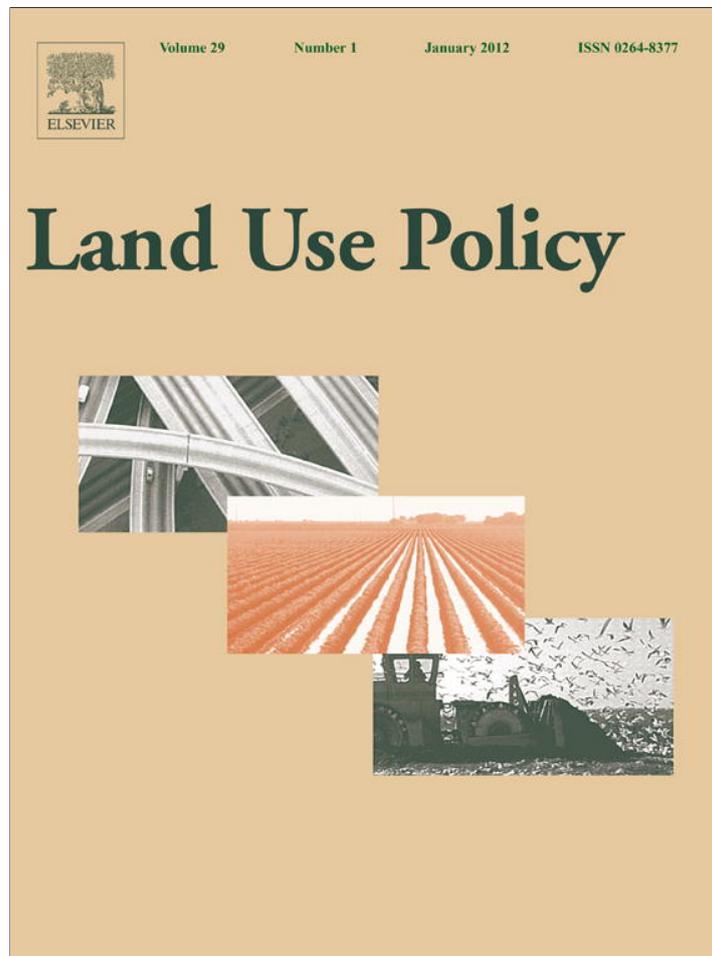


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## Land Use Policy

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# Land use policy shocks in the post-communist urban fringe: A case study of Estonia

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### ABSTRACT

Urban land use has been a major driving force behind land use change in Estonia since regaining independence and land reform process in the 1990s. The study summarizes land use change, land management and planning practices in the urban fringe over a period of 20 years with the aim of introducing a sustainable land use policy in highly fragmented suburban land. The processes and dynamics of land use change are explored using cartographic and landscape metrics analysis. The liberal-conservative planning practices have resulted in ad hoc allocation solutions which have created dramatic changes in land use in Estonia during the 1990s and 2000s. The patchy and scattered suburban land is formed by occupying former agricultural land, natural grasslands and forests. In the framework of physical planning, the land use, spatial and urban changes are related to master plans. The nature of the evolution of land management and the deficiencies of institutional framework are discussed as factors in inefficient land use in the sprawling suburbs. A further debate on the feasibility of encouraging land use diversity in peri-urban zones is advocated.

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### Introduction

Land use planning in suburban neighbourhoods is a matter of economics, environment, social well-being and politics (Albrechts, 2003). Hence, there are numerous negative aspects and critical implications associated with land use in suburban and urban sprawl. It is quite unclear what the socio-economic and environmental cost of inefficient land use in suburbs is and how to address it, in short-term as well as long-term. The lack of knowledge and agreement is largely due to a lack of consensus on what constitutes sprawl and the forces driving it (Hoggart, 2005; European Environment Agency, 2006). The city regions' complexities, their impact on land use and development could be managed, but not easily. While it is generally recognized that sprawl is initiated by individual choices regarding land use and location, the collective understanding of factors influencing personal decisions and of the accumulation of these decisions over time and space to create sprawl is inadequate. Analysing instances of farmland loss due to urban sprawl, and searching for market-based instruments to regulate land use often overlook real in situ land allocation and landscape conditions (EEA, 2006; Squires, 2002). Territorial planning of land use is identified for regulating the growth. Yet in many instances, land use policy and physical planning practice are

not supported by applied research that would weigh local circumstances and environmental pressures to enable them to be more responsive to changing circumstances, and deliver planning decisions and land allocations in a more professional, transparent, and timely manner (Royal Town Planning Institute, 2001; Barker, 2006). The causes and processes that create land use patterns are often poorly understood, sometimes due to a lack of research, but often also because of the format, and unavailability of data that represent land use patterns. In principle, the relevant spatial pattern within a landscape is revealed only when the scale of analysis approaches the operational scale of the phenomenon studied (Naess and Jensen, 2004; Wu, 2004). In the present study, suburban processes are matched with the operational scale of physical planning with master plans and parcels as survey elements.

