ESPON

EUROPEAN UNION

Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

APPLIED RESEARCH SPIN-OFF //

SUPER – Sustainable Urbanization and Land-use Practices in European Regions

Croatia – Spin-off

Final Report // April 2021

This Applied Research Spin-off is conducted within the framework of the ESPON 2020 Cooperation Programme, partly financed by the European Regional Development Fund.

The ESPON EGTC is the Single Beneficiary of the ESPON 2020 Cooperation Programme. The Single Operation within the programme is implemented by the ESPON EGTC and co-financed by the European Regional Development Fund, the EU Member States and the Partner States, Iceland, Liechtenstein, Norway and Switzerland.

This delivery does not necessarily reflect the opinions of members of the ESPON 2020 Monitoring Committee.

Authors
Ivana Katurić, Mario Gregar, Sven Simov, Ranko Lipovac URBANEX (Croatia), Giancarlo Cotella, Erblin Berisha, Donato Casavola, Politecnico di Torino (Italy), Mailin Gaupp-Berghausen, Cristian Andronic, ÖIR GmbH - Austrian Institute for Regional Studies (Austria), David Evers, PBL - Netherlands Environmental Assessment Agency (The Netherlands).

Advisory group
Ingrid Gojević, Croatian Institute for Spatial Development (Croatia);
ESPON EGTC: Marjan van Herwijnen (project expert), György Alfoldy (financial expert)

Information on ESPON and its projects can be found at www.espon.eu.
The website provides the possibility to download and examine the most recent documents produced by finalised and ongoing ESPON projects.

ISBN: ISBN: 978-2-919795-76-5

Layout and graphic design by BGRAPHIC, Denmark

Contact: info@espon.eu

Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

APPLIED RESEARCH SPIN-OFF //

SUPER – Sustainable Urbanization and Land-use Practices in European Regions

Croatia – Spin-off

Final Report // April 2021

Table of contents

List of maps, figures, charts and tables

List of maps

List of tables

Abbreviations

EMS	European macroseismic scale
ESPON	European Spatial Planning Observation Network
EU	European Union
GDP	Gross Domestic Product
GVA	Gross Value Added
ITI	Integrated Territorial Investments
OG	Official Gazette
RDNA	Rapid Damage and Needs Assessment
SUPER	Sustainable Urbanization and land-use Practices in European Regions

Executive summary

The ESPON SUPER project produced evidence on how to promote sustainable urbanization and land use in European regions. Among other activities, 11 case studies were carried out, including one for Croatia. This results and policy recommendations of the project were then bundled for decision makers and policy makers in the SUPER *Guide to Sustainable Urbanisation and Land use*. In order to evaluate the ability to implement these recommendations and to increase the national, regional, and local relevance and application of ESPON's evidence in policy processes and developments at different scales, a SUPER spin-off was created to conduct new research at the request of the Croatian Ministry of Physical Planning, Construction and State Assets. This study seeks to apply the results and recommendations of the SUPER project, particularly the Guide, to post-earthquake reconstruction in Croatia.

A first step in the process was to understand the territorial and institutional context. This was done by performing a literature review of legal, academic, and other sources, including the SUPER Croatian case study. In addition, quantitative research was conducted to describe and understand the main socio-economic, territorial, and morphological land-use transformations occurring over the last two decades. Using SUPER data on land use, a series of maps, tables and charts were produced that display the socio-territorial transformation of the country and identify key trends. This analysis revealed, for example, that Croatia faces serious demographic, economic and environmental, and land-use challenges, but also that the study area generally has a more favourable territorial development with respect to the country as a whole. Together with Ministry officials, key actors from different sectors and planning levels were identified as potential interview partners.

The main work of the Croatian spin-off study focused on the development of the legal and financial framework for reconstruction planning after the March 2020 earthquake in Zagreb and December 2020 earthquake in Petrinja. The first earthquake hit the Croatian capital, resulting in enormous damage to vital public services and public institutions. The damage area of the first earthquake includes the City of Zagreb, Krapina-Zagorje County and Zagreb County, which coincides with the area of Zagreb Urban Agglomeration, established for the implementation of the Integrated Territorial Investment (ITI) mechanism. The overall process of reconstruction is complex and therefore a customized legal framework was needed to provide the best response. The process of post-earthquake reconstruction is managed by the Act on the Reconstruction of Earthquake-damaged Buildings in the Territory of the City of Zagreb, Krapina-Zagorje County and Zagreb County. During the development of this study, in late December 2020, a new, even stronger earthquake occurred in nearby Sisak-Moslavina County (Petrinja) with devastating effects. As the study was in its final stages, in February 2021, the Act on Reconstruction was amended to include new affected area after the second earthquake. This new Act was not included in the study due to territorial differences (rural, underdeveloped, etc.) and the fact that the interviews had already been conducted. However, the recommendations should apply to the newly affected area as well.

The Act on the Reconstruction of Earthquake-damaged Buildings was not developed to manage land management or development process, but to provide financial and management framework for the post-earthquake reconstruction process. The Act is not directly related to spatial planning but to rehabilitating buildings. The renovation of damaged buildings itself will deal with the immediate problem, but the wider environmental, social and economic issues in urban areas remain unresolved, as this is the task for spatial and strategic planning. Given that the Act was recently adopted and the reconstruction process has only just begun, its effectiveness can only be seen after some time. On the basis of similar events in the European Union (EU) in the past, reconstruction can be time-consuming.

This spin-off resulted in numerous conclusions and recommendations for integrating sustainable urbanisation and land-use instruments for future natural hazards. To ensure resilience and preparedness, both pre-event as well as post-event recommendations are provided. These were drawn up by linking together general recommendations of the ESPON SUPER project, the conclusions derived from the Croatian case study and the insights gained from the conducted interviews (five in-depth interviews and one multi-sector focus group). These recommendations are structured as a list of potential interventions and policies for decision makers and policy makers at the national and local levels.

For decision makers on the national level, the research offered the following recommendations: (1) adapt a legal framework to support reconstruction, (2) strive for better coordination of the spatial and strategic planning system, (3) ensure a stable financial mechanism for post-earthquake reconstruction, (4) identify

financial resources for a broader process of integrated urban revitalisation, (5) promote coordination during post-earthquake reconstruction and revitalisation process, (6) bolster political will in multilevel governance and to (7) establish a more efficient framework to manage cultural heritage and cultural assets. Policy makers on the national level were urged to: (1) promote knowledge transfer and capacity building and (2) engender cooperation and coordination between sectors.

For decision makers at local and county level, the study produced the following recommendations: (1) promote long-term post-earthquake reconstruction planning through integrated urban revitalisation, (2) think multidimensional, (3) adopt an integrated approach in decision-making and (4) strengthen the participative approach in urban development projects. For policy makers at the local and regional levels, the study gave the following suggestions: (1) adapt spatial plans, (2) conduct continuous and efficient land management, (3) rehabilitate neglected and illegal areas to create resilience, (4) improve hazard resistance of public and private buildings and spaces, (5) assure safety as priority, (6) focus on plan implementation for post-earthquake reconstruction and integrated urban revitalization, (7) implement interventions that ensure the sustainability of urbanisation and land-use, (8) apply good practices regarding green infrastructure and circular management of buildings and spaces, (9) strive for densification and regeneration, (10) preserve cultural heritage and (11) ensure public participation of citizens and private stakeholders during the post-earthquake reconstruction process and integrated urban revitalisation.

Many urban areas in Europe, especially in the Mediterranean areas, could learn a lot from this case study. Earthquakes are infrequent, unpredictable, so they are often not seriously considered during urban development planning. But when they do happen, they cause great physical damage as well as undermine urban functions and services. It is therefore important to emphasize at the EU level the need to strengthen resilience to earthquakes and other natural hazards in order to preserve sustainable urbanisation and sustainable land-use.

1 Introduction

The ESPON Sustainable Urbanization and land-use Practices in European Regions (SUPER) project provides recommendations on how sustainable land use can be promoted and unsustainable urbanization avoided, reduced and/or compensated in Europe, its cities and regions. More in particular, the project:

- provided a conceptual framework to understand urbanization and land-use dynamics
- gathered and analysed evidence on urbanization and land-use developments within the ESPON space in the 2000-2018 period;
- gathered and analysed evidence on policy interventions, including EU policies, and their relative success and sustainability;
- gathered and analysed evidence on how interventions affect land-use practices through case study research within a wide diversity of territorial contexts;
- drew up a comprehensive sustainability assessment framework and applies this to three urbanization scenarios for 2050 (compact, polycentric, and diffuse).

This SUPER spin-off study was conducted at the request of the Ministry of Physical Planning, Construction and State Assets of the Republic of Croatia. The original intent was to integrate the knowledge presented in the *SUPER Guide to Sustainable Urbanization and Land Use* (ESPON, 2020a) in their policymaking. Croatia was already a location of one case study during the SUPER project implementation. That case investigated the effect of the Protected Coastal Area (PCA) within the Physical Planning Act on development practices; the case study report can be found on the ESPON website as Annex 3.7. (ESPON, 2020d).

In the meantime, in 2020 Croatia was hit by a devastating earthquake near Zagreb. The rebuilding process will be guided by the new Act on the Reconstruction of Earthquake-damaged Buildings in the Territory of the City of Zagreb, Krapina-Zagorje County, Zagreb County (Official Gazette, 102/20) as well as Sisak-Moslavina County and Karlovac County which were added later (Official Gazette, 102/20, 10/21). This comprises as one of the most important acts affecting the urbanization of Croatia's capital and its environs. At the initiative of the Ministry of Physical Planning, Construction and State Assets of the Republic of Croatia, the spin-off research activities were shifted to this topic. As a result, the primary goal of this spin-off became more implementation-oriented: the provision of guidance and recommendations to support the implementation of the Act while promoting a more sustainable use of land. The main policy questions identified by Croatian representatives were:

- What does the current Croatian land use look like?
- Which externalities play a significant role in the Croatian context?
- Do the interventions regarding earthquake reconstruction adequately address sustainable urbanization and land use aspects?
- Which interventions hold potential for promoting sustainable land use at the regional and local level?
- How could the national programmes 'green infrastructures in urban areas' and 'circular economy of spaces and buildings' provide added value towards sustainable urbanization and land-use?
- What lessons can be drawn from interventions put in place elsewhere at various territorial levels?

