development of urbanisation processes, it has to be said that literature related to Soviet urban planning in the mid-1970s focused on the utility of administrative limitations on growth in big cities. The first excuse for the limitations was ideological in nature. Soviet man, according to this thought, did not deserve to live in areas that had emerged as the result of processes of suburbanisation, because this was something which reflected the planning failures of cities in capitalist countries. Moreover, increased welfare among the soviet people meant that people had to

be kept from building homes in the green recreation zones which existed on the edges of cities [Chorev, 1975]. This, it has to be said, had little effect on the development of suburbanisation processes in the under-urbanisation form. There were different characteristics and forms of migration than those that were seen in the West, however. Changes in institutional attitudes vis-à-vis settlement planning in the 1970s could be attributed to a regional development theory in the context of geography and urban construction. Regional planning was subordinated to the interests of the centralised economy, and this market out the concept of the equal development of regions that was part of the Soviet system – a concept which at that time was also being developed in Western countries [Tosics 2005; Vanagas et al. 2002]. Thus it was recommended that the inefficiencies of administrative regulations be reversed by implementing resources of economic influence: (1) Increasing labour productivity, not the size of the labour force; (2) Establishing branches for industrial companies in more peripheral settlement areas, supplementing this with institutions for professional training in those areas; (3) Promoting the conclusion of short-term labour contracts in priority industrial sectors, housing the workers in dormitories built by the relevant companies; (4) Monitoring the demographic structure of urban residents, using migration to regulate the composition of population in cities, where demographic habits were such that population aging was the result; (5) Liberalising the housing registration system, allowing people to maintain their registration even if they actually left the city [Chorev 1975]. Most of these theoretical ideas were never implemented, because practice was based on administrative regulations, job-creating capital investments, and extensive growth [Fuchs and Demko, 1978].

The theory of agglomeration and the related pattern of commuting

Urbanisation and industrialisation, along with flows of migration in the direction of cities – this ensured growth in large cities and their agglomerations [Geyer and Kontuly 1993]. Different levels of income in rural areas and cities have often been reviewed as the determinant factor for population migration toward urban areas. The nature of deconcentration, in turn, meant a flow of migration in the opposite direction, and new signs of overall population mobility [Zelinsky 1971]. From the perspective of the theory of regional economics, the development of urban agglomerations is usually explained on the basis of two different approaches [Krugman 1999]. The first refers to obvious development that is facilitated by obvious geographic placement or “natural advantage”. Krugman (1993) referred to this as the “first nature of agglomeration.” The approach of the second nature, in turn, emphasises the interaction among economic agents which shape the agglomeration as the determinant factor in development, fully separating it from any advantages that are created by circumstances of a physical nature [Krugman 1999]. Of course, a review of the development of specific agglomerations over the course of time will show that both approaches to agglomeration are at their foundation [Roos 2005].

The approach of New Economic Geography, in turn, defines the level of development in agglomerations by using economic agents such as the development of labour markets, specialisation in manufacturing, the nature of consumption, and the dissemination of knowledge, communications and information [Richardson 1995; Fujita et al. 1999]. These processes and indicators mainly characterise population concentration. The main reasons for the development of processes of suburbanisation and counter-urbanisation, by contrast, have to do with the aforementioned environmental circumstances, housing and changes in lifestyle [Champion 2001]. Where industrial development at one time was determinant in economics, the human factor is becoming increasingly important now [Gore 1984]. From this perspective, overall mobility and the development of urbanisation require a review of important concepts such as productionism and environmentalism [Hart 1983]. At the stage of urbanisation and concentration, the dominant factor in choosing to live in a city is productionism. In the stage of counter-urbanisation, the approach of environmentalism dominates instead.

Scientific research in recent times has confirmed the increasingly important role which higher-level centres play in the hierarchy of settlements. Agglomerations, as the highest level of settlement are characterised by the increased, flow, speed and availability of people, goods and services [Gordon et al. 1991; Castells 1996]. In order to explain these processes in agglomerations, specialists speak to the flow of movement among local residents, clearly identifying commuting rings as the most dynamic settlement areas [Herrington 1984; Errington 1994; Saraceno 1994]. The nature of

commuting best reflects the changes that are occurring in an agglomeration, because it is most closely linked to the aforementioned actors in terms of places where people live and work. The development of a good communications infrastructure unquestionably facilitates increasing public mobility, and that, in turn, has an effect on the nature of migration. It is also reflected in the settlement structure of the agglomeration [Geyer 2002]. This can reduce the physical movement of local residents as a result of further developments in communications and other technologies. It can also, however, facilitate diffusion of residents outside of traditional areas of deconcentration in the suburban zone, increasingly expanding the FURs. The development of migration processes and settlement structures today are not longer as unambiguous as was the case in the 20th century. The universal shifting of residents that was typical of the industrial age, as defined by Ravenstein [Plane et al. 2005] is no longer in place. Increasing population mobility today is based on where people work and spend time, and these locations are far more dynamic and flexible. They are more easily adapted to shifting economic and social circumstances.

Data and methods

A range of different sources related to commuting in Latvia and in the Rīga agglomeration (RAGL) has been used to describe processes of population concentration and deconcentration in this paper. The data extraction methodologies have different over the course of time, but information about the volumes, directions and intensity of migration flows reflects processes that were typical in Socialist and post-Socialist agglomerations. They also point to trends in this area. It has to be noted that since the 1970s, when the RAGL first emerged, the agglomeration has changed, and it has never existed as an administrative or statistical unit. For that reason, there are many cases in which statistical data about housing, social and economic indicators are based on administrative territorial statistical units. Some part (mainly internal zone of the RAGL) lies within statistical region of the Rīga metropolitan area (*Pierīga in Latvian*) as such (city of Jūrmala, Rīga, Ogre, Limbaži and Tukums district).

Data about migration volumes and directions in the Soviet period come from studies that were conducted in this regard in 1978, 1981 and 1991 by the Central Statistical Board (known as the State Statistical Committee in Soviet times).

Since the restoration of independence, statistical data about migration have not been collected with as much detail as was the case in previous years. The data sources which can be used to describe migration processes today are the following:

- Studies conducted by the Department of Human Geography of the University of Latvia in the area of population mobility;
- A 2004 study on the delimitation of the boundaries of the Rīga agglomeration. The mobility processes which are occurring in the agglomeration today will be described on the basis of spatial division of the RAGL described by this study;
- A study called “The Geographic Mobility of the Labour Force,” which was commissioned by the Latvian Ministry of Welfare under the auspices of the European Union Structural Fund programme “Labour Force Research” (Study No. VPD1/ESF/NVA/04/NP/3.1.5.1/0003);
- Central Statistical Bureau of Latvia (CSB) Labour Force Surveys (LFS) about Latvian residents of working age who live in one place and work in another – these have been conducted since 2002.

The results of the study called “The Geographic Mobility of the Labour force” were used to describe commuting processes. The 2006 study involved a survey of 8,005 respondents in Latvia who were aged 15 to 65. This cohort offered representative data not just about Latvia as such, but also about each of its regions, as well as about the Rīga agglomeration [Krišjāne et al. 2007]. According to the methodology of this study there were 874 daily commuters among respondents. These are persons whose jobs are located in different territorial unit as place of residence (other neighbourhood within Rīga city or/and different municipality). These data allow us to present a detailed description of commuters and their motivations.

Shape of the Rīga agglomeration

Rīga has emerged as a major centre for economic activity over the course of a long period of time. Its size and its dominant economic role in a widespread part of Latvia have, both directly and indirectly, influenced the development of settlements, as well as the placement, movement and economic and functional interaction of local residents.

In 1966, the Rīga Suburban Zone Plan identified the territory of the Rīga agglomeration as a unit for research and planning. A substantially expanded suburban zone was merged into the agglomeration – the towns of Jelgava, Jūrmala and several other larger settled areas. A study of the functions of these various places made it possible to conduct functional zoning of the agglomeration's territory. In the 1980s, a new regional planning project was launched in Rīga, as was a project related to the settlement system in Rīga [Bauls et al. 1996; Kūle 2008].

The Rīga agglomeration was defined as "the area which is adjacent" to Rīga city at a radius of 60 to 70 kilometres. It includes both urban and rural areas, and these are linked by intensive reciprocal migration. Together with the core city, these areas establish a unified and local-level functional and spatial system. The functional region supports the functioning of the capital city, but it also takes advantage of the proximity of the capital city and its economic potential to deal with the problems of the broader area. The entire territory of the agglomeration, there, takes on the characteristics of the capital city.

Criteria for the delimitation of the boundaries of the Rīga agglomeration particularly focused on the intensity of labour migration, finding that its maximal indicators were found at a radius of 50 to 60 km, with travel times of up to 1.5 hours. The intensity and directions of labour commuting will largely be determined by the direction of transport links and the availability of public transportation services. "Support" points for the agglomeration include transport networks and the final destinations of the electric suburban train – Tukums, Jelgava, Lielvārde and Saulkrasti. Beyond the boundaries of this functional region, the intensity of labour migration declines rapidly. There is a bit of labour commuting in the other parts of the agglomeration territory (inter-highway sectors), which means that the territories which are alongside highways are unquestionably a part of the agglomeration [Bauls et al. 1996].