Focusing on land allocation in the suburban zone, suburbanization refers to a population growth in the periphery of the urban area at the expense of the core city (Champion, 2001). In Europe, the sprawl is defined as the physical pattern of low-density expansion of large urban areas under market conditions mainly into the surrounding agricultural areas (European Environment Agency, 2006). In order to better understand the influence of land use changes in suburbs and to predict the impact of future land use changes, it is necessary to consider the economic, social and environmental factors influencing land use. Socio-economic impacts often determine the types of land use within a given region and these, in turn, affect environmental aspects (Palang et al., 1998). The main socio-economic motive for suburbanization is the desire of the inhabitants to improve their living environment (Timar and Varadi,

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2001). The rise of the middle class, automobilization and the development of market-based relations can be pointed out among the factors shaping the process (Tammaru et al., 2009). The following preconditions for suburban land use can be shortlisted in the post-communist Estonia:

- privatization and restitution of suburban land;
- prevalently liberal-conservative market ideology and the resulting modest regulation of land use;
- property price divide between the core city and suburban land;
- biased land management (either aggressive development pressure or unsystematic use);
- inexperience of local governments in land use planning.

While Western Europe already reached the re-urbanization phase, in Estonia, similarly to other Central and Eastern European (CEE) countries, since the late 1990s the cycle of urbanization had turned from urbanization to suburbanization with major implication in land use (Kok and Kovacs, 1999; Tammaru et al., 2004; Van Kempen and Vermeulen, 2005; Kulu and Billari, 2006; Pichler-Milanović et al., 2007; Palang and Peil, 2010). Suburbanization, particularly in the form of urban sprawl is traditionally perceived as a negative process as it produces functionally homogenous zones (Hoggart, 2005). There is a clear link between suburbanization, land fragmentation and decline in landscape diversity while the proportions of new settlements and other land use types are not homogenous and tend to be strictly separated throughout a defined space (Kasanko et al., 2006). Ensuring that urban expansion has the lowest possible environmental cost can be achieved through effective land use planning.

The current paper focuses on land use policy directed at suburbanization on the basis of spatial analysis of land use. The modelling scheme aims to measure the urbanization processes, land use and landscape change through the use of a simple set of spatial indicators, a common database, statistics methodology, pattern metrics analysis, and other assessment methods of spatial dynamics. The aim of the analysis is to interpret land use changes, practices, and policies in the urban fringe arising from high socio-economic dynamism in Estonia. Detailed data of the Tartu urban region as a prototypical mid-size city of 100,000 inhabitants, a university city and a regional economic and service centre, are employed to demonstrate the implications of land reform and fast suburbanization in the course of two decades since the early 1990s. The spatial extent of urban development in the region is limited to the five adjoining municipalities of Tartu, defined as a peri-urban zone. It discusses a framework for modelling and decision support in the urban fringe. Coherent multidisciplinary understanding will assist in designing a land use policy for sustainability in suburban areas.

#### *Land reform and statutory planning in the context of suburban development*

The impacts of societal change on the Estonian landscape during the Soviet period have received most attention (Palang et al., 1998). In early 1990, the Estonian economic policy was steered to the right, towards ultra liberalism and throughout the 1990s, restitution set the scene on the land property market. As a result of the restitution policy, land properties were restored directly to the former owners in just a few instances; in fact, land was typically a subject to appointment to several heirs, which resulted in highly fragmented land plots. Land fragmentation affects the agricultural sector most of all, though there is impact on all other, including urban uses (FAO, 2004). Land consolidation should be the most important procedure in Central Europe as it would assist in creating properly functioning rural land markets (Van Dijk, 2003; Pasakarnis and Vida, 2010).

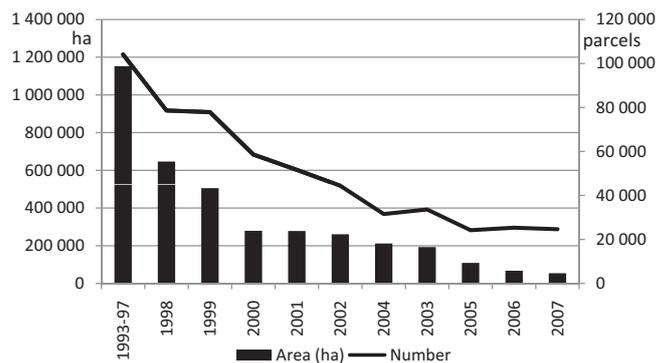


Fig. 1. Registering parcels in the Estonian cadastre.