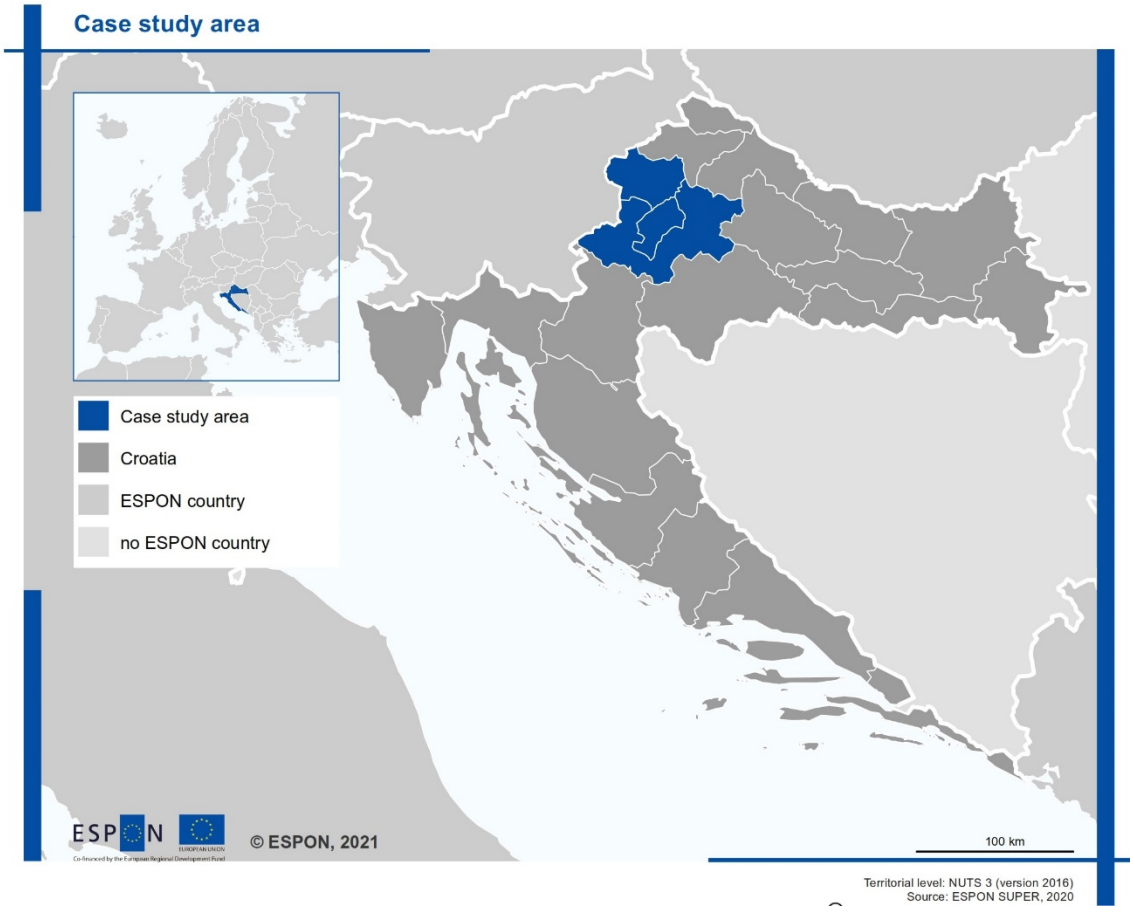
The present report provides answers to these questions. Chapter 2 discusses the approach and methodology taken to this end. Chapter 3 examines the territorial and institutional context in Croatia, with a special emphasis on the earthquake affected area. Chapter 4 contains a comparative analysis of Croatian interventions versus similar examples elsewhere in Europe. Chapter 5 contains conclusions and recommendations for Croatian decisionmakers and policymakers.

2 Approach and methods

2.1 Definition of scope and objectives

Between May and July 2020, the ESPON EGTC, service provider and the Ministry of Physical Planning, Construction and State Assets of the Republic of Croatia met to identify policy objectives to be investigated during the SUPER spin-off research activity, which officially commenced in September 2020. It was agreed to analyse the sustainability of the reconstruction process of the earthquake that hit Central Croatia in March 2020, which corresponds to the three counties: the City of Zagreb, the surrounding Zagreb County and Krapina-Zagorje County to the north. In late December 2020, another earthquake occurred and, consequently, new areas were added to the post-earthquake reconstruction policy. The new areas were excluded from the analysis because the damage and needs assessment was still ongoing. Nevertheless, the recommendations should be valid for the new earthquake-affected areas as well. The geographical delineation of the study area is shown on Map 2.1.

Map 2.1
The scope of the study area (City of Zagreb, Zagreb County and Krapina-Zagorje County)



Source: authors' elaboration
Note: The City of Zagreb is in the centre of the Zagreb Urban Agglomeration. The northern part of the ring is Krapina-Zagorje County, while the other surrounding part is Zagreb County.

2.2 Survey activities

2.2.1 Territorial analysis

Quantitative research was conducted to describe and understand the main socio-economic, territorial, and morphological land-use transformations occurring over the last two decades. Using SUPER data on land use, a series of maps, tables and charts were produced that display the socio-territorial transformation of the country and identify key trends.

2.2.2 Institutional analysis

One of the first tasks was to draw up a review of the literature to familiarize the project team with the Croatian situation. This included academic book chapters, articles, conference papers and statistical data as well as an analysis of the ESPON COMPASS country reports on Croatia (ESPON, 2018) and the SUPER case study on Croatia (ESPON, 2020d). The search was expanded to include an analysis of norms, laws and amendments concerning land use in the country with a particular emphasis on the post-earthquake legislation.

2.2.3 Identification of key actors

Together with the Ministry of Physical Planning, Construction and State Assets, key actors from different sectors and planning levels were identified as potential interview partners. Care was taken to: (1) have a heterogeneous sample – aiming at presenting a multiplicity of voices and evidence; (2) have a balanced point of view (public servants, private experts etc.) and (3) cover different land-use planning levels (from central to local). The Ministry and service provider agreed on the final list of potential interviewees.

2.3 In-depth analysis

2.3.1 Expert interviews

The interviews (five in total with an additional multi-sector focus group) took place between October 2020 and mid-February 2021. The interviewees were asked to participate in a semi-structured interview using a specific list of questions (the interview protocol is included in the technical report). During the interviews, local experts were relatively free to expand the discussion.

2.3.2 Selection and analysis of Croatian interventions

According to the SUPER project, land use is influenced in part by the introduction of all kinds of public-sector interventions (ESPON, 2020a). The project distinguished five intervention types according to their aims and scope (densification, regeneration, containment, governance, and sectoral policies). The project also distinguished five intervention types according to the kind of instrument being deployed (e.g. visions and strategies, rules and legal devices, and regulations, programmes, and projects).

This activity focussed on interpreting the SUPER Guide and Intervention Database from the perspective of Croatian post-earthquake reconstruction. Four data collection methods were employed to select interventions in Croatia: (1) input provided directly by the Croatian Ministry of Physical Planning, Construction and State Assets, (2) an analysis of the ESPON COMPASS national project reports and the SUPER case study report (3) suggestions provided during the interviews (4) literature review and targeted searching. The fourth method provided the most results, while the third provided important information necessary to fill in the gaps and to evaluate the aspect of sustainability. In the end, the spin-off identified and analysed 13 interventions that somehow deal with sustainable land use in Croatia.

2.3.3 Selection and analysis of European interventions

At stated, this spin-off applies the *SUPER Guide to sustainable urbanization and land use* (ESPON, 2020a) and the SUPER Intervention Database to a specific country. The objectives are: (i) to highlight if the country's development is in line with the main European trends; (ii) to select a preliminary set of examples of interventions that can be useful for the elaboration of recommendations (iii) to identify opportunities and warnings. This exercise was helpful to craft and select recommendations and suggestions for promot-

ing sustainable land use. This analysis resulted in the selection of 13 salient interventions from the SUPER project.

2.3.4 Crafting and validating recommendations

For the purposes of testing and discussing the policy recommendations an online focus group workshop was conducted on 5 March 2021. Participants from the Ministry of Physical Planning, Construction and State Assets and the City of Zagreb, representatives of Zagreb Urban Agglomeration, independent architect and civil engineer as well as representative of associations of architects, had the opportunity to express their opinion and advance proposals for modification and adjustments. Their valuable feedback was integrated into the final version. The recommendations concern not only the Croatian case, but all earthquake-affected areas in Europe.