Rīga, as the primate city, has determined the functional structure of other cities in the agglomeration. Industrial objects which required links to companies in Rīga were established in the city's immediate surroundings. Until 1991, the Rīga agglomeration was home to sectors and companies which used imported raw materials and then sold their output in parts of the Soviet Union outside of Latvia.

All Soviet-era plans spoke to limitations on the development of Rīga, but Rīga developed and grew anyway. New companies emerged in response to new demands in science and technology. At the same time, however, Rīga did not get rid of those companies which were not typical of a proper capital city.

Analysis of the way in which the RAGL has developed shows that actual development trends were quite different from the planned trends, because limiting the city's development in administrative terms did not yield the expected results. Rīga did not do enough to get rid of out-of-date industries or to develop new and progressive sectors. Early in the 1980s, the Rīga agglomeration produced 67.3% of industrial output in Soviet Latvia, and it employed 67.1% of industrial workers, but much of this was concentrated in the city itself (52.4% and 54.5% respectively).

The main centres of the RAGL – Rīga and Jelgava – had a polyfunctional structure. Ogre and Tukums also tended to have the same type of structure. In terms of certain sectors Olaine, Vangaži, Kalnciems, Baloži and Ķegums (see Figure 1), by contrast were narrowly specialised and monofunctional centres.

Detailed analysis of the functional structure of cities in the 1980s shows that during the preceding two decades, there was a very intensive placement of branches of Rīga companies in other parts of the agglomeration's territory. This helped small towns to develop their urban foundations, and it also facilitated industrial, labour and other types of contacts with Rīga. During the 1980s, the cities in the agglomeration developed not just industrial functions, but also support functions such as science and education.

A study of the Rīga agglomeration in 1981 confirmed a generally accepted criterion – that the agglomeration was made up of a zone that stretched between 50 and 60 kilometres from the city itself

(LatNIIstroitelstva 1981). Commuting volumes and dynamics confirmed the hypothesis that the agglomeration stretched to Tukums, Jelgava, Lielvārde, Sigulda and Saulkrasti (see Figure 1), and at that level of transportation development, there was no need to expand the borders of the agglomeration.

From the very beginning, researchers focused a great deal of attention on the development of the settlements and their territory, as well as population mobility, particularly in terms of commuting. Studies of commuting, as well as its volume and intensity were used to describe not just population flows, but also the internal structure of the agglomeration. In 2004, the borders of the RAGL were defined along with zones with different areas of influence. A wide range of indicators was brought to bear in the urban region. Alongside indicators such as the density of populations and settled locations, changes in population numbers, and the flow of the income tax from the capital city, there were indicators related to overall mobility, as well as the volume and intensity of job-related commuting to Rīga.

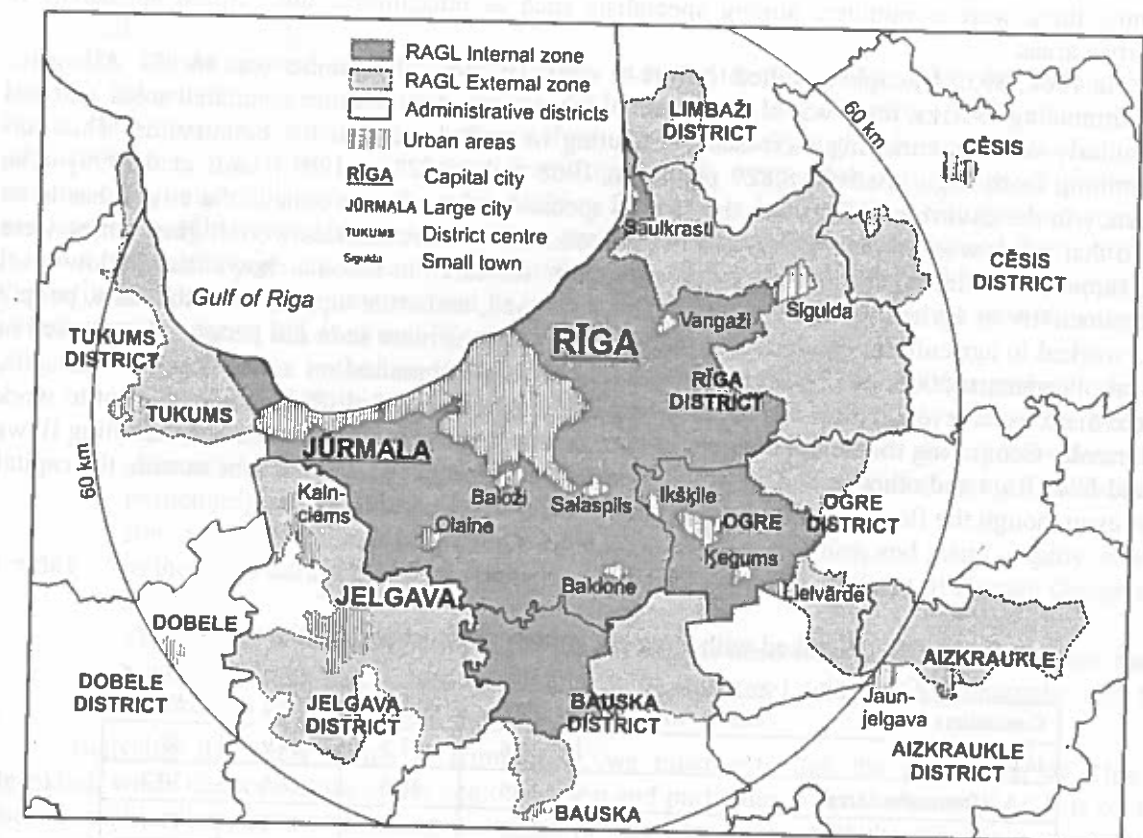


Figure 1. The spatial structure of the Rīga agglomeration

Source: Department of Human Geography, 2004

The local municipalities which are in the Rīga agglomeration are characterised by considerable larger population densities and settlement concentration than is the case in other parts of Latvia. At the beginning of 2007, the total population of the RAGL except the capital city was 428,627 people, or approximately one-fifth of the national population. The average population density in the agglomeration was 64.8 people per square kilometre – nearly two times higher than the national average of 35.3 people per km². Fully one-half of the Latvian population lived in Rīga city and its agglomeration at the beginning of 2007, even though the agglomeration covers only 15% or so of Latvia's territory. The RAGL consists of the core city and the internal and external zone of the agglomeration (Department of Human Geography, 2004). These zones around the core city differ from one another in terms of the nature and intensity of interaction, as well as population, settlement and transport network density.

Pattern of commuting in the Rīga agglomeration

Socialist period

As Bauls (1978) has indicated in studies about commuting, there is a fairly intensive process of daily commuting in Latvia. Research on this subject began in the early 1970s at the Faculty of Geography of the University of Latvia, because at that time, the daily commuting indicators in Latvia were comparably higher than those of the other Baltic and Soviet republics [Bauls and Krišjāne 2000].

During the Soviet period, commuters came from different groups in the population. Initially this involved a flow of rural residents, but then increasing numbers of people in towns and cities began to go to work in the capital city as satellite towns began to emerge. Taborickaja (1975) argues that in the 1970s, the first commuters in the Soviet Union tended to be less educated people. Fuchs and Demko (1978) stressed that commuting served to draw surplus labour into cities. Those who went to work in the countryside were often with a higher level of education, by comparison. In Estonia, there were commuters among specialists such as educational and cultural specialists to suburban areas.

In 1968, 39,614 people travelled to Rīga to work. By 1991, the number was 48,137. Alongside this commuting to Rīga, there was also substantial labour migration to other populated areas, and it is particularly worth mentioning increased commuting to settled areas in the countryside. This out-commuting from Rīga involved 8,827 people in 1968 and 18,727 in 1991. [Bauls et al. 1996] The tendency in the environs of Rīga was the same – specialists found work outside the city. It has to be added that many worked on collective farms, or kolkhozes, where salaries were higher. There were also support facilities and processing enterprises there. Research in Estonia shows that the low level of productivity in agriculture led to greater labour demand, and with support from the state, people who worked in agricultural enterprises near cities often earned more than did people who worked in the city [Tammaru 2005: 1672]. Many scientists from Rīga commuted on a daily basis to Salaspils, where there were several research centres. More than one-quarter of all Rīga residents went to work in Jūrmala. Comparing the ratio indicators of commuting (see Table 1), we see that commuting flows to and from Rīga and other settled areas indicate a certain deconcentration of jobs outside the capital city, even though the flow of labour was distinctly in the direction of Rīga.