In Estonia, land reform started already in 1991 when the Land Reform Act was adopted (Virma, 2004). The purpose of land reform is to restore property rights, meet the requirements of market economy, and manage local land assets for intensifying land transforming relations based on state land ownership into relations primarily based on private land ownership. Land is returned according to its former boundaries, planning and land use planning requirements, or by agreement between adjacent neighbours. Land which has not been returned and has not been retained in state ownership or transferred into municipal ownership has been subject to privatization (Jørgensen, 2004). Alongside the implementation of land reform, privatization and land restitution, a well functioning land market has been created in Estonia. The organization and structure of land possession has changed dramatically. In 1996, the legal framework of land reform was modified by increasing the titles of actual land users. The process of land registering in cadastre has slowed in the 2000s (Fig. 1). Overall, land reform had a stimulating effect on national economy.

The tightening of the restitution principle led to a slowing down of the restoration of former property rights, because of the increased complication of the judicial process (Alanen, 1999). A sharp turn towards an ultraliberal economic policy together with difficult internal and external circumstances favoured ad hoc type solutions in farms, and undermined the target-oriented character of the land reform. Also, property rights allude to a complex web of relationships, not least concerning decision-making and its spatial articulation (Maandi, 2009). Although Estonia demonstrated a national commitment to environmental sustainability related to joining the European Union in the first half of the 2000s, there is a need to strengthen land use policy on physical developments in the urban fringe.

A statutory planning system provides a regulatory framework for the physical use and development of the land resource in the public interest. According to Estonian law, planning in urban areas, in high-density built environment is clearly distinguished from rural planning. The areas subject to suburbanization, treated by legislation as rural, are located at the furthestmost cutting edge of urban growth. Municipality councils are the focal decision makers for spatial development. Local comprehensive plans were issued massively in the second half of the 2000s. Still, smaller municipalities prefer to consult private planning companies before major decisions. Comprehensive plans indicate zoning by the function of land use and define how large the new allotments in development areas will be. As this can and has resulted in fragmented and unsystematic land use, there is a growing demand for improved land use planning and policy-making that would take into account socio-economic and environmental concerns in suburbanization.

## Materials and methods

Effective land use planning is based on the knowledge of its context, and planning activity needs to be rooted in an understanding of the field in which it operates (Fainstein, 2005). A full range of impacts of urbanization should be considered in land use practice which compounds impacts in respect to environmental resources, urban and adjoining, affected rural environments. Tracking suburbanization processes to provide information and enhancing standards for land use planning compounds various spatial modelling techniques. Sub-models combine a spatial urban database, indicator systems and a model for calculating landscape metrics, a land use model for quantifying land use changes and its visualization in topical mapping. The indices and indicators are chosen depending on the objectives of the case study, information available in the national (Statistical Yearbook of Estonia, 2008) and Eurostat databases (Eurostat, 2004), directions and sensitivities of indicators, and the relative importance of these indicators. The urban–rural gradient is one of the techniques commonly used to investigate how urbanization is changing the processes across the landscape (Luck and Wu, 2002; Hahs and McDonnell, 2006). However, in studies of peri-urban zones, there is great variability in how urbanization is quantified (Theobald, 2004).

There is a focus on defined spatial dynamics, in particular on suburban land use and landscape change. The relevant aspects of urbanization are assessed on the levels of administrative units, master plans and parcels. Master plans are treated as key tools in delivering land use planning in urban areas. The analysis comprised suburbs where the reference area had its own administrative identity, or where the adjoining local authority areas participated

significantly in the city life. Developing a working definition of urban and rural features quantifies basic information on the urbanization process and land use change. Vector data represents land use, soils, green network and parcel units as polygonal figures. Environmental indicators related to land use and landscape metrics were derived on the basis of the Estonian basic map (1:10,000) and soil map (1:10,000).