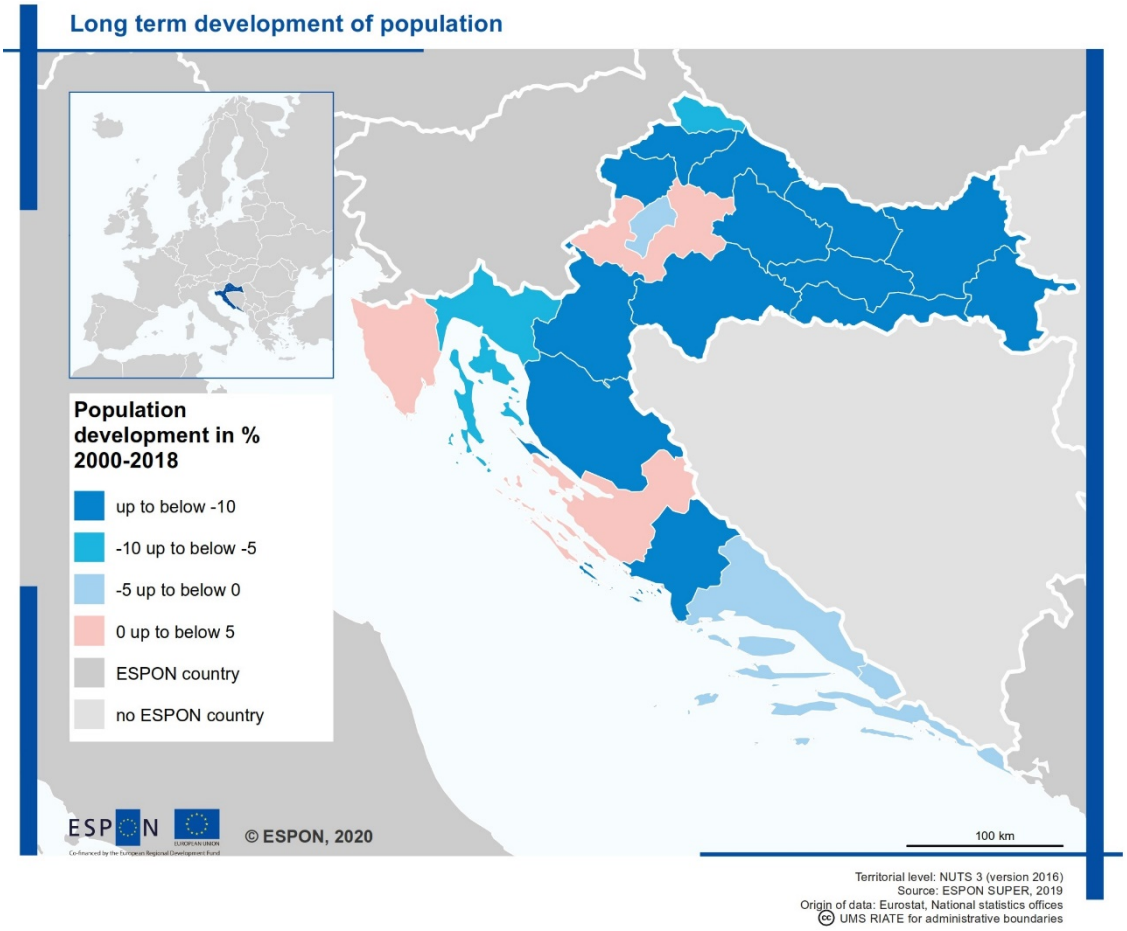
3 Territorial and institutional context

3.1 Main drivers of land-use changes

3.1.1 Demographic development

Demographic fluctuations are one of the main drivers for land-use change. The population of Croatia is declining and ageing rapidly (see Map 3.1). At the regional level (NUTS3), only three counties in Croatia have gained population (but no more than 4%): Zagreb County, Zadar County and Istria County. The study area has slightly better demographic indicators than other parts of the country, mostly due to the socioeconomic advantages of the capital city of Zagreb. Still, in the 2000-2018 period, the City of Zagreb experienced a slight population decline of -0.34%, while Zagreb County, the immediate suburban area surrounding the capital, grew by a modest 0.43%. This indicates demographic stagnation which, as we shall see, is caused by migration. Krapina-Zagorje County, located in the rural north of the capital (behind the mountainous area of Medvednica) had a strong population decline in the 2000-2018 period with -13.98%.

Map 3.1
Population change in Croatia in 2000-2018



Source: authors' elaboration

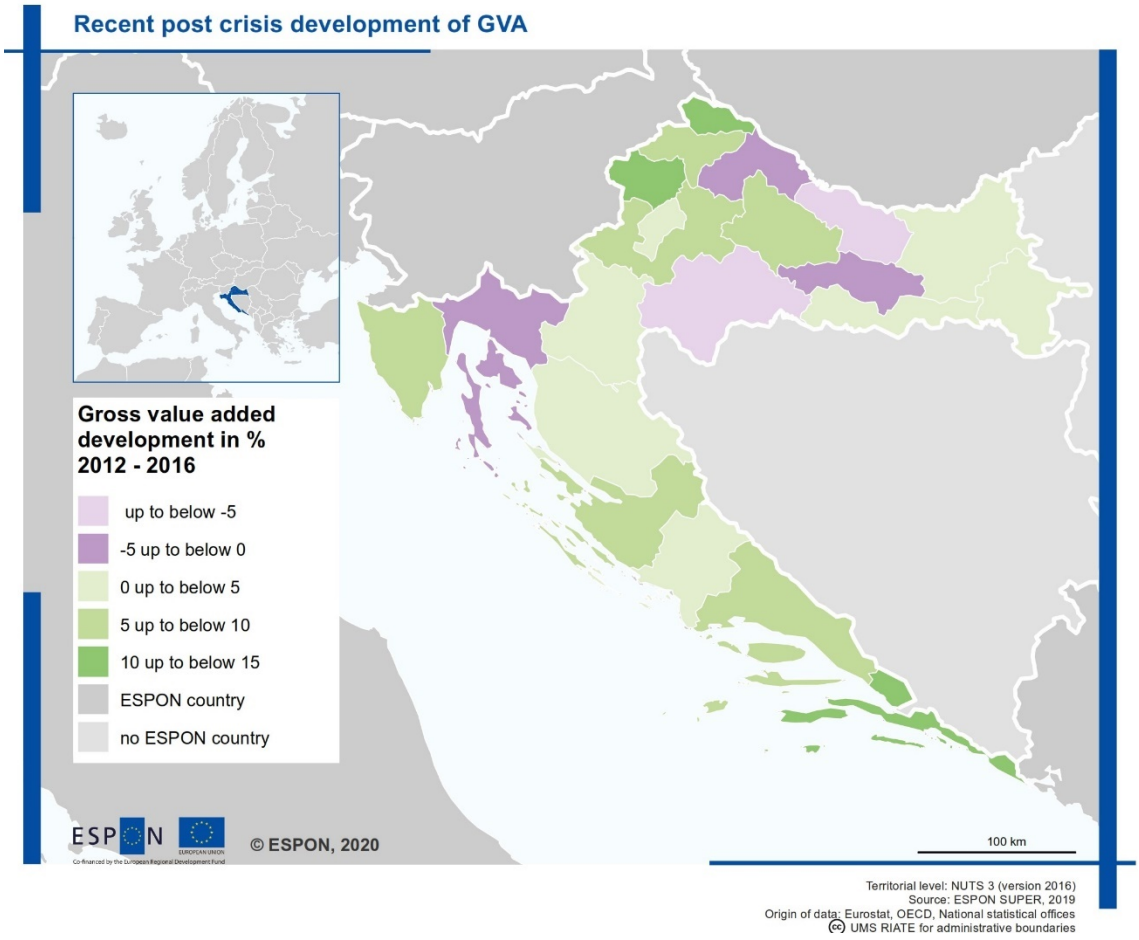
Internal migration is another important factor for population development. Only two counties recorded positive net migration rates: the City of Zagreb and Istria County. The Croatian coast is highly influenced by tourism, while continental Croatia struggles with negative migration (Spatial Development Strategy of the Republic of Croatia, OG 106/17). Due to its economic growth and employment possibilities, the study

area scores slightly better than other parts of continental Croatia (City Office for Strategic Planning and Development of the City, 2017). The City of Zagreb's average 3% net migration rate in 2014-2018 offsets its negative natural population change. It is mostly younger and working-age population who migrated (World Bank, 2019). On the other hand, Zagreb County experienced -3.5% net migration and Krapina-Zagorje County -2.9%. Migration directly affects the need for housing and therefore impacts urbanization.

3.1.2 Economic development

A main driver of urbanization is economic development. This creates demand for industrial areas, warehouse spaces, shops, offices, but also influences socioeconomic developments that drive housing demand (Arbaci, 2007). In terms of Gross Value Added (GVA), Croatia performed well compared to most European countries, thanks to tourist-sector growth and European Union membership in 2013. The study area was one of the most prosperous areas in this period. Krapina-Zagorje County had the best national results: a GVA increase of 13.7%. Zagreb County as a direct suburban area of the City saw an increase of 7.4%, while the City of Zagreb increased by 4.1%. The City of Zagreb is the strongest economic centre of Croatia, where nearly one third of national GDP is concentrated. This analysis indicates positive economic indicators that helped attract population, and with it demand for urban uses.

Map 3.2
GVA development in Croatia in period 2012-2016 (post-2008-crisis)



Source: authors' elaboration

3.1.3 Employment development

Employment directly drives demand for housing and work locations. In the 2000-2016 period, Coastal Croatia recorded the highest employment increases, due mainly to tourism and associated activities like

construction and manufacturing (Spatial Development Strategy of the Republic of Croatia, OG 106/17). Zagreb saw the highest growth in employment with 17.0% more employed in 2016 than in 2000. In the same period, the number of jobs in Zagreb County shrunk by -3.5%, and in Krapina-Zagorje County by -2.8%. Most of Continental Croatia fared even worse.