Table 1

Commuters linked with Rīga city during socialist period, thousands

Commuters	1968	1978	1981	1991
In commuters	39.6	37.7	34.9	48.1
from urban areas	17.6	18.2	18.5	30.7
from rural areas	22.0	19.4	16.4	17.4
Out commuters	8.8	16.2	18.4	18.7
to urban areas	5.1	8.2	9.5	8.6
to rural areas	3.7	7.9	8.9	10.1
Net commuters	30.8	21.5	16.5	29.4
Ratio, %	4.49	2.32	1.90	2.57
Share urban/rural commuters from Rīga	1.38	1.03	1.07	0.86
Share urban/rural commuters to Rīga	0.80	0.94	1.13	1.76

Source: Bauls et al. 1996

Table 1 shows commuting volumes linked with Rīga from 1968 until 1991, and here we see several interesting trends. First of all, however, it must be noted that the total number of job-related commuters to Rīga gradually declined to 34.9 thousand people by 1981. That can perhaps be attributed to the aforementioned opening of branches by Rīga companies in the agglomeration. Later the number of commuters began to increase again, and that may be because of labour demand and by

increased population numbers in satellite towns, where jobs were comparatively fewer in number than was the case in the capital city. The chemical industry in Olaine is an example of this – the number of commuters from Olaine nearly doubled in comparison to the number in 1968. Traditionally, there has been substantial in-commuting in Rīga from larger towns in the area – Jūrmala and Jelgava. It has to be said, however, that the greatest proportion of commuters into Rīga has come from semi-urban townships in the Rīga District. Many of these have large apartment buildings with a modern infrastructure. In terms of lifestyles and working conditions, these were places which were more like urban areas. The placement of such towns and settled areas along the suburban railroad also facilitated the flow of commuters. Salaspils, for instance, sent more than 5,000 people to Rīga every day. What's more, Salaspils was the largest semi-urban township of its kind not just in the Rīga agglomeration, but in all of Latvia. Since the 1980s, there has been an increasing proportion of urban residents among those who commute to the capital city for work, and that can be explained through housing shortages in capital city and under-urbanisation process.

Post-Socialist period

The socioeconomic transformations which occurred in the 1990s, after the restoration of Latvia's independence, brought along several specific trends in the settlement system of the RAGL. For the first time, people were free to choose their own homes, although this process was limited by people's income. Those who moved away from Rīga usually were either people with a high level of income or, alternatively, those who were looking for cheaper housing. The transfer to the market economy meant that by the beginning of 1990s many industrial facilities were closed down, and that meant a rapid shrinkage in the number of available jobs. Rīga had more jobs and higher salaries, and that influenced everyday commuting and its intensity. The following trends can be seen in evaluating commuting tendencies in Latvia and Rīga agglomeration:

- In comparison to the late 1980s and early 1990s, there has been a very significant decline in the flow of daily commuting from the urban centres to peripheral rural areas, because suburban job opportunities have disappeared in many cases. Major state farms which were once near cities have collapsed, and many of the people who worked for the kolkhozes – particularly professionals – lived in cities anyway;
- Job losses in rural areas have led people to go to work in cities, and many employees stay in the cities during the week [Bauls and Krišjāne 2000; Department of Human Geography 2004];
- The decline in daily commuting within RAGL has been influenced by the fact that many Soviet-era industrial factories shut down or narrowed output. One example was the closure of a factory in Jelgava which manufactured vans.

Analysing the latest trends in commuting, we must note that the population of Rīga is shrinking, while the population of the agglomeration and particular internal zone of RAGL is on the rise. Available data about commuting show that at the beginning of 2000s there is a more rapid increase of commuting towards Rīga. The increase of commuting ensured not only by those people who travel to jobs in Rīga from agglomeration but also from far more distant parts of Latvia. As the number of such people increases and the number of people who commute out of Rīga diminishes, the net commuting changes.

Table 2

Commuters linked with Rīga city 2002-2007, thousands

Commuters	2002	2003	2004	2005	2006	2007
In commuters	60.7	67.8	75.3	80.2	75.1	106.1
Out commuters	13.6	13.6	17.0	17.2	17.4	15.8
Net commuters	47.1	54.2	58.3	63.0	57.7	90.3
Ratio, %	4.46	4.99	4.43	4.66	4.32	6.72

Source: Central Statistical Bureau of Latvia

Since 1991 the net commuting has doubled – 54.2 thousands in 2003, or approximately 15% of all employed persons in Rīga. In 2007, the number was 90.3 thousands. These data come from a Labour Force Survey (LFS), and presumably they are a bit exaggerated, in that the authors of that survey consider anyone who does any kind of job outside of his or her area of residence for as little as one hour per week. Comparing the number of computers in 1991 and 2004 to Rīga from its agglomeration (see Figure 2), we see that there has been a substantial increase in the number of commuters from cities in the agglomeration (Jelgava, Ogre, Jūrmala), as well as from rural areas that are in the external zone of the agglomeration.

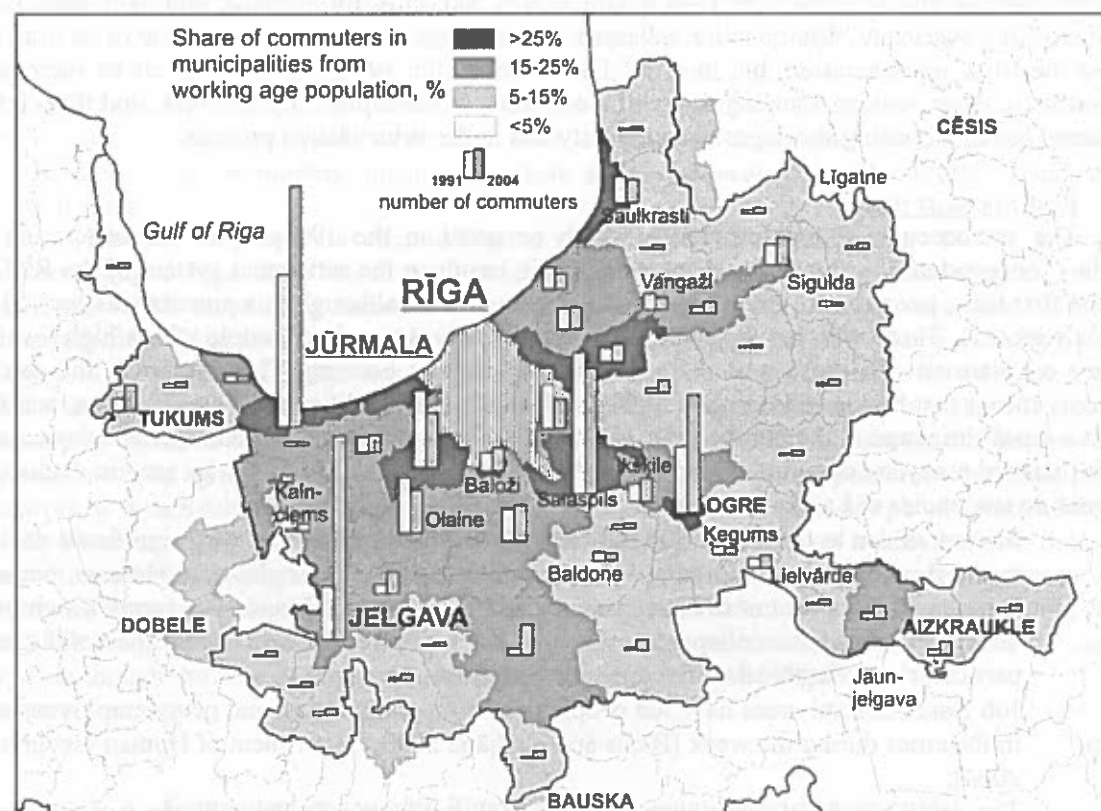


Figure 2. Commuting in the Rīga agglomeration

Source: Department of Human Geography, 2004

A 2004 survey showed, for instance, that the largest share of commuters come from local municipalities adjacent to Rīga city – more than 40% of the residents of the municipalities of Mārupe and Salaspils who are of working age have jobs in Rīga. The next highest percentages are found in Baloži, Saulkrasti, Jūrmala and Ogre (see Figure 2).

Analysing key factors in the processes of population mobility there is important the placement of jobs within RAGL. The core of RAGL is a significant centre for industry, finances and transport, and it is not just of national, but also of international importance. This encourages an influx of people and a concentration of jobs and residents in Rīga. The small number of jobs outside of Rīga is a major factor in facilitating commuting. Since 2000, there have been increased numbers of registered businesses in the Rīga metropolitan area (*Pierīga*), but the capital city still dominates in terms of available jobs – nearly five times more jobs in 2007 than was the case in the metropolitan area (see Table 3).

Table 3

Registered enterprises in regions by year, %

Region	1991	1995	2000	2005	2007
Rīga city	52.1	44.5	56.5	58.7	54.9
Rīga metropolitan (<i>Pierīga</i>)	7.4	7.9	7.3	10.0	11.7
Other regions (4)*	40.5	47.6	36.2	31.3	33.4

* According to EU NUTS 3 (population 150 000 – 800 000)

Source: Lursoft

The distribution of places of residence and dynamics in this regard in a specific territory are also important indicators in characterising processes of suburbanisation and commuting. Approximately one half of all homes in Latvia are in Rīga and its metropolitan area. Outside of this area, larger numbers of homes are found in Jūrmala, in the district centres of Latvia, and the towns of the Rīga district. This, generally speaking, conforms to the distribution of residents among these various areas.

