



RURBANIVE

RURAL · URBAN · IMMERSIVENESS

RURal-uRBAN synergies emerged in an immersIVE innovation ecosystem

D2.1 Literature and Knowledge Review

Author: Rickard Fornell (RISE)



Co-funded by
the European Union

General Data

Project Number	101136597
Project Acronym	RURBANIVE
Project Name	RURal-uRBAIn synergies emerged in an immersIVE innovation ecosystem
Type of action	HORIZON Innovation Actions
Horizon Europe Topic	HORIZON-CL6-2023-COMMUNITIES-01-2
Starting – End date	1st January 2024 - 31st December 2027
Project Website	RURBANIVE-project.eu
Work Package	WP2 Rural-Urban Co-creation labs, experimentation and capacity building
Relevant Task(s)	T2.1: Building RURBANIVE results on previous knowledge and understanding the present context from a broad systems perspective
Deliverable Type	R - Document, Report
Dissemination Level	PU: Public - fully open
Due Date	31 December 2024
Submission Date	23 December 2024
Lead Beneficiary	RISE RESEARCH INSTITUTES OF SWEDEN AB (RISE)
Author	Rickard Fornell (RISE)
Contributors	Magnus Eriksson (RISE) Hayley Ho (RISE) Shane Carnohan (RISE) Tatjana Apanasevic (RISE) Pontus Svenson (RISE)
Reviewer(s)	Kostas Naskou (ICCS) Christine Bertl (ALCHEMIA)

The Consortium

	Legal Name	Short Name	Country
1	EREVNITIKO PANEPISTIMIAKO INSTITOUTO SYSTMATON EPIKOINONION KAI YPOLOGISTON	ICCS	GREECE
2	GEOPONIKO PANEPISTIMION ATHINON	AUA	GREECE
3	FUNDACION CARTIF	CARTIF	SPAIN
4	RISE RESEARCH INSTITUTES OF SWEDEN AB	RISE	SWEDEN
5	REFRAME FOOD ASTIKI MI KERDOSKOPIKI ETAIREIA	RFF	GREECE
6	ASSOCIATION EUROPEENNE POUR L'INNOVATION DANS LE DEVELOPPEMENT LOCAL	AEIDL	BELGIUM
7	ČESKÁ ZEMĚDELSKÁ UNIVERZITA V PRAZE	CZU	CZECHIA
8	ALCHEMIA-NOVA RESEARCH & INNOVATION GEMEINNUTZIGE GMBH	ALCHEMIA	AUSTRIA
9	AGRIFOOD LITHUANIA DIH	AFL	LITHUANIA
10	IMERYS VIOMICHANIKΑ ORYKTA ELLAS MONOPROSOPI ANONYMI ETAIREIA	IMERYS	GREECE
11	THE LISBON COUNCIL FOR ECONOMIC COMPETITIVENESS ASBL	LC	BELGIUM
12	ANAPTYXIAKI ETAIREIA DIMOU TRIKKAION ANAPTYXIAKI ANONYMI ETAIREIA OTA	TRIKALA	GREECE
13	KEDAINIU RAJONO SAVIVALDYBES ADMINISTRACIJA	KDM	LITHUANIA
14	PERIFEREIA NOTIOU AIGAIΟΥ	SAR	GREECE
15	INNOVATION CAMPUS LEMGO E. V.	ICL	GERMANY
16	PARTENARIAT POUR L'EUROPE RURALE	PREPARE	BELGIUM
17	BIOBASE GMBH	BIOBASE	AUSTRIA



Document History

Version	Date	Comments
v0.1	06/12/2024	First draft for internal review
v0.2	13/12/2024	Revised draft
v0.3	19/12/2024	Final draft
v1.0	23/12/2024	Final version for submission

Disclaimer

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.

©RURBANIVE Consortium

This document contains unpublished original work unless clearly stated otherwise. Previously published material and the work of others has been acknowledged by appropriate citation or quotation, or both. Reproduction is authorised provided the source is acknowledged.

Executive Summary

The purpose of this deliverable has been to establish a body of knowledge related to the development of the innovation framework in the RURBANIVE project. The main focus has been on performing a literature review on scientific, peer-reviewed publications to understand how systemic and transformational perspectives have been used in scientific discourse concerning the rural-urban context. The deliverable also includes a stock-take of previous EU-funded Research and Innovation projects, focusing on relevant projects within the rural-urban context.