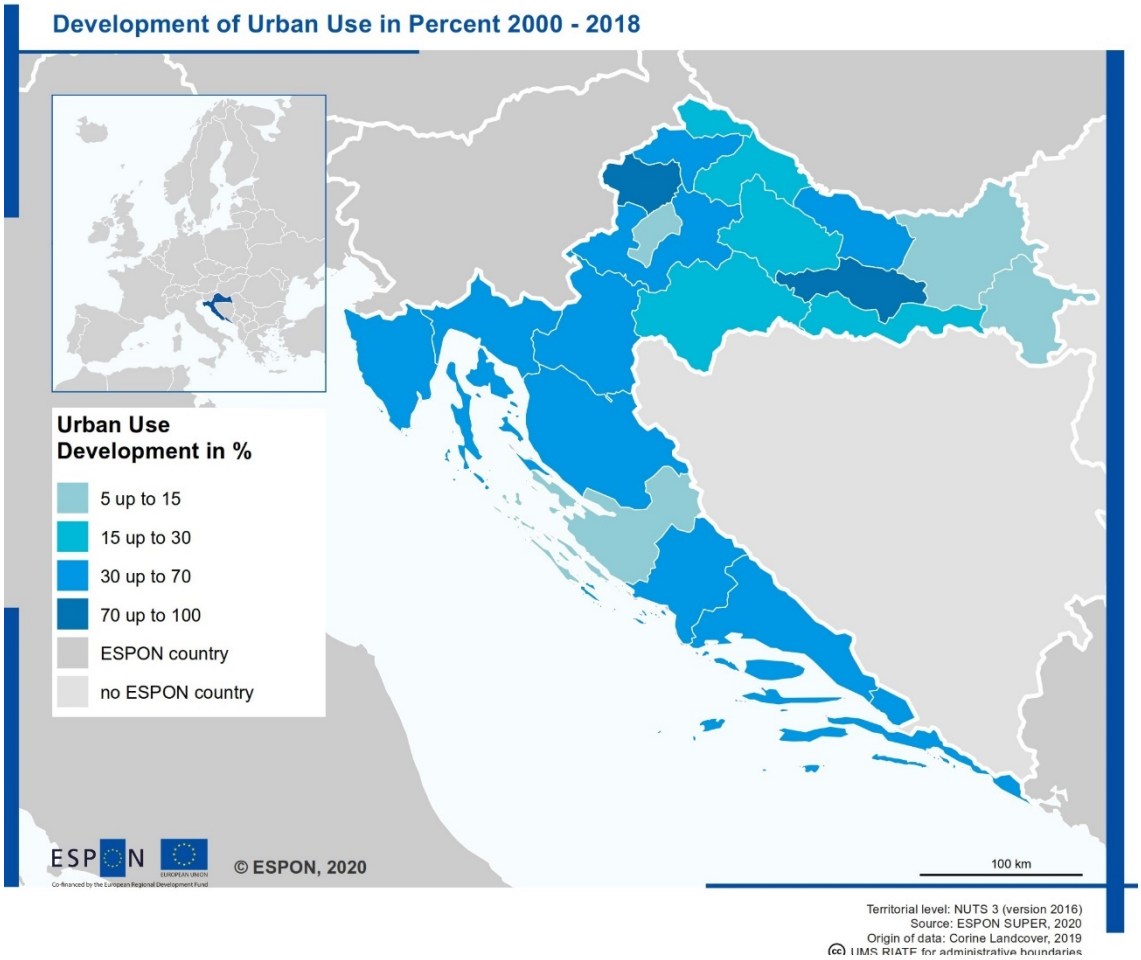
3.2 Main land-use changes

Based on Corine Land Cover data provided by the Copernicus Institute, it has been possible to explore land-use change in Croatia using four different measurement years: 2000, 2006, 2012 and 2018, which translates into three change periods 2000-2006 (pre-crisis), 2006-2012 (crisis) and 2012-2018 (recovery).

3.2.1 Urbanization

Urban use increased throughout Croatia in the 2000-2018 period (Map 3.3). Coastal and Northern Croatia grew more than Central or Eastern Croatia. Krapina-Zagorje County experienced the highest growth rate at 93.2%. Urban use in Zagreb County increased by one third (34.0%), while the City of Zagreb grew by 8.5%. The City of Zagreb grew the most between 2000 and 2006, while the other two counties grew the most between 2012 and 2018, corresponding to Croatia's entry into the European Union and the recovery from the 2008 crisis.

Map 3.3
Urban use development in Croatia in period 2000-2018



Source: authors' elaboration

Between 2000 and 2018, Croatia urban use per capita increased considerably. However, this indicator should be seen through the lens of depopulation. In the study area, the City of Zagreb grew by 17.9 m^2 per capita, Zagreb County by 126.8 m^2 per capita, and Krapina-Zagorje County by 136.5 m^2 per capita.

3.2.2 Change in urban form

Not only the magnitude of urbanization is important for sustainability, but also the way this physically occurs. To investigate this, the SUPER project assessed urban form according to five development models: compact, compact/polycentric, polycentric, polycentric/diffuse and diffuse. The analyses revealed that the Croatian main structure is highly heterogeneous but generally leans towards more compact modes. Looking at the change to the main structure since 2000, it is worth noting that this has occurred in a more polycentric manner, indicating that the Croatian main urban structure is becoming more scattered.

When zooming into the study region, there is a clear distinction between the urban form of the core city and its environs. The main structure of the City of Zagreb has 'compact-monocentric' characteristics. The main structure area of Zagreb County (polycentric-diffuse) is result of the development of 'satellite cities' around the nation's capital running outwards along the main transport routes. The substructure of Zagreb County is relatively compact, however, with many rural areas near the city still relatively intact (City Office for Strategic Planning and Development of the City, 2018). The main morphological structure of Krapina-Zagorje County is 'compact linear' due to the hilly terrain; urbanization occurs in the valleys along the main transport routes towards Central Europe. Its substructure is polycentric due to its historical development as a traditionally agrarian county, with many villages adorning the hilly terrain.

With respect to the changes in the 2000-2018 period, it is evident how urbanization in the City of Zagreb occurred at the edges of the urban fabric, categorized in the SUPER project as 'compact – in edges'. Zagreb County on the other hand is under suburbanization pressure, so the changes in the main and substructure are more diffuse, falling into the categories 'polycentric – new cores' and 'polycentric – in edges'. New, small-scale projects are realized in villages in this metropolitan region, transforming traditionally rural areas to suburban ones. The changes in Krapina-Zagorje County exhibit 'ribbon development' characteristics due to the hilly terrain and linear urbanization along transport routes.

3.3 Institutional context

3.3.1 State structure and planning system

The Croatian spatial planning system is determined in the Physical Planning Act (Official Gazette, 153/13, 65/17, 114/18, 39/19, 98/19) and its bylaws. Following the principle of an integrated approach based on a comprehensive view of the use and protection of space and an organized hierarchical system (national, regional, and local spatial plans), in theory the Croatian spatial planning system can be considered as a model of a *comprehensive integrated approach*. In practice, it is a *land-use spatial planning* which, under the influence of ESIF, steers towards the *comprehensive integrated approach*, but it is not completely matured and settled. In addition to the three main levels of government, there is cooperation between the City of Zagreb, Krapina-Zagorje County and Zagreb County. This tri-county region drew up the Zagreb Urban Agglomeration Development Strategy (City Office for Strategic Planning and Development of the City, 2017). The spatial scope of the agglomeration is coincidentally also the area affected by the 2020 Zagreb Earthquake. This catastrophic event has created a new sense of urgency with respect to urban reconstruction, renovation, regeneration, and revitalization and underscored the need to take a more coordinated and strategic approach.

The development of a spatial plan begins with a decision on its initiation made by a competent authority. Topics contained in the draft decision include: a spatial survey report, objectives/priorities of strategic development documents, interests of individuals/groups and updates of the legislative and strategic framework. The decision is then forwarded to the sectors that can submit requests or offer input. After processing input from the public debate and the Strategic Environmental Assessment, the proposal is finalized and sent to the representative body for adoption. The main spatial planning institution in Croatia is the national Ministry of Physical Planning, Construction and State Assets which develops and coordinates the development and implementation of the National Spatial Development Strategy.

The post-earthquake reconstruction is a long-term process that includes the first responses to save lives, preparation of emergency housing, damage assessment, preparation of measures, development of reme-

diation and reconstruction plans, implementation of material damage remediation, reconstruction of buildings and seismic reinforcement. Immediately after the 2020 Zagreb Earthquake, rapid damage and needs assessment (RDNA) started on the usability of affected objects/property. About 25,000 buildings were inspected and marked, and over 5,000 were deemed either temporarily or permanently unusable. Soon afterwards, a legislative and financial framework was drawn up in the Act on the Reconstruction of Earthquake-Damaged Buildings in the Territory of the City of Zagreb, Krapina-Zagorje County and Zagreb County (Official Gazette, 102/20) and the First Programme of Measures for the Reconstruction of Buildings Damaged by the Earthquake in the City of Zagreb, Krapina-Zagorje County and Zagreb County (Official Gazette, 119/20).[1] In September 2020, the Expert Council for Reconstruction was established, which performs advisory and, if necessary, other tasks related to professional issues in the implementation of the Act on Reconstruction. In October 2020, the Fund for the Reconstruction of the City of Zagreb, Krapina-Zagorje and Zagreb County was established to perform professional and other tasks of preparation, organization, and implementation of the reconstruction of damaged buildings and monitoring the implementation of the Programme.

3.3.2 Current land-use practices

Many European cities (especially those cities affected by transition from a state to free-market system) face problems of urban decline and decay. In Croatia, there are many areas that once had flourishing economic and social functions, but today experience severe challenges (especially brownfields). The City of Zagreb has neglected urban spaces, while Krapina-Zagorje County faces fragmented urbanization. The interviewees indicated there is a room for improvement of the spatial planning of these areas in the context of sustainability, especially in the direction of transport development, green infrastructure and brownfield redevelopment. The lack of coordination is evident with respect to the administration of the Integrated Territorial Investment (ITI) policy. A large part of ITI funding is focused on individual objects without an overarching strategy that considers the wider conditions that generate urban stagnation in the first place. Some interviewee stressed the need to integrate (currently draft versions of) the Programme for the Development of Green Infrastructure in Urban Areas and the Programme for the Development of Circular Management of Space and Buildings in the area of City of Zagreb, Krapina-Zagorje and Zagreb counties as it would provide higher spatial quality and greater social, environmental and economic benefits. This would also help enable the post-earthquake reconstruction process to promote sustainable land-use. Support of strong, stable and effective political will is needed since the spatial effect of containment and regeneration initiatives usually takes time to be seen.

Another important warning could be seen in the lack of territorial awareness which is often due to a shortage of knowledge, data and technical capability. Additional training is needed as well as strengthening the management structure of public administrations to improve cooperation. The interviewees also stated the importance of involving stakeholders at the regional and local level, especially those responsible for spatial and sustainable development issues. In addition, it was deemed advisable to link financial mechanisms to involvement of citizens and the community. At the national level, the Environmental Protection and Energy Efficiency Fund is important as it provides the possibility of (co-)financing green and sustainable construction.

The stakeholders noted an increase in awareness of sustainable development in recent years by citizens and a growing need for citizen participation in decision-making on the future development of their communities. The interviewees therefore call for more ‘expert knowledge transfer’ to support containment policies.