Suburbanization has a clearly visible influence on the landscape pattern. The basic group of measures examined in this study, the landscape metrics, arises from the discipline of landscape ecology, and describes the nature and configuration of patches in the landscape (Turner et al., 2001; Hertzog et al., 2001; Luck and Wu, 2002). Pattern metrics analysis yields quantitative measures of spatial configuration critical to understanding not only the pattern but, more importantly, the process. Thereby, landscape metrics is used as one component for the development of a sustainable spatial planning tool for analysing suburbanization. Landscape metrics were computed using Patch Analyst, an ArcView GIS extension (Elkie et al., 1999; Rempel and Carr, 2003). Metrics can be calculated for the entire suburban area or for a specific landscape element. Patches are defined using a basic map and a combination of demographic and physical variables. Calculating the value of landscape metrics proceeds independently from the characteristic properties of patch types. At the same time, many of the available landscape metrics are highly correlated, and thus do not provide considerable additional information (McGarigal and Marks, 1995). The Tartu county plan, adopted in 2001, composes basic data on land uses, physical development and infrastructure. A suburban green network has been composed on the basis of CORINE land cover and the Estonian basic map (1:10,000). The temporal

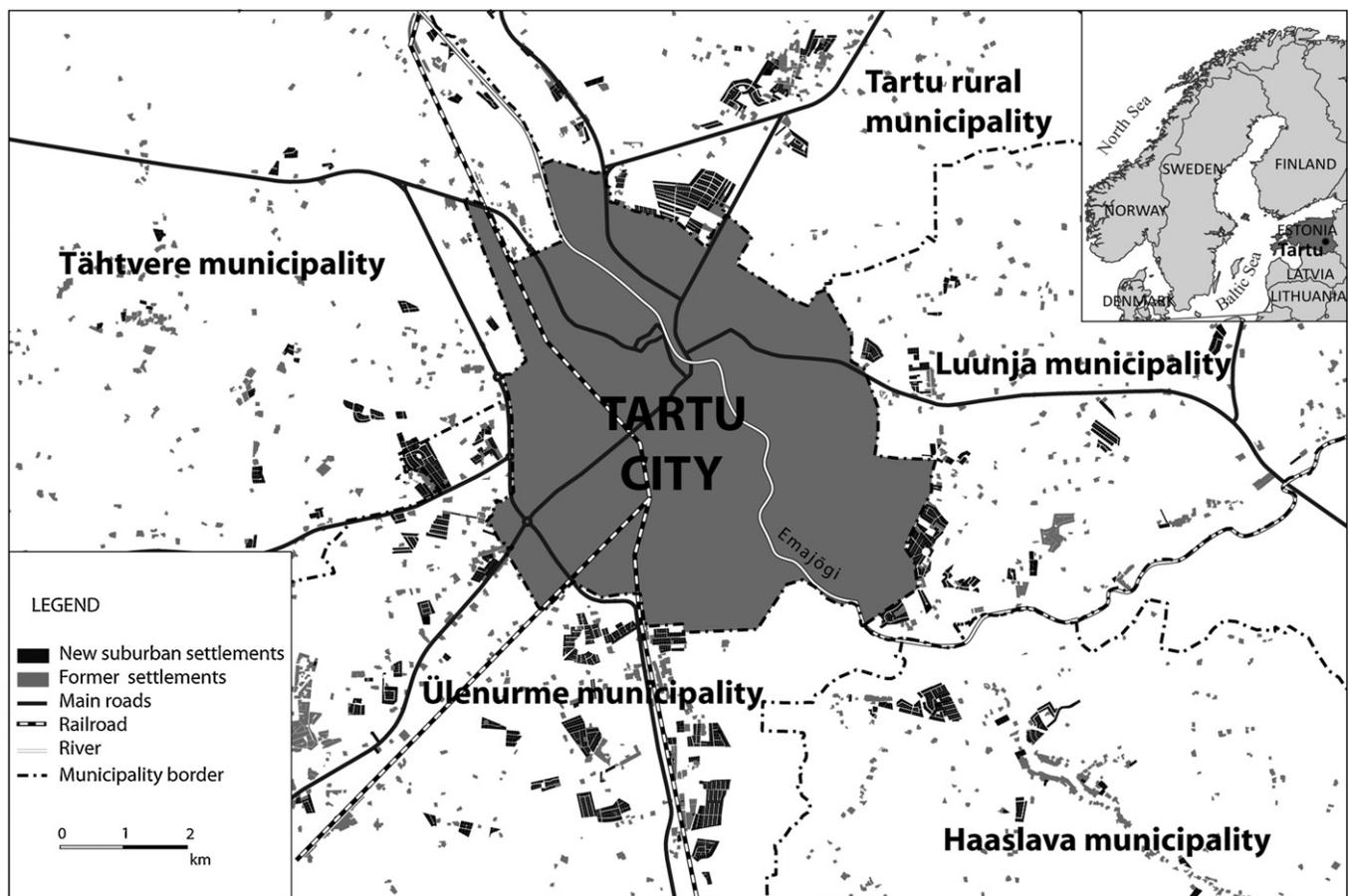


Fig. 2. Map of suburban settlements in the Tartu urban region.

resolution of content data, which is updated annually, is often high as well.