By enabling understanding of the current state of the art regarding rural-urban connections and cooperation, the knowledge gained from this deliverable will help design a rural-urban innovation framework that will be used, tested and iterated in the co-creation activities in the project.

The main results of the work presented are that although there are specific learnings that can be extracted from the reviewed papers, there is also a clear need for development related to the integration of systemic and design methods in a framework that specifically addresses the transformative aspect of rural-urban synergies and development. Since innovation frameworks already exist on policy and organizational levels in several previous EU-projects, as well as many methods available for stakeholder engagement and workshops, RURBANIVE can find its niche in the integration of innovation and design processes with systems thinking and methods for mapping system dynamics that puts the single innovation process in a broader context of a transformation needed in a particular ecosystem of stakeholders around a certain challenge.

This knowledge will be a foundation for the design and development of the RURBANIVE innovation framework, which will be done in an iterative process together with the partners and the different Rural-Urban Co-creation Labs (RUCLs) in the project.

Table of Contents

1 Introduction	9
1.1 Context	9
1.2 The approach.....	9
1.3 Intended readership and document structure	10
2 Review of scientific publications	11
2.1 Different rural-urban interactions in research	14
2.2 Learning perspectives.....	20
2.3 Concluding summary	21
3 Stock-take of previous EU-funded projects with a rural-urban focus	22
3.1 ROBUST.....	22
3.2 COASTAL.....	22
3.3 RURITAGE	23
3.4 FUTURAL	23
3.5 POLIRURALPLUS	24
3.6 RUMORE.....	24
3.7 RURALIZATION	24
3.8 FOODSHIFT 2030	25
3.9 TExTOUR	25
3.10 SmartCulTour	26
3.11 Concluding summary	26
4 Conclusions and future work	27
5 References.....	29

List of Figures

Figure 1. The review process	11
Figure 2. Keywords used in the literature review in order to capture scientific studies with different types of systems thinking perspectives.	12
Figure 3. The connection between learning forms and social interaction in learning.....	13
Figure 4. Urban to rural interactions discussed in the reviewed papers.....	14
Figure 5. Rural to urban interactions discussed in the reviewed papers.....	15
Figure 6. Rural-urban bi-directional interactions discussed in the reviewed papers	16
Figure 7. Topics affecting BOTH rural and urban areas discussed in the reviewed papers	19

List of Terms and Abbreviations

Term/Abbreviation	Meaning
EU	European Union
CO	Confidential
PU	Public
RUCL	Rural-Urban Co-creation Lab
RUE	Rural-Urban Enabler
SVIF	Socioeconomic Vulnerability Indicator Framework
WP	Work Package

1 Introduction

In this deliverable, the main focus has been on performing a literature review on scientific, peer-reviewed publications to understand how systemic and transformational perspectives have been used in scientific discourse concerning the rural-urban context. The deliverable also includes a stock-take of previous EU-funded Research and Innovation projects with a rural-urban focus. The intention is to generate a body of knowledge related to good practices for the facilitation of systemic and transformative synergies based on Rural-Urban Enabler (RUE) as well as cooperations and connections of rural and urban areas in a geographic proximity.

1.1 Context

This deliverable will establish a body of knowledge related to the development of the innovation framework in the RURBANIVE project. The focus of the framework will be on facilitation of RUE-based synergies and cooperation of rural and urban areas and specifically on how to include a systemic perspective on the different enablers.

The literature review in this deliverable is the foundation for the development of the RURBANIVE innovation framework. The first version of the framework will be developed after this review has been completed, also in Task 2.1, and then iterated throughout the project with the Rural-Urban Co-creation Labs (RUCL, developed in WP2) and in connection to the Rural-Urban Enablers (WP3). The iterative development of the innovation framework is done in WP4, and the final outcome will be included in WP6.

This deliverable has a direct connection to the Milestone 7, delivery of 1st version of the innovation framework, and is also connected to Milestone 12, updated version of the innovation framework.

Deliverable 4.3 (Innovation framework assessment report (CO)) and 4.4 (Rural Urban Innovation Framework (PU)) are directly connected to this deliverable since they are reporting the progress of the RURBANIVE innovation framework.

1.2 The approach

The main approach of the work done in this deliverable has been the development of a review of scientific, peer-reviewed literature on rural and urban development and how

different aspects of systems thinking has been included and used in this research. This work is submitted to a scientific journal for publication. In this deliverable, the main aspects and findings of that study are presented in Chapter 2. Apart from the literature study, the authors have reviewed previous EU-projects within the field of rural-urban studies and analysed how these have used frameworks, systems thinking and different digital tools.