[1] The Act’s short-term objectives include structural reconstruction of buildings with reinforcement of structural elements to allow them to withstand future earthquakes, and to provide immediate protection from further damage. Longer term objectives are the protection of the historic urban fabric of the city, renovation of public buildings and buildings protected as cultural property and to purposefully spend public funds with maximum control and public oversight. The Act provides for: 1) reduction and simplification of documentation required for reconstruction, reduction of costs and shortening of time needed for preparation; 2) establishment of the Reconstruction Fund; 3) organization and implementation of renovation of damaged buildings, repairing structure, complete renovation of building; 4) construction of replacement family houses; 5) financial assistance for the necessary temporary protection of buildings and to provide its secure functionality; 6) financial assistance for the execution of works on renovation of damaged buildings for owners who renovate buildings themselves; 7) temporary and permanent housing care for persons affected. (Official Gazette, 102/20, 10/21).

They felt that the post-earthquake reconstruction process did not adequately accept the opinions of experts and the community, for example by building at replacement houses in the planned new settlements at higher densities. The historic core of the City of Zagreb, which suffered the most damage, is a complicated case. Due to its compactness, further densification is difficult but not impossible. There is a potential for the regeneration of neglected blocks and their courtyards which would also help tackle the problem of old, substandard housing stock. Moreover, inadequately organized and outdated transport systems, waste management, water supply and other urban infrastructure, large derelict brownfields, neglected historical heritage pose a real challenge to sustainable land use.

3.4 Main challenges

Croatia is facing a series of challenges that will influence the next decades of territorial development. Land use is a complex phenomenon: socioeconomic, institutional, and cultural factors all intertwine in their impacts on space. The most important challenges within the next period in relation to land-use in Croatia and its sustainability are:

- *Lack of a long-term vision for post-earthquake reconstruction*– Since there is no long-term vision to accommodate short-term steps into a wider framework, there is a high risk of uncontrolled territorial development and less sustainable land use.
- *Need for integrated urban revitalization* – Urban spaces need to be viewed in combination with their surrounding areas in which they have strong functional interrelations. Urban revitalization therefore should be as comprehensive as possible (e.g. including social, economic, environmental, architectural factors).
- *Need for a more participatory approach* – Urban and rural areas should be created together with the inputs from its residents as they will be the final users after the development. Lack of participatory approach and turning towards a top-down approach can undermine functionality and transform residents into opponents if they feel left out of decision-making.
- *Adjustment of spatial planning documents to support post-earthquake reconstruction process* – To secure the conditions for the effective implementation of the post-earthquake reconstruction measures and integrated urban revitalization, a revision of spatial plans in the earthquake-affected areas is needed. Within the spatial planning system, it is necessary to first create a framework for selecting safe locations for construction (creation of spatial layers - fault maps, revised maps of seismic spaces, potential landslides, etc.) and then plan accordingly.
- *Lack of horizontal and vertical cooperation* – There is a strong need for improving cooperation between different levels of authorities (local, regional, national) as well as among different sectors on the same level of authority (various ministries, etc.).
- *Support better coordination between strategic and spatial planning* - In order to make viable plans, better coordination is needed between strategic and spatial planning. Separately, the full spectrum of sustainable development cannot be taken into account.
- *Need for improvement of the land management system* - To ensure sustainable urbanization and land use before, during and after post-earthquake reconstruction, it is necessary to continuously address property issues, especially cadastre, land registers and property rights which together form the basis for all land management activities (including integrated revitalization).
- *Protection of cultural heritage* – There is a need for further development of plans for the protection of cultural heritage as well as deciding upon which sites should be preserved in their original state and which should receive minor adjustments to fit today's needs, and to find a model of creative management.
- *Risk management and preparedness* - Developing new plans of risk management as well as including risk management and preparedness as important features in current spatial plans is advisable.

4 Interventions at home and abroad

This chapter presents an in-depth analysis and critical reflection on how the ESPON SUPER project can help Croatian public bodies address territorial development. It does so by comparing interventions according to their type. By learning about relevant experiences elsewhere in Europe, Croatian policymakers should be in a better position to make the right choice at home. With respect to the Croatian interventions, 13 examples were identified through the literature review and interviews and entered into the SUPER intervention database to facilitate a comparative analysis. Afterwards, 13 examples from abroad were selected from the *SUPER Guide to sustainable urbanization and land use* (ESPON, 2020a) and the SUPER intervention database according to their scope, lessons learned and relevance.

4.1 Visions and strategies

Based on the evidence gathered by the SUPER project, one of the characteristics of successful visions and strategies is setting ambitious, future-oriented, and, even more importantly, realistic objectives (ESPON, 2020a).

4.1.1 Examples from Croatia

Five strategies in Croatia were identified as relevant to post-earthquake reconstruction:

- *National Development Strategy until 2030* – This strategy steers the country's development until 2030. In the context of sustainable land use, the most important points are: (3) efficient and effective judiciary, public administration, and management of state assets; (8) green and energy transition for climate neutrality; (10) sustainable mobility; (12) development of assisted areas and areas with development specifics.
- *Spatial Development Strategy* – This is the main national document for steering spatial development in Croatia. The priorities are: 1) sustainability of spatial organization; 2) preservation of the identity of the space; 3) transport connectivity; 4) energy system development; and 5) resilience;
- *National Programme for the Development of Circular Management of Space and Buildings for the period 2021-2030* (draft) - This sets the framework for future project financing in this area and identifies pilot projects that will test the implementation of various projects;
- *National Programme for the Development of Green Infrastructure in Urban Areas for the Period 2021 to 2030* (draft) – This aims to establish sustainable, resilient, safe, comfortable and orderly cities and municipalities in Croatia. It was developed in accordance with the European Green Infrastructure Strategy and the European Green Deal and provides a framework for the implementation of projects related to the development of green infrastructure in urban areas and future project financing. It also identifies pilot projects;
- *Zagreb Urban Agglomeration Development Strategy for the period up to 2020* - This document sets strategic development actions and priorities for the Zagreb Urban Agglomeration. It served as the basis for ITI implementation in Croatia. It sets three main goals: 1. improve the quality of life, public and social infrastructure, and human resources; 2. develop a competitive and sustainable economy; 3. improve the management of the environment, nature, and space;

The interviewees argued that every successful regeneration initiative needs a well-structured and organized long-term vision and development strategy, which should be drafted together with the local community and relevant stakeholders to ensure the achievement of needed economic, environmental, social and temporal objectives. This helps avoid functional specialization and the creation of monofunctional blocks which ultimately be less resilient. They noted that the Croatian case does not have a comprehensive long-term vision for the post-reconstruction process, rather the focus was put on immediate reconstruction to save lives and to develop a legal framework for state support. Many stakeholders raised the need for a more integrated approach to the revitalization of the affected area.

In addition, urban revitalization and strategic ideas in the spatial planning system should guide urban design, entailing stronger integration of sustainable urbanization and land-use measures. In this sense, the need for a new strategy of Zagreb Urban Agglomeration Development has been identified, which is also

foreseen for the new financial period because the current version was intended for the 2014-2020 period, in accordance with the EU financial framework. This territorial strategy is the basis for ITI implementation. As such, a mechanism exists that can contribute to the development of a more integrated approach.

4.1.2 Examples from Europe

Visions and strategies are instruments that can help decisionmakers and policymakers address sustainable lend use. Over the past few decades, there has been a proliferation of visionary and strategic documents in the field of land use. Visions can define concrete targets as well as new land-use principles in an attempt to alter land development practices. An overview of relevant examples selected for Croatia is presented in Table 4.1.

Table 4.1
Selection of visions and strategies

Name	Country	Intervention type	Main scope	Lessons Learned	Relevance
Red for green: 'contour policy'	NL	Containment	The province Zuid-Holland divided rural areas into several protection categories (contours). The 'red for green' policy links planning permission for new building in the countryside to equal demolition elsewhere.	The strategy was backed by a general provincial urban containment policy, which supports the need for a high-quality vision and strategy.	This could be used in Croatia to achieve the containment and densification in post-earthquake reconstruction.
Masterplan - Cooperative spatial concept for the core region of Salzburg	AT	Containment	This provided an overall long-term vision of key development measures for the entire region in the areas of housing, economy, transport, and landscape.	This contained measures to stop land consumption, manage housing development and reduce environmental pollution. It was supported by participatory planning and a clear vision of future development.	This can serve as an inspiration for the development of an overall strategy for earthquake affected areas to achieve sustainable urbanization and land use.
High density urban expansion	NL	Containment	Amsterdam adopted the concept of 'high urban density expansion' to retain open areas and promote compact yet attractive urban areas. It aims to (i) add building volumes; (ii) transform the urban structure or buildings.	A clear strategy makes it possible to achieve a high level of urban compactness and containment.	Need for a complete strategy to avoid urban expansion during the post-earthquake reconstruction.

Source: authors' elaboration based on ESPON SUPER 2020a

4.2 Rules and legal devices

Sustainable land use can be addressed by deploying specific legal devices, such as binding laws and bylaws, to create a supportive institutional framework (ESPON, 2020a). The nature of initiatives in this category are very diverse are their level of implementation and impact on land use.

4.2.1 Examples from Croatia

Obviously, the Act on the Reconstruction of Earthquake-damaged Buildings in the Territory of the City of Zagreb, Krapina-Zagorje County, Zagreb County, Sisak-Moslavina County and Karlovac County can be placed in this category, but since it provides the framework for financial support for reconstruction, it will be treated as a programme (see Section 4.4). Two other rules and legal devices were identified:

- *The Act on the System of Strategic Planning and Development Management of the Republic of Croatia* - This Act regulates the system of strategic planning, identifying the principle of sustainability as a point of departure. Its objective is to manage the structure of strategic plans, which indirectly affects the post-earthquake development process through strategic planning;
- *Regional Development Act* – This Act regulates the objectives and principles of regional development in Croatia, related policy documents, bodies responsible for regional development management, etc. The main objective is to contribute to the socio-economic development of Croatia, in accordance with the principles of sustainable development by creating conditions to enable all parts of the country to strengthen competitiveness and realize their development potentials.