Table 4

Completed new residential buildings, total floor space, thousand m², %

Region	1991	1995	2000	2005	2007
Rīga city	27.6	12.3	13.7	29.5	38.2
Rīga metropolitan (<i>Pierīga</i>)	13.9	29.8	48.0	49.8	45.8
Other regions (4)	58.5	57.9	38.3	20.7	16.0

Source: Central Statistical Bureau of Latvia 2008

Since the restoration of independence, the availability of housing has increased most substantially in the Rīga metropolitan area (see Table 4). It has diminished in other regions, including the capital city. New housing in the metropolitan area has become available thanks to the construction of new residential buildings. Since 2000, there has also been a rapid increase in the overall floor space of newly constructed homes in *Pierīga*. In other regions of Latvia, there has been a decline in the construction of new homes since the early or middle part of the 1990s.

Mobility is also influenced by the development of personal and public transport. The number of light cars has increased very rapidly in Rīga and its environs in recent years, and that has caused substantial traffic jams and other traffic flow problems. This is a typical phenomenon in major cities. In a study of the geographic mobility of the labour force, it was determined that the car is the main form of transportation used by people who live in one local government territory and work in another. 40% of commuters from the Rīga metropolitan area who work in Rīga drive a car to get to work [Krišjāne et al. 2007]. This is also confirmed by the number of registered automobiles in the metropolitan area. Cars are not just a convenient resource for everyday transportation, but also an indicator of the insufficiencies of the public transport system. Particular shortages in public transport are seen in newly built housing estates in areas of the metropolitan region which border the city of Rīga. A good indicator of the use of motor transport in the Rīga agglomeration is average traffic intensity along certain roads. Data about traffic intensity have been correlated and published by the Latvian State Roads agency. Between 2000 and 2007, the intensity of traffic on the country's main roads has increased substantially throughout Latvia, but particularly in the environs of Rīga (see Figure 3). There has been a serious increase in traffic on the Rīga ring road during the course of these years. This road leads to those territories where there has been the most extensive construction of new homes. There have also been increased of motor vehicle intensity to the point of more than

10,000 vehicles per 24-hour period on all of the country's major highways which start in Rīga and connect the capital city to other regions in Latvia.

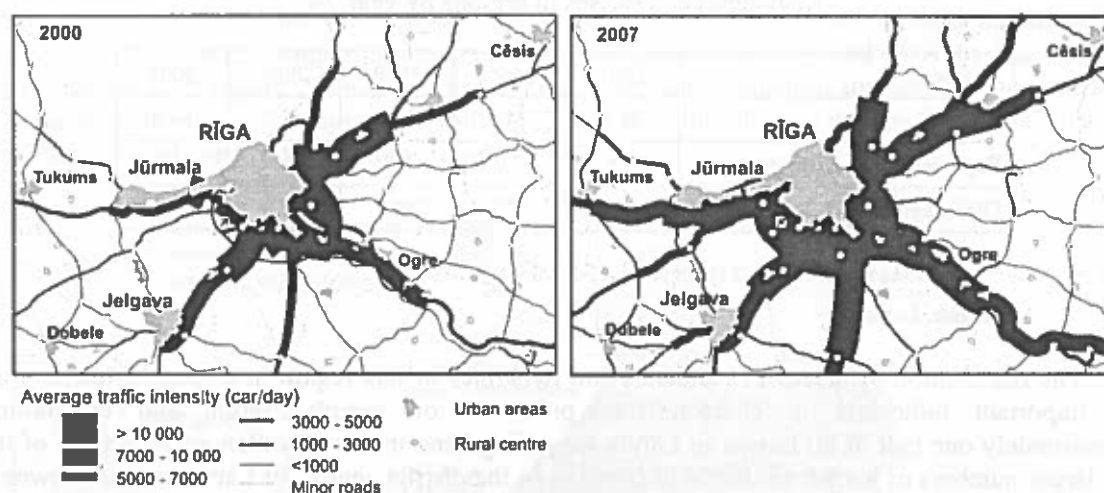


Figure 3. Traffic intensity in the Rīga metropolitan area

Source: Latvian State roads

It has to be noted that approximately one-third of traffic intensity between 2000 and 2007 could be attributed to heavy lorries. These largely transport cargo to and from Latvia's largest ports in Ventspils, Rīga and Liepāja.

Characteristics of commuters

Data from a 2006 survey were used to characterise commuting volumes and describe the composition of the commuter groups. Particular attention should be focused on those commuters who go to work in Rīga – 46% of all commuting respondents (874 persons). Almost 80% of the commuters in the internal zone of the RAGL work in Rīga. In the external zone, the percentage of commuters who travel to the capital city is two times lower than in the internal zone, but it is still higher than the number of commuters who work elsewhere (see Table 5). This indicates that the local municipalities in the agglomeration are home to a comparatively high percentage of people of working age among all people who are employed in Rīga.

Table 5

The places of residence and employment of commuters

Place of residence	Place of employment				Total
	Rīga city	RAGL internal zone	RAGL external zone	Other territories	
Rīga city	75.2	15.3	2.4	7.1	100
RAGL internal zone	78.4	14.5	3.2	3.9	100
RAGL external zone	43.9	21.1	28.9	6.1	100
Other territories	16.8	4.6	7.4	71.2	100
Total	45.9	11.0	8.4	34.7	100

Source: Krišjāne et al. 2007

Among all commuters in the internal and external zone alike, the largest group is in the 30-44 age, while in the external zone there is a comparatively high level of commuting among those who are between 20 and 29 years old. Among commuters who travel to Rīga for work purposes are also

dominated by those in the 30-44 age – approximately 40% of all commuters in both zones. Most commuters are ethnic Latvians – 66.7% in the internal zone and 73% in the external zone.

When asked about their motivation for commuting, respondents most often talk about a lack of jobs in their own area (municipality), as well as greater opportunities for higher incomes working in the Rīga city. In terms of income levels, there are no major differences between commuters in the internal and those in the external zone of the agglomeration. Approximately one-half of those who commuted to Rīga in 2006 did not earn more than LVL 150 (200 EUR) per household member. Among respondents of external zone of the RAGL these numbers were higher than between commuters in the internal zone. We find that 40% of those who work in Rīga have an average level of income (LVL 150-500; 200-700 EUR) per household member. This indicator is higher than the average among all commuters in Latvia – that level of income was indicated by 27% of all commuters.

In both zones of the RAGL, the largest group of those who commute to work in Rīga have a higher education – 37.1% and 31.9% respectively. These are specialists, as well as medium and high-level managers. The education level among those respondents in the agglomeration was higher than the national average – nearly 1.5 times more commuters have a higher education than is the case among the population at large. These data confirm the thesis that people with a higher level of education are more mobile [see Kontuly and Tammaru 2006]. This was true even before 1991. The next largest group of commuters is made up of people with a secondary professional education. This includes qualified working men and women who work in the construction sector. Sadly, the study did not involve sufficient numbers of people who commute out of Rīga for their jobs to offer any representative conclusions. It did show, however, that those who commute to jobs outside the capital city tend to be specialists and qualified workers.

In terms of economic sectors, the LFS offers data from 2006 and 2007 which show that a large share of commuters in Rīga have employment in retail and construction, as well as in the transport and communications sectors. In terms of profession, most are specialists or senior specialists. These data coincide with another survey conducted in 2006 – one which speaks to the concentration of jobs and workers in Rīga. Because there are greater numbers of people who commute to Rīga not only from the Rīga metropolitan area (*Pierīga*), but also from other regions in Latvia, these indicators suggest that there must be increases in weekly or long-distance commuters.

Discussion and conclusions

The visible manifestations of suburbanisation in Latvia, as in other countries of Central and Eastern Europe, can to a certain extent be attributed to the artificial boundary between the desires and abilities of local residents in the housing market which was established by the centralised planning system of the Socialist system. It was specifically this centralised system which could not provide the necessary number of homes in the capital city, and this facilitated the emergence of the Rīga agglomeration in the 1970s. From the 1980s until 1991, the number of commuters in the Rīga agglomeration increased substantially. This was facilitated by increasing numbers of jobs in Rīga's satellite towns and larger semi-urban townships.

The first signs of housing suburbanisation were linked to under-urbanisation processes in the ex-urban areas (rural centres and semi-urban townships) which are adjacent to Rīga city. Such indicators were also seen in other CEE agglomerations [Ott 2001; Ourednicek 2007; Brown and Schafft 2002; Kok and Kovacs 1999; Hamilton (ed.) 2005].

Since the restoration of Latvia's independence and the transition toward a market economy in the country, planned economic decentralisation has not been implemented, and Rīga remains the most important centre for employment in Latvia. Indeed, its importance in the national economy has only increased. Today there is still a distinct concentration of jobs in the capital city. There should be a further study of the decentralisation of jobs – something that is indicated by the increased number of registered companies in the Rīga metropolitan area, as well as by the appearance of industrial parks, warehouses and shopping centres outside of the capital city.

Several studies in the CEE have shown that suburbanisation of housing is the dominant trend in migration and that this is particularly typical in the agglomerations of capital cities [Ravbar 1997; Sykora and Cermak 1998; Rees and Kupiszewski 1999; Tammaru et al. 2004; Ourednicek 2007]. Processes of suburbanisation in post-Socialist countries are very diverse. The changes in the Rīga

agglomeration are no exception. There has been a substantial reduction in population numbers in the primate city and the country as a whole, but there has also been distinct growth in suburban development, along with increasing volumes and intensities of commuting. These are processes which are also seen in the urban regions of other post-Socialist countries [Ott 2001; Tammaru 2005; Boren and Gentile 2007; Sykora and Novak 2007; Ourednicck 2007].