By enabling understanding of the current state of the art regarding rural-urban connections and cooperation, the knowledge gained from this deliverable will help to design a rural-urban innovation framework that will be used, tested and iterated in the co-creation activities in the RUCLs.

1.3 Intended readership and document structure

This deliverable is specifically relevant for the RURBANIVE RUCLs and thus participants and activities in Work Packages 2, 3 and 4 of the project. For the wider public, it is mainly intended for those who are interested in how rural-urban contexts have been investigated in the scientific literature from a systemic and transformative learning perspective. The document is structured in four chapters; chapter one is an introduction (this chapter), chapter two will focus on the literature review (also published as a scientific review), chapter three will give a short stock-take of previous EU-projects of relevance, and chapter four will conclude the deliverable by connecting the work done to the RURBANIVE project, making some conclusions and elaborating on further work within the project.

2 Review of scientific publications

The approach taken for the literature review was a 4-step process, as shown in Figure 1. These steps were all aimed at delivering a relevant and well-grounded innovation framework in the RURBANIVE project.

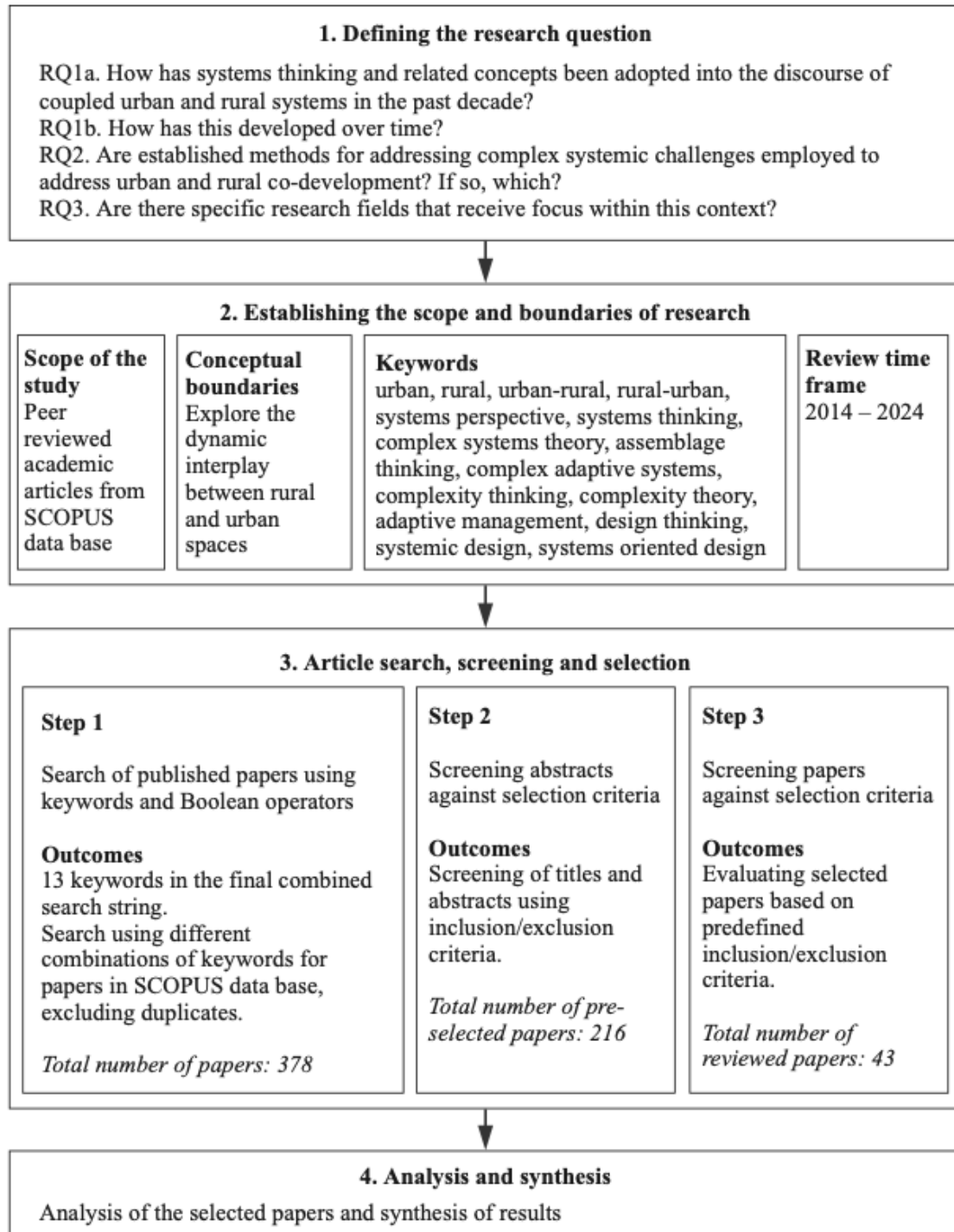


Figure 1. The review process

First, the research questions that framed the review were defined. Step 2 was to define scope, boundaries, time frame and keywords for the work. Step 3 was aimed at screening relevant articles in three steps. Finally, step 4 was the analysis of selected articles.