As stated, the most important stakeholder for post-earthquake reconstruction at the national level is the Ministry of Physical Planning, Construction and State Assets. The interviewed stakeholders argued that this process should be more interdisciplinary, intersectional and interdepartmental including other ministries, especially the Ministry of Economy and Sustainable Development, Ministry of Culture and Media, Ministry of Justice and Public Administration, Ministry of Labour, Pension System, Family and Social Policy, Ministry of Agriculture, and Ministry of Finance.

The interviewees also stressed the importance of involving stakeholders on the regional and local level, especially those responsible for spatial and sustainable development. It was moreover deemed necessary to integrate the ideas of experts from national departments (architects, civil engineers, mechanical engineers, electrical engineers, geodesy engineers, etc.) and experts from scientific institutions. Some pointed out the division between spatial (physical) planning on the one side and strategic planning on the other. Interviewees pointed out that spatial plans should have greater implementation power. In conclusion, a structured and systematic approach to overall post-earthquake revitalization is needed and this should be supported by adequate spatial and strategic planning tools and legal devices.

4.2.2 Examples from Europe

As SUPER highlighted, sustainable land use can be addressed by promoting a series of laws, regulations and norms. This can be targeted in spatial planning as well as via related sectors. It can be done by introducing *ad hoc* laws and norms (e.g. towards land use or environmental protection) as well as or imposing disincentives (fees, *ad hoc* taxes etc.) (ESPON, 2020a). This section offers examples of different interventions in relation of scope and outcome. Within the 'governance' topic, several examples are relevant to Croatian post-earthquake reconstruction:

- In Poland, the Warsaw metropolitan area's planning law and housing policy successfully contributed to both the core city and its surrounding metropolitan area. Its aim was long-term sustainable development (e.g. green corridors, green areas, urban sprawl disincentives).
- In Poland, the Poznan metropolitan area's planning law focused on environmental protection and cultural landscape, providing indicators for degraded areas that require urgent revitalization. However, it failed to achieve expected results due to unsuccessful municipal coordination (ESPON, 2020a).
- In Dresden (Germany), new development on undeveloped land requires adequate (de)sealing measures or 'greening' measures elsewhere within the city boundary; developments in the inner urban area are usually exempted to encourage infill. Developers may carry out compensation measures themselves or pay a compensation fee to the municipal Environment Authority. The objective is to confine built-up land for settlements and traffic to 40% of the total urban land.

Table 4.2
Selection of rules and legal devices

Name	Country	Intervention type	Main scope	Lessons Learned	Relevance
Warsaw metropolitan area - planning law and housing policy implementa-	PL	Governance	This successful planning law and housing policy aims at long-term sustainable development such as green corridors, green areas,	Coordination and political will between stakeholders assure successful imple-	Underlines the need for coordination and political will between stakeholders at all

Name	Country	Intervention type	Main scope	Lessons Learned	Relevance
tion			reduction of urban sprawl etc.	mentation.	governance levels.
Poznan metropolitan area planning law	PL	Governance & Containment	The law focused on environmental protection and cultural landscape and provided indicators for degraded areas that require urgent revitalization.	It failed to achieve expected results due to unsuccessful intermunicipal coordination.	Multilevel governance is needed for post-earthquake reconstruction.
Soil compensation account	DE	Containment	In Dresden, new developments on undeveloped land require adequate (de)sealing measures or 'greening' measures elsewhere within the city. The inner urban area is usually exempted from this. Developers can carry out compensation measures by themselves or to pay a fee to the municipality.	Compensation measures	It gives the option to steer development towards urban areas within the framework of post-earthquake reconstruction.

Source: authors' elaboration based on ESPON SUPER 2020a

4.3 Land-use regulations

Land-use regulations or plans establish binding principles, usually through zoning, that define how land can or cannot be transformed (ESPON, 2020a).

4.3.1 Examples from Croatia

The main interventions in Croatian context are:

- Physical Planning Act –This Act regulates the spatial (physical) planning system in Croatia;
- General Urban Plan of City of Zagreb - The plan ensures the rational use and protection of space;
- Spatial Plan of City of Zagreb – This regulates land-use in the City of Zagreb;
- Spatial Plan of Krapina-Zagorje County - This regulates land-use in in Krapina-Zagorje;
- Spatial Plan of Zagreb County - This regulates land-use in Zagreb.

Stakeholders stated the need for better regulation of the cadastre land registry system, which serves as the basis for reconstruction and revitalization activities. The revision of spatial plans should be preceded by a consideration of individual cultural assets and protected units (urban and rural) and the technological, technical and financial possibilities, economic aspects and likelihood of real-time implementation. Earthquake-affected areas will need to revise their spatial plans to enable reconstruction of individual buildings and to develop policies targeted towards the promotion and management of sustainable urbanization and land-use. Many interviewed stakeholders highlighted problems regarding spatial plans with little implementation power, the lack of a land consolidation mechanism (to overcome land fragmentation) and the problem of frequent changes of spatial plans. Finally, it is necessary to speed up the resolution of property rights issues that are currently form an obstacle for the implementation of the reconstruction programme.

As the morphological analysis revealed, the spatial planning system in Croatia is relatively successful with respect to the containment of natural and rural areas. Great emphasis is put on the preservation of valuable natural areas and the entire national territory is covered by spatial plans. Spatial plans control urbanization by designating urbanization zones, i.e. construction and building areas. A few areas within the City of Zagreb present a delicate problem, particularly areas where illegal building has been legalized, but has not been systematically rehabilitated and regulated. Such construction permanently degrades the space, while subsequent attempts to impose order, ensure adequate transport, communal, social, green and other infrastructure are demanding because there is usually not enough space left. Regeneration seems most successful when the concepts of reuse and integrated sustainable development are included. This

implies the integration of circular management of buildings and spaces, green infrastructure, energy efficiency and different socioeconomic measures into the process of reconstruction.

4.3.2 Examples from Europe

Land-use plans can be deployed both to promote urban development or protect land from development (ESPON, 2020a). Two interesting interventions seem to hold insight for the Croatian case.

Table 4.3
Selection of land-use regulations

Name	Country	Intervention type	Main scope	Lessons Learned	Relevance
'Regionaler Leitplan - Bezirk Mödling' (Regional Master Plan of 20 communities of Mödling)	AT	Containment	A Regional Master Plan was prepared with the support of experts and local community representatives. It was based on: (1) controlling and steering growth (2) protecting, using, connecting and designing green areas and (3) sustainable transport.	Intervention was successful due to its coordinative function across administrative borders.	Multi-level governance is needed for post-earthquake reconstruction process.
Infrastructural Cost Calculator	AT	Densification	The 'Infrastructural cost calculator' is a free online strategic planning tool. It allows municipalities to assess financial costs of urban expansion.	Given that diffuse development generally requires more infrastructural public investment per capita than compact development, this tool could affect local decision making.	There is a need for effective and helpful instruments during the post-earthquake reconstruction.

Source: authors' elaboration based on ESPON SUPER 2020a

4.4 Programmes

Programmes are policy packages aiming at a particular objective over time. They can be used to create favourable economic conditions (e.g. financial schemes, direct investments, development funds) for sustainable land use (ESPON, 2020a).

4.4.1 Examples from Croatia

Even though it is the main legal device for post-earthquake reconstruction, the Act on the Reconstruction of Earthquake-damaged Buildings on the Territory of the City of Zagreb, Krapina-Zagorje County, Zagreb County, Sisak-Moslavina County and Karlovac County (Official Gazette, 102/20, 10/21) should more rightly be viewed as a programme since it sets the framework for financial support in the reconstruction process. The Act organizes assistance for property owners and institutions that have recorded damage; it is not intended to manage the processes of urbanization and land use. The interviewed stakeholders agree that the Act's development was not sufficiently assisted by the spatial planning community and other experts. The Act strives to restore the condition of buildings to their original condition before the earthquake, while the decision on how to improve the condition of these buildings is up to the owners themselves. The interviewees felt that the recovery programme needs to be simplified, and one suggested it should have been divided into two parts: (i) all activities currently clearly provided by Act; (ii) integrated reconstruction planning activities that would cover a wider range of sustainability and development components of individual projects. Finally, the Act envisages the development of the Programme for the Complete Reconstruction of the Historical Core of the City of Zagreb, which will bring together an interdisciplinary group of experts to examine the state of the area in detail from each sectoral aspect and provide integrated reconstruction

activities. However, there is no Programme of restoration of other important historical urban ensembles and valuable urban areas in other counties.

4.4.2 Examples from Europe

Throughout Europe, a number of interesting programmes have been used directly or indirectly to promote fair, equal and balanced land-use practices (ESPON, 2020a) . Two interesting interventions seem particularly relevant for the Croatian case (see also Table 4.4):

Table 4.4
Selection of programmes

Name	Country	Intervention type	Main scope	Lessons Learned	Relevance
22@Barcelona programme	ES	Regeneration	Rehabilitation of 200 ha of industrial land into an innovative district offering modern facilities for intensive commercial and knowledge-based activities.	If supported by a strong political will, regeneration programmes can support sustainable urbanization.	The whole post-earthquake reconstruction process in Croatia needs an efficient programme and strong political will supporting it.
Incentives to increase roof greening in Linz	AT	Regeneration	Incentives to increase greening in built-up areas to reduce air pollution.	Targeted incentives can enhance spatial quality and reduce land consumption in existing urban areas.	The City of Zagreb lacks public green spaces and there is a nation-wide need to implement green infrastructure and nature-based solutions to combat climate change effects.

Source: authors' elaboration based on ESPON SUPER 2020a

4.5 Projects

Projects are *ad hoc* initiatives with a given timeframe. They can be used for the implementation of permanent or provisional of transformations of sites with the aim to foster sustainability (ESPON, 2020a) .

4.5.1 Examples from Croatia

During the research, stakeholders mentioned only one specific project - the Badel block project as a brownfield near the city centre of Zagreb. Badel block represents a complex of a former alcohol factory and refinery and is viewed as cultural property, without clearly designed urban structure and purpose. International tender for project ideas was held and following that, there were already regeneration plans prepared.