The university city of Tartu with its five fringe municipalities in Southern Estonia with an extent of 740 km<sup>2</sup> was chosen as a case study area (Fig. 2). Tartu is the second largest city in Estonia which belongs to the group of medium-sized cities on the European scale with its population of 98,000. As the regional pole of Southern Estonia it fulfils a central role as Estonia's leading research, educational, health-care, and administrative centre. The latest extensive wave of urban development in the Tartu area has been ongoing since the late 1990s. In the 1990s, Tartu County was the only county in Estonia to have a positive net migration on all levels, countywide, in the urban fringe as well as in the periphery.

## Results

### Suburban land use change

In the 1990s, many settlements around Tartu were underdeveloped, being still affected by de-collectivization, rural restructuring and diversification. Hence, these agro-villages had substantial potential for residential growth. The development of suburban settlements in the Tartu urban region displays the typical suburban growth in Estonia since 1998 (Table 1 and Fig. 2). The suburban zone with a radius of seven kilometres from the city centre has been witnessing large changes in land use where mainly grasslands and abandoned former arable lands have been converted to suburban settlements. The first wave of suburbanization runs along major roads and agglomerates larger rural settlements like Ülenurme. Accessibility is the primary criterion – most settlements are located in the vicinity of main roads and the most distant settlements are present only along state roads. In the late 1990s and early 2000s, residential plots tended to become spacious, up to 3000 m<sup>2</sup> in size. There are developments of a higher standard in localities of attractive natural scenery, and more remote or unfavourable allocations with budget housing with plots of 1000–1500 m<sup>2</sup> in

size. Since 2003, widespread access to mortgages has opened up the opportunity to purchase single-family houses to a growing number of people from upper middle class, which resulted in extensive suburban residential development. Ad hoc land use policy and case-by-case planning has been prevailing during the rapid suburbanization in mid-2000s.

Since the early 2000s, land development concentrated on the following uses:

- Sporadic plots for residential use: when plots are seen as having development potential in the urban fringe, the owner launches master planning.
- Residential development projects: higher number of plots developed by developers.
- Infrastructure land: public infrastructure, landscapers such as shopping malls, roads and bypasses.

The residential development projects have been located either on empty parcels, in-fills within existing settlements or as new satellite villages further away from the former settlement. In the Tartu urban region, the development of small real estate projects consisted of 10–20 plots with family houses, with two thirds of the settlements having less than 20 plots. Another area of major residential development has transformed summer cottage settlements into permanent housing in Kõlitse, Aardlapalu, Männisalü, and Kurepalu, similarly to the processes in the Tallinn metropolitan region (Tammaru, 2005; Kull et al., 2007). The migration from the core city to the suburban zone intensified around the turn of the millennium and reached its peak in 2007.

The processes in the peri-urban zone could be well tracked by master plans. In total, 239 master plans and 3616 parcels were analysed in the five municipalities of the Tartu fringe (Table 2). The core city itself was excluded from land use assessment. On average, 15.1 parcels were designed and planned per master plan (464 parcels per km<sup>2</sup>). There is a strong relationship between the distance from the city centre and the size of the master plan area: the average size

**Table 1**  
Timeline of land policies, urbanization and planning practice in Estonia.

Period	Land policy and market	Urbanization process	Development driver	Key areas of urban development	Major features of planning practice and land management	Issued construction permits for new residential developments
1992–1997	Land reform: restitution and privatization	Slow urbanization	Setting property rights and possession	Vacant plots in the core city; single plots at the fringe; individual construction; upgrading summer cottages	No master planning; construction permit based development, shortage of know-how, few districts in the city	2329 <sup>a</sup>
1998–2002	Passive land property market, insufficient supply	Slow suburbanization	Individual choice, foreign investment	Along major roads, small settlements in the fringe, in towns, city developments	Launching master planning and comprehensive city and county planning	7783
2003–2006	Booming land property market, unbalanced demand	Peak of suburbanization/patchy urban sprawl	Real-estate companies, landowners	Mid-size settlements in the fringe, peak of detached houses, apartment houses in the core city, EU co-financed infrastructure	Massive master planning, setting green networks, drafting general plans	34,880
2007–2011	Recession, market recovery, auctioning state land	Slow suburbanization	Major real-estate companies, public projects developed by municipalities and state	Infill in the city as well in suburbs, growing share of semi-detached and terraced houses	Slowing down of master planning, tightening county-level supervision, the adoption of general plans, land consolidation, cross-municipality thematic planning	19,055

<sup>a</sup> Data available from 1996.

**Table 2**

The number of issued master plans and new single-family dwellings planned within the master plan areas 2000–2008.