Socioeconomic and administrative processes over the course of time have affected population mobility in the Rīga agglomeration. It has to be noted that there are more rapid processes of economic transformation in the environs of the city, with new and dynamic sectors emerging. Commuting data indicate that there is a rapid increase in demand for workers, specialists and qualified workers. At the same time, the economic processes are accompanied by the processes of suburbanisation that have been typical of Western cities – new housing estates of private homes are being built, people are building single family homes in Rīga's beautiful suburbs, and large apartment buildings are being built in former satellite cities.

The processes of suburbanisation in Latvia, as in other Central and Eastern European countries, are low in intensity, and they largely have to do with the expansion of residences along major roads alongside big cities. This describes a process of housing deconcentration, because economic processes continue to prevail in the capital city – the centre of the agglomeration.

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Effects of Circular Migration in the Context of Transition in East and Southeast Europe

Daniel Göler

Abstract

International migration has increased recently and should intensify during the coming decades. The socio-economic transition after the collapse of the former Eastern Bloc caused a subsequent shift in migration regimes. At present, the consequences of emigration from countries in east and southeast Europe appears to differ greatly from country to country. There are well-known negative effects such as a quantitative loss of population and a qualitative brain drain as well as positive repercussions of migration in the origin regions. This paper on argues with three aspects and examples from studies in South East Europe. The problem of the brain drain is discussed as well as the role of remittances as a kind of survival strategy and, finally, remittances are interpreted as an essential factor promoting the formation of a class of private entrepreneurs in southeast Europe.

Keywords: Migration, remittances, socio-economic transition, east- and southeast Europe.

Introduction

International migration has increased considerably in the last few decades. According to data recently released by the UN, almost 200 million people migrated internationally in 2006, the equivalent of c. 3% of the total world population. Frequently motivated by employment opportunities, migrants contribute equally to the national economies of their countries of destination and origin. The total amount remitted by migrants to their region of origin is estimated at US\$ 226bn [UN 2008], a well-nigh inconceivable sum. What's more, the actual figure may be even higher; after all, international migrations occurs to a certain extent – which, however, is difficult or impossible to quantify by estimates – in a grey zone that is informal or illegal.

1. A change of perspective in migration research

As the dynamism of international migrations grew, the perspective of migration research changed. The former phenomenon may be causally related – not exclusively, but in part – to the collapse of the former Eastern Bloc around 1990 and the subsequent shift in migration regimes. Instead of the classical study of the course and consequences of a permanent change of residence, analysing the origin and impact of “new transnational social spaces” [Pries 2001] moved into the foreground. Thus, interest began to focus not only on circular migration processes that recur episodically or periodically but also on questions relating to migration networks [Parnreiter 2008] inclusive of illegal networks [Neske 2007], aspects of individual action strategies [Goeke 2007], “incorporation” [Goebel/Pries 2003], or ethnic entrepreneurship [Pütz 2004].

In this context, it is not the primary intent of this article to discuss issues of demarcation between migration and mobility in the sense of commuting or between circular and transnational migration [cf. e.g. Fassmann 2008: 21]. Rather, the analysis focuses on the consequences and repercussions of emigration from the transforming states of eastern and southeast Europe, regardless of whether the migration movement in question was monodirectional and final (permanent) or multiple and multi-directional (temporary).

2. The question about the repercussions of circular migrations in the context of transition

At present, the insights available about the repercussions of emigration from countries in east and southeast Europe appear to differ greatly from country to country: some of the factors identified in Latvia for example, a recent member of the EU, are indeed quite positive, including a quantitative reduction in unemployment and an in input of purchasing power from outside which, in turn, may benefit the education of the next generation. At the same time, these factors

are confronted by highly negative demographic consequences and, most importantly, a decline in the quality of the national labour force. In Latvia, it is almost impossible to meet the demand for high skilled labour because of the ongoing brain drain and the local pay level, which is below the international average. There are even suggestions to recruit the needed higher skilled labour from countries further to the east [Krisjane 2008: 69].

In contrast, there is the experience of the western Balkan states where the labour market can hardly absorb even highly qualified people, and university graduates are often faced by the need to choose between unemployment, casual work, and emigration. Given the present state of the art, therefore, the level of development and, more importantly, the degree of international integration of the sending region under consideration would have to be taken into account more thoroughly when evaluating migrations in the context of post-socialist socio-economic transition.

A focus on the repercussions of such processes suggests itself as a framework for analysing less integrated transforming countries (particularly non-EU countries, especially those located in the so-called Western Balkans). On the one hand, the potential for emigration is still very high there [Göler 2005a: 98], while on the other, the impact of financial remittances on national economies is especially great [Baumann 2008: 231]. Unlike the effects of migration in the host countries, moreover, investigations into the many and varied positive and negative consequences in the countries of origin have remained so far fragmentary, apart from a few exceptions [e.g. Labrianidis/Kazazi 2006]. Before discussing examples of such repercussions in the southeast European countries, a traditional 'sending region', some relevant general aspects will be first addressed.

3. Why people move in times of transition and the tradition of east-west migration

Soon after the collapse of the socialist states, it was found that temporary or permanent emigration from the former Eastern Bloc not only represented the assertion of new-found freedoms but also acted as a kind of safety valve in times of individual economic insecurity. In view of the massive destabilisation in the transforming states on the one hand and the geographical proximity of the West on the other, it is not surprising that migration movements should have evolved between the once nearly isolated eastern and western migration systems despite manifold restrictions in the form of visa regimes etc. Moreover, there is no dispute that the chief reason for the east-west migration after the political upheaval in Eastern Europe is the regional labour market. Furthermore, the originally socio-economic motivation to emigrate was considerably reinforced by diverse economic crises and ruptures, wars, and flows of refugees and displaced persons, especially in the western Balkan countries.

In terms of quantity, the migration movement from east to west which signally characterised the period of post-socialist socio-economic transition was significant indeed, although initial fears that a 'mass exodus' might follow after 1990 were not confirmed [Dorbritz 2007: 50]. Instead, as indicated above, the population movements that did develop are highly variegated and driven by a wide range of motives. They cannot be ascribed solely to deterministic reasons, nor are they directed exclusively from east to west. Because of the restrictive migration policies of the Schengen countries, there is even a trend at present for the east-west migration to shift to eastern Europe, ending at the gates of the 'fortress Europe' [Fassmann/Münz 2000: 32] and ultimately defusing to a considerable extent the potential for conflict that has emerged in media coverage as well as in public opinion.

Throughout the debate, it is frequently overlooked that east-west migration looks back on a long tradition which has recently been given more attention in the European migration research [cf. Fassmann/Münz 2000: 12ff]. With regard to southeast Europe and especially Albania, one subject that would have to be discussed in this context is 'kurbet', the traditional emigration of young people that was widespread in Albania even in the Ottoman era and was (and still is today) of essential importance to the livelihood of those who stayed at home. As early as Germany's industrialisation period, workers were immigrating from Eastern Europe. After the Second World War, migrant workers from Yugoslavia and other countries followed suit. Moreover, the only country of the communist bloc that had thrown open its gates in this regard did not fail to recognise the economic potential inherent in remittances and the possible return of 'guest workers'. Given the constraints of the time, however, this potential was difficult

to exploit in the peripherally situated main emigrant regions, such as the hinterland of the Dalmatian coast, as the example of the 'People of Arzano' showed so impressively.¹

4. Southeast European examples

In the following, the repercussions of migrations on the region of origin will be analysed under three aspects.² Arguments will be essentially based on the author's own empirical studies of various subjects relating to the regional development of southeast Europe (with a focus on Albania, Bosnia and Herzegovina, and Serbia).³

a) The problem of brain drain

Needless to say, the brain drain problem evident in transforming societies everywhere, i.e. the emigration of highly qualified people, is found in southeast Europe as well. Schmidt [2003: 16f], for one, quotes an Albanian study according to which one in three researchers and teachers left the country during the transformation period. And Gjonça [2002: 19] puts the proportion of highly qualified workers who emigrated between 1991 and 1995 as high as 35%. Regarding the emigration of intellectual elites, Canada plays an unusual two-faceted role: entry permits are reserved for persons who are able to show financial means, a high level of education, and qualifications that are in demand on the Canadian labour market [UNDP 2000: 42]. However, while truly Canada is one of the few countries that have viable perspectives to offer to Albanian emigrants it is equally true that Albania itself is thus deprived of investment funds and entrepreneurial potentials that are urgently needed.

As the Albanian labour market, like those of other western Balkan countries that are in the throes of crises, is hardly capable of absorbing academics, the problem needs to be put in perspective: if university graduates from those regions wish to be employed in a capacity that is at least approximately adequate to their qualifications, they often find themselves practically constrained to go abroad. From the development-policy point of view, the crucial question is whether or not they will later return. Consequently, the emigration of highly qualified persons can be finally evaluated only after it has become clear whether their emigration was permanent, or only temporary. If migrants were to return in relatively large numbers, and if they should productively employ the human and financial capital acquired abroad in their region of origin, the brain drain that was initially seen as negative might well be expected to have a positive impact in the long run [Fassmann 2008].