4.5.2 Examples from Europe

The quality of projects and their mechanisms of implementation can be aligned with sustainable land-use objectives. Regeneration processes have the ambition to improve unused and problematic sites such as brownfields. In terms of the Croatian case, the area affected by the earthquake damage needs a valid regeneration methodology to achieve sustainability. More specifically, regeneration interventions aiming to revitalize areas to enhance the economic, environmental and social quality and promote long-term sustainable development. Three projects that might help in the Croatian situation all fall into the category of 'regeneration' (see Table 4.5).

Table 4.5
Selection of projects

Name	Country	Intervention type	Main scope	Lessons Learned	Relevance
Reinventing Paris	FR	Regeneration	This project aims to transform underutilized areas to achieve long-term sustainable development. The city asked urban designers to come up with innovative uses for 34 unused or underused areas under city ownership. Most concerned unused metro stations, basements of historic buildings, tunnels freed by banning cars from Seine's lower quay and underground parking lots.	By delegating the idea development to urban designers, it promoted innovation.	Integrated urban revitalization measures (including new innovations) are needed to support the post-earthquake reconstruction.
Community-led regeneration in Casoria	IT	Regeneration	This implemented a series of small interventions in line with a broader urban strategy. From the onset owners of key brownfield sites were asked to provide temporary public access to their land to connect future regeneration sites to the city centre.	Project had positive results in rehabilitation of abandoned areas and the enhancement of public participation.	Participative approach and public involvement is needed to successfully achieve sustainability objectives in post-earthquake reconstruction.
Regeneration of part of the Taht-el-Kale Quarter	CY	Regeneration	The project aimed at the regeneration and rehabilitation of Nicosia city centre sites. Project activities were integrated with several social and cultural projects in the area as a part of a wider sustainable integrated urban regeneration strategy.	The results were seen in the improvement the quality of life for the local population and the stimulation of economic activities.	Possibility to increase sustainability (both social, ecological and economic) during post-earthquake reconstruction.

Source: authors' elaboration based on ESPON SUPER 2020a

4.6 Potentials and warnings

This section sums up the lessons from the selected interventions, both at home and abroad, relevant for the post-earthquake reconstruction process. Those are grouped in main thematic categories: regeneration, governance, containment and densification and discussed according to the intervention type.

In terms of **regeneration**, it should be emphasized that every successful initiative needs a well-structured and organized **long-term vision and development strategy**, which should be drafted with the local community and relevant stakeholders according to participative planning principles. This is important to ensure the achievement of needed economic, environmental, social and temporal objectives. Successful interventions 'listen' to local communities and their needs to achieve a sustainability 'equilibrium' in places where many interests and needs are strongly intertwined. In the current state, the Croatian case does not have a global long-term vision for the post-reconstruction process, a point which was emphasized by many interviewed stakeholders. Instead, focus was placed on the immediate reconstruction to save human lives and to develop a legal framework for state support for the reconstruction. A long-term vision and strategy could positively contribute to the process of reconstruction.

Regeneration seems to be very successful when the **concepts of reuse** and of **integrated sustainable development** are included. This implies the integration of circular management of buildings and spaces, green infrastructure, energy efficiency and different socioeconomic measures into the process of reconstruction. This improve sustainability aspects of reconstruction process. Another major potential for incorporation into the post-earthquake reconstruction process is **to address environmental, economic and social issues at the same time**. By combining these three pillars of sustainability, policy makers and decision makers can achieve a uniform development of space. Such development would encourage all

aspects of development, thus avoiding single-use urban areas and the creation of monofunctional blocks, which ultimately have less resilience to external shocks. On the contrary, warnings for policy makers and decision makers in terms of regenerations are the scarcity of stakeholder involvement and the lack of financial mechanisms.

Participative approach with citizen and stakeholders is necessary to obtain a well-tailored intervention that is oriented to real spatial needs. The interviewees stated that the participative approach was not sufficient during the development of the Act on the Reconstruction of Earthquake-damaged Buildings. Many architects and spatial planners said that the reconstruction of the historic core of Zagreb should be driven by well-structured ideas. The Act on the Reconstruction of Earthquake-damaged Buildings recognized this by setting the need for drafting of the Programme of complete restoration of the historical urban fabric of the City of Zagreb, although not for other important historical sites in the three counties. The need for effective financial mechanisms was well prepared by the Act.

In terms of **governance**, a huge focus was put on improving **multilevel cooperation between stakeholders** which often enhances effectiveness. As stated, a **long-term sustainable development perspective and integrated approach** is needed for success. To assure effectiveness, the need of integrating public priorities with private (corporate or individual) should be emphasized. If the needs of all stakeholders in the area and the needs of all levels of management and development are assimilated, it is possible to achieve successful sustainability and the implementation of interventions with harmonized effects. Also, successful interventions enable adaptive multilevel collaboration and governance. Unfortunately, the Croatian case lacks multilevel collaboration; many interviewees pointed out that the planning community and other sector experts were not sufficiently involved in the process of drafting the Act. According to the SUPER Guide, successful cross-sectoral integration policies should be accompanied and supported by **cooperative governance mechanisms** capable of including different scales and sectoral needs.

In terms of **containment**, the establishment of an **efficient normative apparatus** for the **adoption of legally binding instruments** often seems to improve the success of containment interventions. In Croatia, this potential seems well established since the main instrument is the Act on the Reconstruction of Earthquake-damaged Buildings. Since the interventions in Croatia concern three counties, it is important to achieve good cooperation and coordination between them. Because containment measures take time to take effect, the support of strong, stable and effective **political will** is needed. Also, the engagement with a heterogeneous group of experts or '**expert knowledge transfer'** was important for containment policies. Unfortunately, many interviewees pointed out that post-earthquake reconstruction did not adequately accept the opinion of experts and the community. This is understandable given how quickly frameworks needed to be prepared to commence reconstruction. These kinds of policies drastically impact the social behaviour and quality of life of the local population.

In terms of **densification**, the SUPER Guide stresses that **knowledge, data and technical capacity** is important factor for sustainable urban development. This is needed for the adoption of a **long-term perspective** for urban development. If interventions are not implemented correctly, they might lead to a discrepancy between the objectives and outcomes, undermining legitimacy. This is the reason why a long-term and stable strategy should be developed with **implementational strength**. Another important warning could be seen in the lack of territorial awareness which is often due to a shortage of knowledge, data and technical capability.

In summary, the main messages are:

- Private actors – The inclusion and involvement of private actors;
- Integrated approach – Successful regeneration interventions regeneration are those that promote a long-term sustainable perspective and integrated approach;
- Stakeholders – Cooperation and coordination between stakeholders seems to improve effectiveness;
- Multidimensionality – Addressing environmental, economic and social issues at the same time;
- Long-term vision – The adoption of a long-term vision (e.g. enhance the economic, environmental and social quality of the area and local community);
- Political will – The support from a strong political will (ESPON, 2020a).

5 How to achieve sustainable urbanization

The recommendations developed from the Croatian study are structured into two main parts: those for decision makers and those for policy makers. According to the ESPON SUPER Guide (ESPON, 2020a), decision makers are mostly elected officials, representatives of bodies with decision-making powers, ministerial and departmental officials related to territorial development and land-use management. Policy makers are public administrators and officials in charge of land-use planning and development at the local, regional, and national levels. Additionally, recommendations were structured into two subcategories: national and regional/local.

The recommendations were crafted by linking the recommendations of the ESPON SUPER project to the conclusions of this Croatian study including the conclusions of the interviews. The recommendations contain suggestions for interventions that could be used to support sustainable urbanization and land-use during the process of the post-earthquake reconstruction. In addition, they can also assist in preparing urban and regional areas for the consequences of natural hazards. For instance, since earthquakes are frequent in Mediterranean countries some recommendations address the European level of decision making and policy making. These concern the following:

- **Raise awareness of the need to restore historic urban areas at the EU level**. These areas are concentrations of traffic and social activity and represent unique cultural heritage and cultural identity. It is important to bear in mind the need for a balance between development and preservation in historical urban cores due to their mixed use.
- **Raise awareness of the need to develop earthquake resilience at the EU level**. The EU's Mediterranean area is very prone to potentially devastating earthquakes. In order to reduce physical damage and human casualties, consideration should be given to creating an EU financial mechanism to co-finance seismic reinforcement of public buildings, commercial buildings and residences. It is important to bear in mind that for relatively undeveloped areas or declining areas renovating buildings after an earthquake is not enough: there is a need for a broader process of revitalization and regeneration to ensure environmental, economic and social recovery.

5.1 Recommendations for the national level

5.1.1 Decision makers

The results of the Croatian study produced the following recommendations for decision makers at the central state level, which are also relevant for other EU Member States:

- **Adopt a legal framework to support reconstruction**. The implementation of sustainable land-use policies before and after earthquakes requires a legislative framework, implementing documents, acts, regulations, ordinances and spatial plans. It is also necessary to adapt the broader legal framework to allow the implementation of sustainable reconstruction.
- **Strive for better coordination of spatial and strategic planning systems**. In order to ensure a successful implementation of urban development documents and policies, better coherence and coordination of the spatial and strategic planning system on all the levels is necessary. This is a prerequisite for successful sustainability of urbanization and land-use.
- **Guarantee a stable financial mechanism for post-earthquake reconstruction**. This is needed to organize reconstruction assistance and ensure funds for reconstruction.
- **Earmark resources for a broader process of integrated urban revitalization**. It is important to allow EU funds to be used for the revitalization of earthquake affected areas. Urban areas should be able to use EU Green Deal funds and integrate 'green' measures to achieve better sustainability of urbanization and land-use.
- **Promote coordination during post-earthquake reconstruction and revitalization**. Successful cross-sectoral integration of policies should be accompanied and supported by cooperative governance mechanisms capable of bringing together different scales and sectoral needs between all governance levels. Strong, stable, and effective political will is a precondition since the effects

of containment initiatives take time to become apparent. Cross-sectoral and interdisciplinary coordination of post-earthquake reconstruction should go hand in hand with long-term political, professional and scientific cooperation.

- **Bolster political will in multilevel governance**. When affected areas include several administrative units, cooperation and political will towards a common goal is required.
- **Establish a more efficient framework to manage cultural heritage and cultural assets**. It is necessary to clearly define the approach towards cultural heritage with respect to preservation of original forms versus the development of modern uses as well as finding a model of creative management of cultural heritage. Revitalization does not necessarily imply reconstruction, but can mean using historical elements to inspire the creation of new values.