Suburban municipality	Issued master plans	Area of issued master plans (ha)	New single-family dwellings within the issued master plans
Haaslava	22	71	329
Luunja	44	121	551
Tartu rural	57	168	811
Tähtvere	31	72	248
Ülenurme	85	292	1677
Total	239	724	3616

of a master plan area close to the city is 5.2 ha and this decreases in distant areas to 2.5 ha. The area varies to great extent between municipalities, depending on the availability of attractive land for residential development and the connections to the city. The leading municipality was Ülenurme with 85 issued master plans with the size of 292 ha (see Table 2). However, there is a big gap between issued master plans and actual development (Fig. 3). Only 48% of the planned development was carried out by 2008, which clearly indicates to planning above real demand with the aim of preserving planning and construction rights for the future. Estimates based on the issued master plans allow making a prediction as to the growth in the number of residents. The inhabitant numbers could double in Luunja (ca. 6000 citizens), Tartu (ca. 10,000) and Ülenurme municipality (ca. 10,000) if all master plans are to be developed. On the other hand, it is a long-term prospect depending directly on economic conditions which can be uncertain as the Estonian economy turned to recession in 2007.

The development of suburban land corresponds to the typical configuration of suburban growth (Fig. 2). A distinction between the urban area and the surrounding rural landscape was apparent until the late 1990s. Since the turn of the millennium, new residential estates, as a rule, have occupied the cultivated fields at the city's perimeter, near suburban agro-villages, along major roads, and at garden allotments and summer-house districts. This process is characterized by the increase in the mean area of master-planned residential projects from 1.3 ha to 1.8 ha while the median area of projects in the five municipalities has increased only slightly (from 0.53 ha to 0.55 ha). This indicates that the more remote land is still unaffected by real estate development. Spatial organization remained fragmented into urban low density and rural uses.

Investigation of the change in land uses shows that new residential developments are established on former agricultural land (45.3%), natural grasslands (16.8%), and forests (9.3%) seconded by sparse settlements and farmsteads (27.7%). Master plans with the aim of establishing new residential settlements in forests, wetlands and natural grasslands are more frequent at a distance of 5–10 km from the city centre while arable land clearly dominates

the near-fringe development. New suburban settlements mainly occupy former arable land with fertile soils in the urban fringe. Other targets for development are “natural beauty driven” parcels where gleysols, histosols (6%) and alluvial (1%) soils are occupied in the river valley and at lakeshores.

#### Landscape metrics analysis

Based on the landscape metrics analysis of the present land use and newly issued master plans in the surroundings of Tartu, patchy and scattered land use types characterized by vast discontinuity are formed. At the beginning of the study period, rapid urbanization caused dramatic alteration of land use patterns where former arable lands were fragmented by sparsely located new development parcels along major access roads and in locations of high natural beauty. Landscape mean shape index varied across the peri-urban zone, with the highest values occurring in the Ülenurme municipality (2.38), and in the fringe of the study area. The distribution of the patch types of master plans is highly uniform (Shannon's Evenness Index = 0.96) in all five rural municipalities, their shape is simple (area weighted mean shape index = 1.44), median master plan area is very small (2.1 ha), and their average size is only 4.1 ha (Table 3). The mean area covered by a master plan is relatively similar in Luunja, Ülenurme and Tartu rural municipality (4.6, 4.4 and 4.3 ha, respectively) but much smaller in Tähtvere (3.1 ha) and Haaslava (2.5 ha). The median size of a master plan is even smaller (1.9–2.2 ha). At the beginning of physical planning, the shape of the fringe neighbourhoods has been strictly tetragonous, followed by the so-called semi-curved American-style pattern of suburbs. This led to a decrease in the edge density of settlements from 0.032 to 0.026 on the landscape scale. The majority of land has been allocated for dwellings leaving marginally low proportions for public use. A slightly more complex shape of master plans was dominant in Tähtvere while most regular parcels were indicated in Ülenurme. The general tendency is that new settlements increase at the mean edge length of the built-up area (from 405 m to 480 m), although at the same time the edge density decreases from 0.032 m/ha to 0.026 m/ha.

#### Discussion

##### Implications of greenfield's colonization in the city fringe

Suburbanization was rather slow in the first half of 1990s in Tartu as well as anywhere else in Estonia (Tammaru, 2005). Up to 2002, new residential developments occurred mainly in the vicinity of major roads and former settlements. Land property market was slowly developing, with insufficient supply at the beginning. Over the years, the fragmentation of development areas decreased as the process of restitution increased land availability and the existing newly developed areas provided convenient neighbourhood and infrastructure for the enlargement of urban sprawl and in-fill of earlier settlements. As the economy grew stronger, micro-economic factors, such as rising living standards, price of land, availability of cheap agricultural land, and competition between municipalities resulted in extensive residential developments in the urban fringe since the turn of millennium. It is estimated that over 55% of the new residential development in the urban fringe occurred between 2003 and 2007. Suburbanization slowed down in 2007 as the economy turned to recession.