The most evident feature of Albanian migration still is the (temporary) emigration of employable young men. 85% of those Albanians who emigrate to Italy are between 20 and 45 years of age [Gjonça 2002: 21]. This drain of economically active people has a visible effect on Albania's age pyramid, causing a corresponding deficit in the population of the younger age groups, mainly between 18 and 30 years [Göler 2005b: 123]. Also, within this context, it is necessary to keep in mind that the prime motivator of migration is normally unemployment in the home country. However, it is equally true, that the effect of securing livelihoods at home which emigration had in past periods of crisis was highly important as well.

b) Remittances as a survival strategy

Some statistical data can visibly illustrate the dimension and importance of remittances for one of the most precarious national economies in the Balkans. In 2000, the sum transferred by private persons to Albania from abroad was higher at US\$ 531m than the country's export

¹ "Die Leute von Arzano" is title of a documentary aired on German television on 11-8-1974 which described the initial attempts and the manifold problems encountered by guest workers investing in their home country (the hinterland of Split in this case).

² There are further conceivable consequences such as, for instance, the problem of the care drain in Albania [Vullnetari/King 2008].

³ These are study projects conducted between 2004 and 2007 with teaching staff and students of the geographical institutes at the universities of Bamberg/Germany, Belgrade/Serbia, Tirana/Albania, and Tuzla/Bosnia and Herzegovina as well as the Geographical Study Centre of the Albanian Academy of Sciences in Tirana. We owe a debt of gratitude to the DAAD (German Academic Exchange Service) for its financial support under the Southeast European Stability Pact (Special Programme Academic Reconstruction in Southeast Europe).

earnings, the foreign direct investment received by it, and the total value of its industrial output. Around the year 2000, remittances⁴ held a share of about one fifth in the gross domestic product [UNDP 2000: 43], and in the first half of the 1990s they even accounted for more than 25% of the GDP [Korovilas 1999: 408ff]. The study by Arrehag et al. [2005: 13] puts the share of capital generated abroad in the income of southeast Albanian families at nearly 19%.

In most cases, these bald figures mask a kind of survival strategy: family members employed abroad – normally young males – financially support their families at home. Given that the livelihood of many families is acutely threatened, this is indeed necessary. Thus, about half the population of certain districts in northern Albania receive governmental income support⁵ [Kukes MDG 2004: 22]. The average amount paid in income support to each family is €25 per month, so additional revenues, remittances included, are common not only in the rural and/or peripheral regions but also among the urban population. Furthermore, our own studies [Göler 2005a, 2007] show that very few of the Albanians abroad are employed in highly qualified jobs, and that most serve as unskilled workers in the building industry, in restaurants, etc. This, then, is one respect in which circular migration in the Balkan countries differs from that in the Baltic countries, where emigration is frequently referred to as education-oriented (s.a.).

Against this background, it is hardly surprising that remittances are spent mostly on consumption. Next to financing daily supplies, people invest in property by, for example, erecting a residential building on land owned by the family, with much of the work done either by family members or with the help of neighbours. By contrast, the part played by education expenditures is less important [Arrehag et al. 2005: 26].

At the same time, the study cited above concludes that there is hardly any difference in material equipment between households that receive remittances and those which do not [Arrehag et al. 2005: 33f]. While this confirms the contention that consumption spending dominates in the use of remittances, it also suggests that money may be spent on investments outside private households.

c) Examples of business start-ups in Serbia, Albania, and Bosnia and Herzegovina

Indeed, remittances should be interpreted as an essential factor promoting the formation of a class of private entrepreneurs in southeast Europe. Based on entrepreneurs' biographies, related studies show that capital transfers from abroad play a crucial part in the foundation of small and medium-sized enterprises [Göler 2007]. In Albania, where this is the rule; start-ups are preponderantly based on several months or years spent working abroad, mostly in Italy or Greece. According to the UN, nearly 40% of the funds needed to start up a business in Albania are procured in this way. [Göler 2005b: 124]. With certain qualifications, the same holds true for ex-Yugoslavia; in Serbia as well as in Bosnia and Herzegovina, for example, (former) guest workers either appear as investors or provide the funds for entrepreneurial activities by family members in their home country. Moreover, returned civil-war refugees occasionally invest the money they have earned in Germany or received from the German state as a 'return bonus' in starting up a business [Göler 2008: 59].

Besides procuring capital pure and simple, circular migrations and subsequent business start-ups in the country of origin also entail a transfer of knowledge and innovations from abroad or, in other words, a brain gain [see also Brügger 2002: 67]. It is relatively rare for this brain gain to be based on formal qualifications or formally documented knowledge acquired abroad. Instead, skills learned in emigration are frequently reproduced in a self-employed entrepreneurial activity at home. And it is by no means rare for the requisite technology to be procured in the same way, meaning that people buy familiar machines second-hand from their former employer when they return home. Often, even long-term supply and sales relationships result from foreign contacts; there are cases in Albania in which foreign companies have acquired an interest in the businesses of their former employees under a joint venture. To that extent, the combination of capital, knowledge, and – where applicable – highly specialised technical skills have a positive effect on private business start-ups. At the same time, it is a fact

⁴ Because of the horrendous charges levied, this backflow of capital rarely takes the form of actual bank transfers. Generally, it is affected by individuals bringing cash into the country [cf. Arrehag et al. 2005: 23].

⁵ The Albanian average is 22.1% [Kukes MDG 2004: 22].

that, in the extremely difficult socio-economic environment prevailing especially in the peripheral regions of the transforming states, many of these start-ups are so-called 'emergency solutions', meaning that the decision to set oneself up in business is (at least partially) taken for lack of alternative action options.

5. Conclusion and outlook

The above discourse corroborates the need for giving more consideration to the repercussions of migration in the context of the transition initially outlined. In the process, the negative effects of a (possible overrated) brain drain should be given as much consideration as the positive effects of the brain gain, which may be underrated. This is all the more true as, within the framework of emigration from southeast Europe, it is rarely possible to attain the objective of permanently moving one's residence abroad; instead, movements are frequently circular so that a "brain circulation" [cf. Friedrichs/Schultz 2008] actually takes place. Thus, the east-west migration increasingly fits into the pattern recently established in international migration. At the same time, it is becoming increasingly difficult to base the rationale of migration solely on the transformation context, 20 years after the system changed in east Europe. It appears more promising to apply criteria such as the degree of geopolitical and international integration or the level of socio-economic development for the purposes of differentiation in future analyses.

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A Brief Overview of 20th Century Latvian Migration Studies

Pārsla Eglīte

Latvia suffered heavily during the 20th century from military actions in both WW I and WW II. Each time the wars and corresponding political and social changes caused both massive out-migration flows and a collapse of the data collection system, especially concerning population counts and mobility. Persons doing migration research also faced further difficulties with the beginning of the Soviet occupation because of the political sensitivity of topics about forced migration and the changing dynamics in the ethnic composition of the population. These appear to be the main reasons for the fragmented coverage of migration topics, and the poor comparability of Latvian migration data with other countries less disrupted by volatile historical forces.

Migration research up to WW II

The territory of Latvia, up to the end of WW I, was incorporated in tsarist Russia. Accordingly, the dynamics of the population, including net migration up to 1914, was characterized by significant in-migration of potential workers from its inner regions, as can be illustrated by the data of the 1897 Census, as well as the yearly statistics on the western colonies of the empire [Первая, 1897; Статистический, 1914].

The number of Latvians in the Russian army since the beginning of WW I, as well as the number of refugees and employees of enterprises evacuated to the inner regions of Russia, was calculated afterwards on the basis of special records and the results of the first post-war Census of Latvian Republic in 1920. The data from the next Census in 1925 also shows the number of Latvians who returned home, including those from custody, exile, work and studies in different regions of Russia since the beginning of 20th century, as well as the number of Russians fleeing the new regime [Otrā, 1926].

Statisticians active in that period were primarily concerned with the dynamics of the population, the causes for losses suffered during the war, as well as its composition. There was less attention paid to different migration flows and their variation [Skujenieks, 1927; 1930; 1937].

There was no research on the immigration of the relatively small number of workers from Poland and Lithuania employed during the 1930s by Latvian farmers. Nor on the more than 20 thousand émigrés who, largely for religious reasons, left Latvia for Brazil during the 1920s. Both the migrants and their fate were only described in the media of the period, as well as in Latvian fiction. And, already at the start of WWII Latvia some 60 thousand persons were repatriated to Germany.

Migration flows under the occupations 1940-1991

Research on out-migration flows which took place since the very beginning of WW II was rather popular among Latvian historians and other specialists living in exile outside the occupied homeland [Andersons, 1982; Dunsdorfs, 1983; Priedkalns, 1983; Misiunas et.al., 1983; Dreifelds, 1984]. Their efforts were devoted mainly to documenting and discussing the losses of the local population caused by forced deportations, mobilizations, as well as exile following colonization of the territory and Russification. Table 1 summarizes how migration flows impacted population changes in Latvia over various timeframes.