5.1.2 Policy makers

National policy makers should consider the following points that could help to better address sustainable land use during post-earthquake reconstruction:

- **Promote knowledge transfer and capacity building**. Expert knowledge transfer is vital for sustainable policies. Engagement of a heterogeneous group of experts supports the creation of effective interventions. Moreover, a long-term perspective of sustainable urban development should be underpinned by knowledge, data and technical capacity. Exchanging experiences with other earthquake-affected areas would enable the application of best practices and widen the knowledge base for integrating sustainable urbanization and land-use in the reconstruction plans.
- **Engender cooperation and coordination between sectors during reconstruction**. Multilevel cooperation and coordination between sectors improves effectiveness.

5.2 Recommendations for local and county levels

5.2.1 Decision makers

Decision makers at the subnational level apply central political priorities while respecting local needs and priorities. In so doing, they should be aware of territorial differences which characterize the country and consider the following:

- **Promote long-term post-earthquake reconstruction planning through integrated urban revitalization**. It is necessary to reconstruct damaged urban and rural areas in ways that will ensure both functionality and sustainability. When reconstructing and/or adapting existing buildings and proposing new ones, one should consider modern needs and challenges (e.g. adequate quality of life, climate change impacts, etc.) and potential future disasters and hazards. To meet economic, environmental, social and temporal objectives, a well-structured long-term vision and development strategy is essential. This should be drafted with local community and relevant stakeholders using participative planning principles. Afterwards, the strategy should be granted strong implementation powers.
- **Think multidimensional**. Sustainable post-earthquake reconstruction and integrated urban revitalization requires addressing environmental, economic and social issues simultaneously. By combining these pillars of sustainability, policy makers and decision makers can achieve a prudent development of space that avoids the creation of monofunctional urban areas which have less resilience to external shocks.
- **Adopt an integrated approach in decision-making**. Involve experts of different profiles and expertise in post-earthquake reconstruction and integrated urban revitalization. Strengthen public awareness about the need for an integrated and interdisciplinary approach in the decision-making process.
- **Strengthen the participative approach in urban development projects**. Broad participation should be encouraged for urban development projects, as this can improve public support and raise opportunities for cooperation between public, private and civil actors. This is of particular importance for projects in historical urban cores.

5.2.2 Policy makers

Policy makers on the local level reside at the nexus between spatial planning and development practices; they are on the forefront of everyday urbanization. They should consider the following:

- **Make Spatial adaptive**. To lay the conditions for effective implementation of post-earthquake reconstruction and integrated urban revitalization, it is necessary to revise spatial plans in earthquake-affected areas, but also elsewhere as a preventive measure. It is necessary to use the planning system to create a framework for selecting safe locations for construction (e.g. creation of maps of faults, current seismic areas, potential landslides) and creating an adequate construction typology. Data should be accessible and interoperable for geospatial analyses, which would enhance the cooperation among planners and between different sectors. A new spatial plan type on the lowest level (conservation plan for the historical urban core) can be considered.
- **Conduct continuous and efficient land management**. To support sustainable urbanization and land-use planning before, during and after post-earthquake reconstruction and provide foundations for integrated urban revitalization, it is necessary to resolve property issues, especially within cadastre registries. Also, it is necessary to revise the planned construction sites in spatial plans to avoid the occupation of problematic areas. Urban consolidation should also be considered as a tool for better urban management and revitalization.
- **Rehabilitate neglected and illegal areas to create resilience**. Areas characterized as neglected areas, substandard areas and areas of illegal construction need rehabilitation. Poor construction and management has put these areas at high risk for earthquakes and other natural disasters. Illegal construction undermines sustainable urbanization and land-use, and thus, post-earthquake reconstruction. It also damages the urban structure; subsequent repairs and attempts to 'impose order', ensure adequate transport, communal, social, green and other infrastructure are very demanding because there is usually no room left.
- **Improve hazard resistance of public and private buildings and spaces**. It is necessary to raise safety levels in urban spaces and buildings with respect to natural hazards. It is also necessary to prescribe mandatory spatial standards for hazard risk reduction (planning of urban areas, evacuation routes, collapse zones, etc.) and renewing buildings that do not meet safety requirements. In the process, all responsible parties should be involved. It is also advisable to start with the regeneration of old urban cores, raising standards of vital public buildings (schools, kindergartens, hospitals and social institutions) and developing hazard plans which ensure that reconstruction activities are implemented clearly and in a coordinated manner.
- **Put safety first**. In the event of an earthquake, emergency repairs on buildings and spaces should be carried out immediately to ensure the safety of citizens and solve urgent problems, while long-term reconstruction requires a structured implementation plan supported by spatial planning and strategic documents. Emergency repair measures need to be implemented swiftly but should not undermine future revitalization plans. In affected areas, seismic rehabilitation is a prerequisite for demographic renewal and the return of a sense of security among residents.
- **Focus on plan implementation for post-earthquake reconstruction and integrated urban revitalization**. Post-earthquake reconstruction plans and integrated urban revitalization plans must be well connected to the spatial planning system and the strategic planning system (EU funds). Experts from various backgrounds need to be involved in this process. Simplifying reconstruction programme implementation is also needed as is facilitating good communication between sectors to improve quality and efficiency. When making strategic and spatial plans, special attention should be given to risk management and revitalization.
- **Implement interventions that ensure the sustainability of urbanization and land-use**. When building replacement houses and buildings after an earthquake, it is necessary to direct construction towards the sustainable urbanization goals and to use tools to achieve regeneration, containment and densification.
- **Apply best practices on green infrastructure and circular management of buildings and spaces**. When planning the reconstruction and revitalization of earthquake-affected areas, concepts of green infrastructure and circular management of buildings and spaces can improve sustainability.

- **Strive for densification and regeneration**. Many substandard and/or brownfield areas exist that could and should be regenerated to avoid new greenfield construction. For example, in dense urban areas, courtyards of residential blocks provide potential opportunities. Problematic urban areas should be upgraded or rezoned (e.g. recreation, function for local community and residents, etc.) and require accessibility in times of emergency. Regeneration seems to be successful when the concepts of reuse and of integrated sustainable development are included in interventions. This implies the integration of circular management of buildings and spaces, green infrastructure, energy efficiency and different socioeconomic measures into the process of reconstruction. The need to revitalize brownfield areas and neglected and abandoned urban areas must be integrated with the needs of the post-earthquake reconstruction.
- **Preserve cultural heritage**. Cultural heritage supports cultural and spatial identity and should be nurtured during and after the earthquake reconstruction process and integrated into revitalization processes. It is necessary to prepare conservation documentation and appraise protected cultural assets and historical areas (especially historical urban cores). There is a need for a clear vision for cultural heritage which identifies what should be preserved in its original state what should be adapted to current needs.
- **Ensure public participation during post-earthquake reconstruction and integrated urban revitalization**. Participation can enhance the social component of sustainability (public, citizens, associations, local community). A participatory approach will improve the prospects of creating a well-tailored intervention which answers real spatial needs.

6 References

Arbaci, S. (2007). Ethnic Segregation, Housing Systems and Welfare Regimes in Europe. *European Journal of Housing Policy, 7*(4), str. 401-433.

City Office for Strategic Planning and Development of the City. (2017). *Zagreb Urban Agglomeration Development Strategy for the period up to 2020.* 2017: City of Zagreb.

City Office for Strategic Planning and Development of the City. (2018). *Analysis and Evaluation of Development Potential and Limitations of the Zagreb Urban Agglomeration.* Zagreb: City of Zagreb.

ESPON. (2018). *COMPASS - Comparative Analysis of Territorial Governance and Spatial Planning Systems in Europe: Croatia.* Luxembourg: ESPON EGTC.

ESPON. (2020a). *ESPON SUPER – Sustainable Urbanisation and land-use Practices in European Regions. A GUIDE TO SUSTAINABLE URBANISATION AND LAND-USE.* Luxembourg: ESPON EGTC.

ESPON. (2020b). *ESPON SUPER – Sustainable Urbanisation and Land Use Practices in European Regions. Annex 1 - Evidence on developments.* Luxemburg: ESPON ETGC.

ESPON. (2020c). *ESPON SUPER – Sustainable Urbanisation and land-use Practices in European Regions. Annex 4 – Sustainability assessment and scenarios.* Luxemburg: ESPON EGTC.

ESPON. (2020d). *ESPON SUPER – Sustainable Urbanisation and land-use Practices in European Regions. Annex 3.7. Case Study HR-Coastal.*

Official Gazette. (102/20). Act on the Reconstruction of Earthquake-damaged Buildings in the Territory of the City of Zagreb, Krapina-Zagorje County and Zagreb County.

Official Gazette. (102/20, 10/21). Act on the Reconstruction of Earthquake-damaged Buildings in the Territory of the City of Zagreb, Krapina-Zagorje County, Zagreb County, Sisak-Moslavina County and Karlovac County. (amendments).

Official Gazette. (119/20). The first programme of measures for the reconstruction of buildings damaged by the earthquake in the City of Zagreb, Krapina-Zagorje County and Zagreb County. Zagreb: Official Gazette.

Official Gazette. (153/13, 65/17, 114/18, 39/19, 98/19). Physical Planning Act. Zagreb: Official Gazette.

Spatial Development Strategy of the Republic of Croatia. (OG 106/17). Zagreb: Official Gazette.

World Bank. (2019). *National Development Strategy Croatia 2030 Policy Note: Family Policies.* World Bank.

Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

espon.eu

ESPON 2020

ESPON EGTC
4 rue Erasme, L-1468 Luxembourg
Grand Duchy of Luxembourg
Phone: +352 20 600 280
Email: info@espon.eu
www.espon.eu

The ESPON EGTC is the Single Beneficiary of the ESPON 2020 Cooperation Programme. The Single Operation within the programme is implemented by the ESPON EGTC and co-financed by the European Regional Development Fund, the EU Member States and the Partner States, Iceland, Liechtenstein, Norway and Switzerland.