The primary precondition for suburbanization or urban sprawl in Estonia has been the availability of free land for development. The restitution and privatization of land took place in patches, and this did not follow any geographic logic from the perspective of land use planning. The second precondition has been the

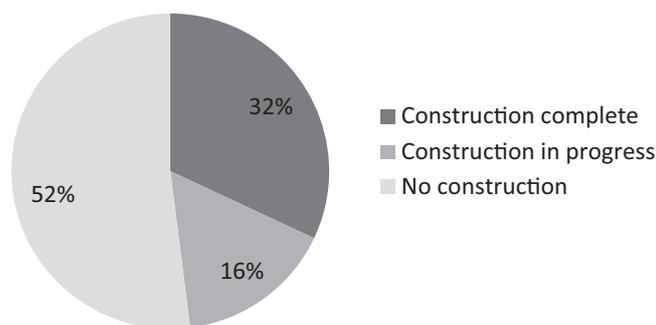


Fig. 3. Deployment of planning and construction rights by plots in the Tartu suburbs by 2008.

**Table 3**  
Landscape indices by master plans and settlements.

Index	New master plans <sup>a</sup>	Former and new settlements	Former settlements
Class area (ha)	1112.1	3951.8	2839.7
No. of settlements	274	2157	2109
Mean patch size (ha)	4.1	1.8	1.3
Median patch size (ha)	2.1	0.55	0.53
Patch size coefficient of variance	143.6	348	321
Patch size standard deviation (ha)	5.96	6.4	4.1
Total edge (km)	22.8	103.5	85.4
Edge density (m/ha)	0.021	0.026	0.032
Mean patch edge (m)	851.8	479.6	404.9
Mean shape index	1.35	1.21	1.19
Area weighted mean shape index	1.44	1.71	1.50
Mean perimeter–area ratio (m/ha)	0.039	0.055	0.057
Shannon's evenness index	0.960	–	–

<sup>a</sup> Adjoining master plans may form a new settlement or become part of an existing settlement if adjoining with its border.

willingness of city residents to upgrade their housing and to move from Soviet-era flats to single-family dwellings while, at the same time, maintaining an urban lifestyle and strong connections with the core city (Kostinskiy, 2001; Sykora and Cermak, 1998; Tammaru, 2005). The third precondition has been easing mortgage conditions and economic boom. Real estate developers took advantage of low land prices and the shortage of supply. Private housing developers and commercial banks became the new key actors in housing construction (Tammaru, 2005).

The results of this study indicate that the process of land use planning in Estonia reflects shortage of planning know-how in many cases allowing the promotion of ad hoc and case-by-case schemes and the overruling of general plans if available and issued. Poor planning control of land subdivision has been rather a rule than an exception during the exponential growth. Master plans have been issued for relatively small developments (average master plan area is 4.1 ha with 15.1 building parcels) and they do not often coincide between each other or with the comprehensive plans. As a result, development, in spatial terms usually patchy and scattered, is characterized by discontinuity, leaving numerous empty spaces which indicate the inefficiencies in development and highlight the consequences of uncontrolled growth. The neighbourhood layout has been strictly tetragonal in early stage, followed by the more complex semi-curved pattern. Too much emphasis is placed on the delivery of quantity, namely land supply rather than the benefits of quality and allocation choices. A theory of the sprawl must treat space as multidimensional to account for the relative distance among agents as well as the spatial distribution of key sources of landscape heterogeneity and supporting environmental resources.

Most of the developments took place on former agricultural land as the economic basis for agriculture has been weaker than the investment power of the urban sectors. Rural uses, mainly farming and forestry, have become mixed with peri-urban activities and uses such as residential estates and industrial parks. Due to suburbanization, some traditional village-based settlements have merged into the city agglomeration. The colonization of many areas in the urban fringe that were previously considered too rural and disconnected has been a defining feature of suburbanization in the region. In conventional cases, the degree of landscape diversity and fragmentation gradually decreased when urban land use types became dominant (Jenerette and Wu, 2001; Herold et al., 2003). Only legal measures can protect the 'weaker' functions (agriculture, recreation, cultural heritage) under pressure, and give an economic basis for the equitable peri-urban development or green continuities.