Table 1

Impact of migration on population changes in Latvia

Year, beginning of	Population, thousand	Net migration during period, thou ²⁾	Most massive of the assembled flows	
			Prevailing	Diverse
1897	1929.4 ¹⁾			
1914	2552.0	264	workers from Russia	
1920	1596.1 ¹⁾	-700	refuges to Russia	
1925	1844.8 ¹⁾	218	coming back refuges and military	20-30 thou migrants to Brazil
1930	1900.0 ¹⁾	..		
1935	1950.5 ¹⁾ *	4.1	labourers in agriculture from Poland, Lithuania	
1940	1886.0	-20	German repatriants to Fatherland – 60 thou	territorial changes – 44 thou
1945	≈1600.0	-250 ?	Refuges to West incl. military	Imprisoned or deported to Russia in 1941 – 15 thou
1959	2093.5 ¹⁾	410	colonists from Russia et.al.	Deported to Russia in 1949 – 53 thou and returned since 1956
1989	2666.6 ¹⁾	348	colonists from Russia et.al.	-
2000	2375.3 ¹⁾	-158	repatriation of soviet time colonists and Soviet Army	voluntary leaving for West + repatriation of some Latvians from East and West

* including Abrene district – alike 1920-1930

¹⁾ Census data

²⁾ all data on number of migrants are approximate due to lack of proper primary information and high mobility of those involved

In Latvia, under the Soviet regime, two main factors hampered research on migration: lack of proper statistical data and strong ideological pressure.

Data about the composition of the population, as well as the components of population growth were not published until 1961. They appeared first in the 1959 Census, including some yearly data since 1955, and some summarized data for the 1946-1950 period [Численность, 1961]. Data about migration inflows and outflows were only available for urban areas. There was no in-migration or net migration data for rural areas, nor for the total population.

It goes without saying that data about the resident population did not include real numbers concerning military personnel who had been relocated into the territory: only some average amount for all the USSR regions was added, though in border areas like Latvia the share of military personnel was significantly larger.

In the former USSR no border control existed for travellers between the so called joint republics. All the migration flows were calculated from registration of arrivals and departures at the place of residence. The problem was that registration at arrival was connected with eventual housing: living with one's family, the possibility to rent at least 6 m² and in Riga even 4.5 m² for a person, studying or having been employed at a company with a hostel for workers, etc. Living at such a hostel for at least 10 years or renting a flat with less than 4.5m² per family member was recognized as a precondition for improvements in housing. Only certain categories of senior officials and military personnel had certain privileges [Migranti, 2004]. No wonder, people were interested in becoming registered, or in registering more family members without their even coming to certain cities and regions, including Riga and some other Latvian towns.

There was little attention paid to the registration of people who left. Subsequently, after each of the post war Censuses (1959, 1970, 1979, 1989) annual data about migration during the

previous 10 years was corrected, and this is why data in succeeding collections differ [Численность, 1966; Естественнос, 1969 ... 1988].

Very few data on population growth and rather aggregated Census data about all the USSR disaggregated by 15 republics use to be published for all the public [Итоги, 1959, 1970, 1979; Население, 1988; Демографический, 1990].

The censuses and the subsequent yearly (since 1968) collections with rather detailed population statistics in Latvia were only for official use, and data from these editions was not allowed to be published for open consumption, though some appeared in editions for limited circulation [Эглите, 1967; Миграция, 1974; Барановский, 1976; Сборник, 1983]. The initial research on migration in Latvia after WW II dealt with the regions and cities in Latvia preferred by immigrants, the exchange territories, the age composition of migrants and the depopulation of remaining territories – mainly in NW Russian (Эглите), motives for migration by age and previous place of residence, plans to move again, etc. (Барановский), longevity of stay at current place (Сборник). No wonder these publications and their results remained unknown to most migration specialists [Migranti, 2004].

Under the communist regime all the texts, including fiction, had to undergo censorship before publication. Politically sensitive texts were either "corrected" or refused publication. For example, a manuscript about the demographic consequences of immigration (inevitable aging after some 30 years because of the enormous growth of active age groups at the period of immigration) prepared by Eglite in 1972 was blamed by the Bureau of Latvian Communist Party's Central Committee as providing ideological support to émigrés in their accusations concerning Soviet occupation and was not allowed to be published [Dokumenti, 1999].

In publications about Latvian population prevailing role of migration in its growth could be allowed to explain only by necessity to meet the growing demand for labour force [Mežgailis, 1985]. In reality housing problems caused by the enormous inflow of colonists was one of the determinants of the decrease of the birth rate among the local population – the lowest among all the soviet republics. It was only at the very end of USSR regime that the extensive growth of industry and endless immigration were recognized by the Government of Latvian SSR as being harmful and having negative impacts [Latvijas, 1989].

There were also some articles on the spatial redistribution of population inside the republic and the impact of immigrants' choice of place for settlement on the migration process [Маркауса, 1986; Витольнш, 1986].

At the period of the singing revolution starting at the very end of the 1980s, publications started to appear in Latvia on the forced migration during and after WWII [Strods, 1989; Krastiņš, 1991; Šmulders, 1992; Zvidriņš, 1992 and Zvidriņš, Vanovska, 1992]. They dealt mainly with population losses during the 1940s, and their impacts on the resulting changes in the ethnic composition that exist to this very day. However, no attention was paid to the return migration of survivors from earlier deportations made possible after the death of Stalin in 1953, and the condemnation of his regime by the All-Union Congress of the Communist party in 1956. Afterwards, the final losses of the local population up to 1st post-war Census (only in 1959!) were calculated on the basis of Census data [Eglite, 2002]. An evaluation of the economic losses from deportations was offered by Zvidriņš and Vitolinš, 2003. The expected aging of the population was recognized as a remote consequence of immigration during the 2nd Soviet occupation [Eglite, 2003]. This experience provides a valuable example for other European countries trying to avoid depopulation via immigration.

Mobility in Latvia after regaining independence

At the very beginning of the 1990s there began a reverse migration, both of former colonists and their descendants, from Latvia to other parts of the former USSR, and of urban dwellers of rural origins back to their native districts [Demographic, 1992-2003]. Several sociological surveys included questions on actual and planned migration, as well as on everyday local migration, and afterwards these were statistically analyzed. [Markausa, 1994; 1997; Zepa, 1995; Eglite, 1997; Krišjāne, 2000; Bauls, 2000; 2002].

The Centre of Criminological research carried out a survey on illegal migration to Latvia but the results of that report (1994) was not published.

In all these recent studies it was found out that actual and planned mobility, as well as the direction of migration differs by age groups, and that also during the second half of the 1990s that the intensity of reverse migration, both inner and international, slowed down. Instead, there started to be some emigration to the West [Bauls, 2004; Eglīte, 1996; Hanell, 2000; Markausa, 2001]. The studies show that at the very end of 20th century, with people once again given freedom to choose potential target destinations, as well as the ability to cross borders, that current motivations and direction of migration has already become very different from that during most of the 20th century. In addition, research on actual emigration can not just be based on statistics. The free movement of labour force in the EU gives them choices they did not have before. Many of the current era migrants may have no intention of leaving for ever and do not omit their registration at the place of residence of the family. Additional difficulties for researchers arise from the growing diversity of migration forms regarding motives, longevity of stay and so on.

One may conclude that the methods of migration studies on current and future flows in XXI century are to be enriched, and international cooperation in the process becomes more important than in the XX century.

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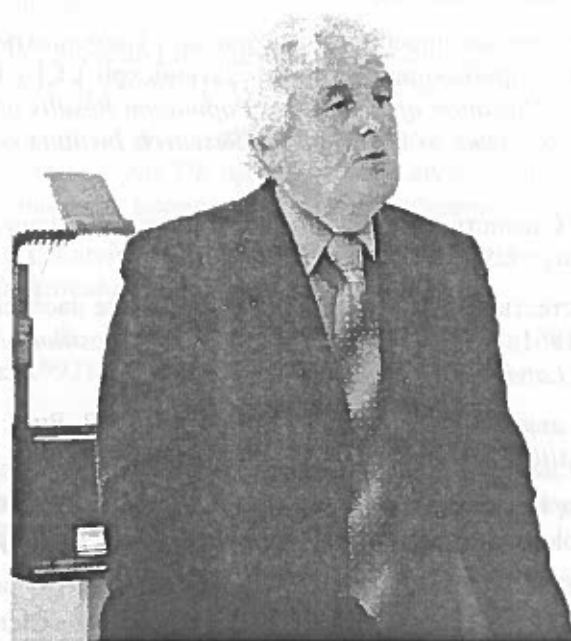
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Adolfs Krauklis – a Life Dedicated to Geography