Forms of suburban development differ significantly from place to place and vary from greater and rather autonomous new settlements to individual projects of separate single-family dwellings. Inevitably, there has been some dilution of sharply distinguished uses, to create a unique landscape, interfacing town and country,

labelled the rural-urban fringe. These areas have been created more by accident than comprehensive planning and design: less favoured urban uses such as sewage works, processing units, wholesale centres have been pushed away from residential areas. Like in most other European suburban developments, there is a clearly distinctive feature affecting suburban development in its early stage – due to an ongoing land restitution process there is a spatially continuous suburbanization along roads. A highly urbanized landscape is actually more homogenous and better-connected than a rapidly urbanizing landscape in the case of Tartu. In-fill development, which can help reduce patchiness, has been rare, though the degree of fragmentation is expected to be reduced through bigger residential developments. Landscape metrics proves to be an effective method to describe urban sprawl and changes in land use, though on the contrary it fails to provide solid information on what is specifically problematic about a particular case of development as it often misses the dynamic component of the sprawl and is therefore difficult to utilize in the planning policies and processes.

#### *Forming a land use policy for suburban growth management*

As a conclusion of the case studies we pose a critical question for further debate: does the land use planning system in Estonia need radical change? Also, what is the role of local authorities in the development of new suburban settlements and, specifically, how does the interaction between the public and the private sectors and confronting interests shape the geography of these developments, often affected by highly fragmented possession and neo-liberal conditions? Regarding legislative context, neither European Union nor Estonian laws act directly and comprehensively against urban sprawl since municipalities are the ultimate authorities in land use and physical planning (European Environment Agency, 2006). In practice, the myriad of dispersed decisions shape outcomes in the peri-urban zone. Since the mid-1990s, when the government initiated the decentralization of planning regulations which led to the devolution of county-level powers, each municipality has become the primary administrator of planning in its territory. Still, planning capacities are weak and decentralized, having little control on the county level, poor regional coordination, and sporadic local participation. Residential development is more guided by detailed plans for small parcels of land initiated by private developers than comprehensive strategic land use plans and general plans of the municipalities. As a result, the majority of new developments remain vaguely planned and allocated, being in many cases without any links to comprehensive planning and master planning. After a period of highly speculative and disorganized urban growth in the mid-2000s, the impending economic recession since 2007 has opened up a phase of increased concern with environmental and social justice and equity in suburban planning.

The present land management regime, allowing separate agreement of municipalities with developers, promotes further losses of productive farmland, and causes further deterioration of the green network and environment. The old pattern of rural settlement confronts the sprawl but, at the same time, municipalities would like to attract capital in investing in residential infrastructures. The de-concentration of the central city is generally a favourable circumstance, apart from the fact that it poses a great challenge to the administrative and planning capacity of the local government. Recently, the co-operation between neighbouring municipalities in harmonizing physical planning has improved in Estonia (Noorkõiv and Sepp, 2005).

## Conclusion

The article addresses land use changes in the suburban zone of mid-sized city in the context of liberal land policies and loose planning controls. The Estonian case study provides a model for analysing and interpreting suburbanization at sparsely populated region, that is, aggressive urban sprawl during economic growth. We argue that although land reforms have promoted economic growth and urbanization processes, under existing land use regulations continued urban sprawl is increasingly dysfunctional in terms of land use and socio-economy. The locations of new residential settlements are chosen according to the availability of land, mainly occupying agricultural land as well as pressurizing the green network. Planned residential development areas have been quite small, with an average of 15.1 plots per master plan, often without any joint planning elements between each other. As a result, patchy and scattered suburban land allocations characterized by vast discontinuity are formed.

It is not possible to explore fully how much the Estonian land use policy and its artefacts followed a planned or chaotic path. Suburbanization was rather slow at the beginning of 1990s, but as the economic conditions improved, residential development added a lot of pressure to the greenfields in the urban fringe, especially between 2003 and 2007 when over 50% of the developments from total took place as a response to an economic boom that had peaked in 2006. Massive master planning indicates the establishment of suburban settlements but also a legal approach – preserving planning and construction rights for the future. The conflicts among diverse policies and regulations that focus on the planning rights of rural land have generated intense ‘overbooking’ in suburban land parcels as only 48% of the planned development has been carried out.

The critical task is to manage the growing demand for development land, both by ensuring more efficient use of urban land taking into account regional plans for the settlement system, service centres, the transport network, and the green network. The dominant way to narrate the Estonian urban sprawl is to stress the proactive, private–public partnership approach instead of the uncertain trial and error, and coincidence. Policy-makers demonstrate institutional learning and the capacity to intertwine the key actors of land use and suburban development in developing and promoting physical and land use planning. The private sector played an even more important role. It is obvious that new policies and tools are necessary to direct urban expansion so land allocations are optimal and landscape diversity is preserved.

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