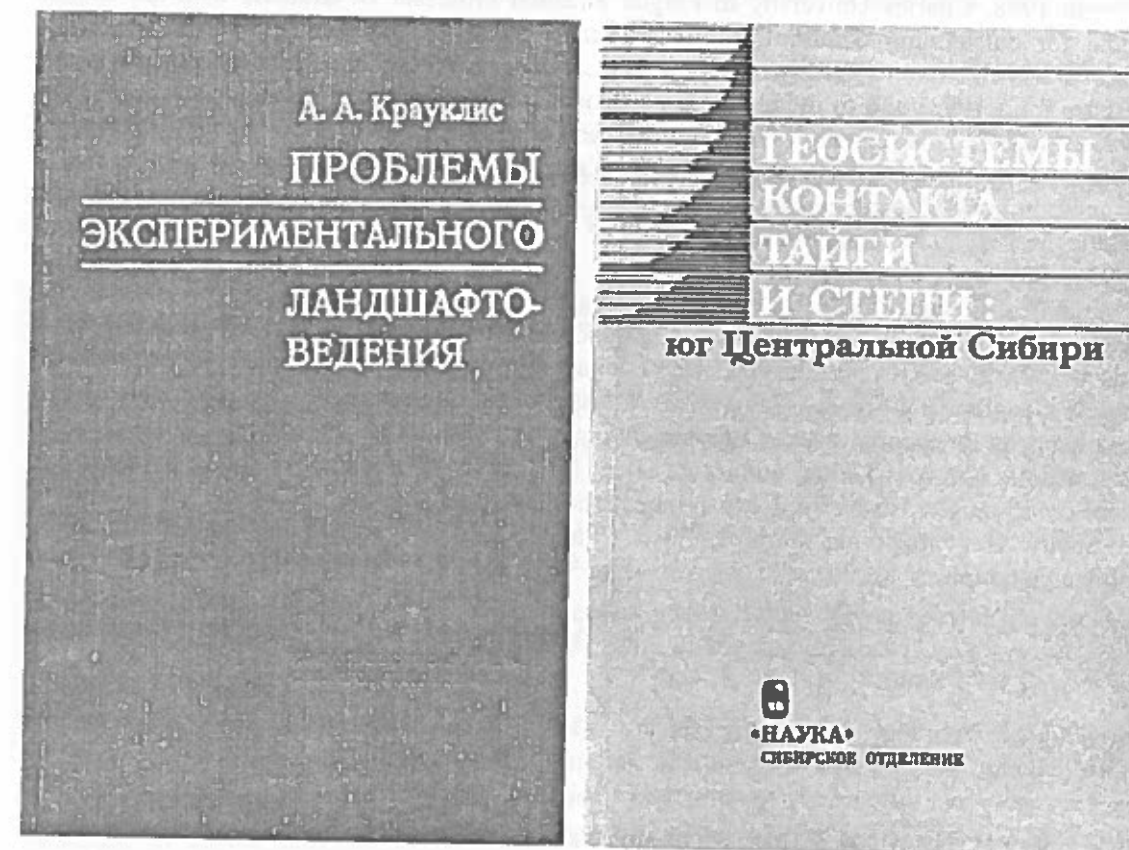
Adolfs Krauklis (1937 – 2006) is one of the most outstanding Latvian geographers of the 20th century, an inheritor of Latvian geographic traditions developed by Reinholds Putnins, Leonids Slaucitajs, Gederts Ramans, Kamils Ramans, Aleksandrs Jaunputnins and talented author of new ideas. A. Krauklis loved geography and loved to be a geographer.

Adolfs Krauklis was born in Grukhovka village, Kholmisky district (nowadays Novgorod region) on March 25, 1937. In 1944 the family resettled in Latvia. His years of studying geography at the University of Latvia (1956-1961) coincided with a significant upsurge of scholarly interest in geography. At that time the Faculty of Geography of the University of Latvia was evolving into an important centre of geographical research and brainpower within the Soviet Union (known in Eastern Europe as the Riga school of landscape geography). Several dissertations that dealt with Latvia's landscapes were written and defended (Valija Klane, Kamils Ramans), and the 4th All-Union Conference of landscape studies was held in Riga in 1959. A. Krauklis took active part in organizing this major event and was also committed to guiding a part of the field session. As Professor K. Ramans later recalled, his colleagues had expressed admiration for the professionally prepared and guided event and could hardly believe that the erudite young man was just a third-year student.

The conference assembled a large number of participants and was assessed by the geography community as a big success. At that time landscape geographers in Riga focused their research on classification and typing of local geosystems, and strived to develop a rational system of geographical places (localities). Soon after his graduation from the University of Latvia, Adolfs Krauklis amended and improved the system of localities developed by K. Ramans and defined five basic types: eluvial, deluvial, fontinal, supraquatic and subaquatic (Krauklis 1963). According to A. Krauklis the main factors that differentiate local geosystems of different hierarchical levels (fācījas, savrupienes, vietienes) in Latvia are the mechanical (litological) composition of loose deposits and the supply of nutriment in the habitat.

A year after graduation A. Krauklis resettled to Irkutsk (Russia) and joined the newly established Institute of Geography of Siberia and the Far East of the USSR Academy of Sciences directed by V. Sochava (at present the V.B. Sochava's Institute of Geography). There A. Krauklis spent most of his creative years of geographical research (1962-1991). While working in Siberia, he refined the above described classification of localities and developed

unitary factorial dynamic rows of taiga geosystems: placor, lytomorphy, hydromorphy and cryomorphy (Krauklis 1972; Крауклис 1969, 1974). Considering factorial dynamic rows of elementary geosystems as a basis for modelling natural regions, A. Krauklis organized regular field investigations (measurements of radiation and heat balance components in geosystems, seasonal and interannual cycles in biota, turnover of chemical elements and others) and used the obtained data to describe quantitatively the basic factor groups affecting geographical landscapes: inert (lithology, relief), mobile (matter and energy flux) and biotic (species activity and plasticity) (Krauklis 2003, Крауклис 1975, 1979, 1985). A. Krauklis showed his talent in linking the local and regional studies and his study of the interrelations of forest and steppe may be regarded a good example of his skillful interpretation of data (Krauklis 2003, Крауклис 1985).



The photographs (from left to right) of the books covers of "Problems of Experimental Landscape Science" and "Geosystems of Taiga-Steppe Contact: southern Central Siberia".

During his long years in Siberia A. Krauklis maintained friendly contacts with his teachers, his fellow-students and young students at the Faculty of Geography. Upon his initiative many students from Riga spent their summers in the Siberian taiga and gained excellent fieldwork experience. Thus, Adolfs Krauklis and his wife Lauma Kremerc, also a geographer, consolidated around them a sizeable group of „Siberians” – Latvian geography students who spent one or several summers working together in the taiga.

In 1991 A. Krauklis came back to Latvia and continued his academic life in the University of Latvia: he was elected Professor in the Faculty of Geography and Earth Sciences, actively carried out research and was also involved in science administration. A. Krauklis carried out field research of geographic landscapes in Latvia and beyond its borders, in Europe, (Krauklis 1999a; Krauklis, Zariņa 2000, 2002; Draveniece, Krauklis 2004) a heavily affected and modified environment. Professor Krauklis analysed the composition and main environmental processes of landscapes recognizing the role of anthropogenic factors and the interaction of natural, social and human processes. He defined the *geographical landscape* as referring to an intensely perceived area or segment of earth's surface that encompasses broad

content expressible in the terms of the humanities and natural sciences (Krauklis 1996). Thus, landscapes have a physical reality that exists independent of the humans, and at the same time the landscapes are existent as mental images of human beings (Krauklis 1997, 1998, 1998a, 2000). Our understanding of the visual appearance, the natural and cultural wealth of the landscape forms the basis for good and sustainable management of our environment (Krauklis 1996a, 1996b, 1998b, 1999, 2005, 2006; Knappe, Krauklis 1998).

A. Krauklis developed the concept of the advancement of modern geography and of academic study programs at the Faculty of Geography and Earth Sciences (Krauklis 1993, 1997a, 1998c, 2001, 2003, 2004). He saw the necessity of new programs either for the Bachelors, Masters or Doctoral degree qualifications to include nature, human, applied, environmental and regional geography courses.

In 1998, Charles University in Prague awarded Professor A. Krauklis with the Golden Medal for outstanding contributions to landscape ecology. Professor A. Krauklis has been honored by election to membership of the Latvian Academy of Sciences (corresponding member from 1993) and to membership of Deutsche Akademie der Naturforscher *Leopoldina* (1999). In 2003, he accepted the invitation of the Geographical Society of Finland to become a corresponding member of that society. A. Krauklis was a member of the International Association for landscape ecology (since 1996) and also a member of several associations and societies in Latvia. A. Krauklis was President of the Latvian Geographical Society for ten years (1993-2003) and chairman of the Latvian National Commission of the International Geographical Society (IGU). He was always eager to attend the congresses of the International Geographical Union and in retrospect A. Krauklis has participated in four IGU congresses in Moscow, Paris, Seoul and Glasgow. He re-launched publishing of the research papers of the Latvian Geographical Society *Ģeogrāfiski Raksti (Folia Geographica)* and initiated the idea of, and organized three congresses of Latvian geographers (1996, 2000, 2004).

Adolfs Krauklis had an admirable talent for perceiving geography from a different and uncustomary angle. He enjoyed expanding its horizons and showing the power and beauty of geography. His pioneering spirit, enthusiasm and dedication made him a unique figure in Latvian geography.

Anita Draveniece, Zaiga Krišjāne, Māris Laiviņš

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