In this deliverable, we will focus on a brief description of the step 4, the analysis of the included articles. A short clarification of the purpose is however needed. As Figure 2 shows, the review’s intention was to capture how different ontological and epistemological approaches to systems thinking have been implemented in different rural-urban studies.

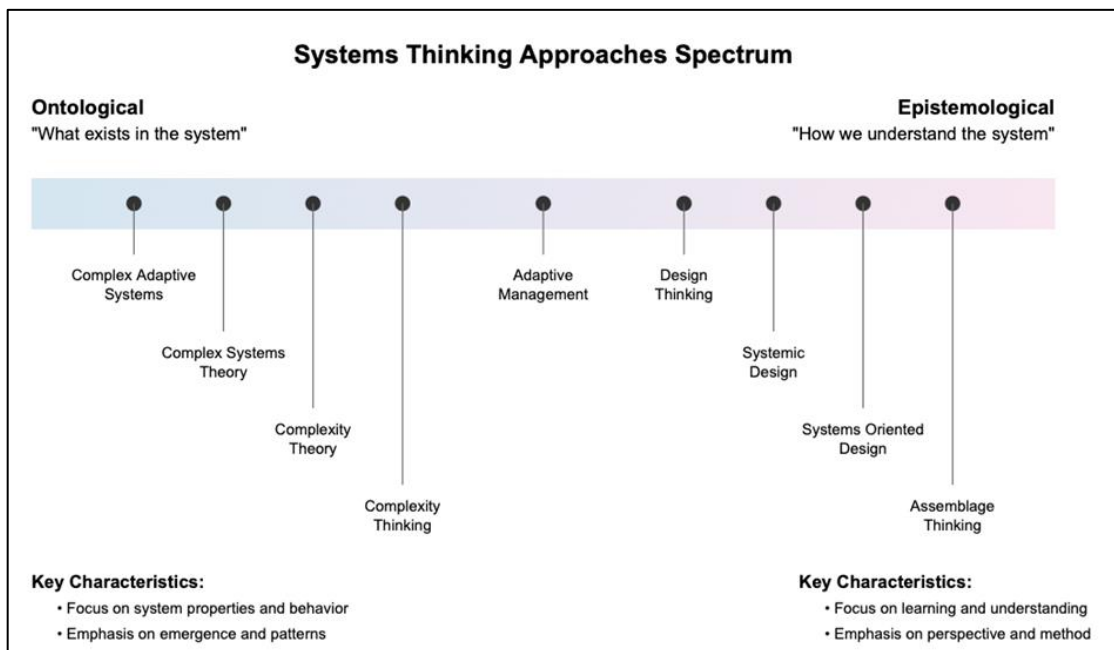


Figure 2. Keywords used in the literature review in order to capture scientific studies with different types of systems thinking perspectives.

This understanding of system thinking method application was then brought into a deeper assessment with the intention to analyse what type of learning objectives had been used when addressing these systems thinking approaches, and more specifically if and how transformative learning objectives have been included in the different reviewed papers. Figure 3 depicts a matrix that has been used in the review process for understanding both the type of learning approached in the different papers (Single, Double or Triple loop), and who was the target group intended to learn from the scientific studies made. **Single-loop learning** is mainly focused on improving current trajectories by adjustment and minor tweaks, i.e. improving efficiency or optimizing

current processes. **Double-loop learning** involves challenging current ways of doing things, and focuses on how we address challenges and if there is need to reframe and reorganize processes. Finally, **Triple-loop learning** is a transformative approach to learning where we challenge current beliefs and norms and widen the perspective on why, how and what we need to focus on.

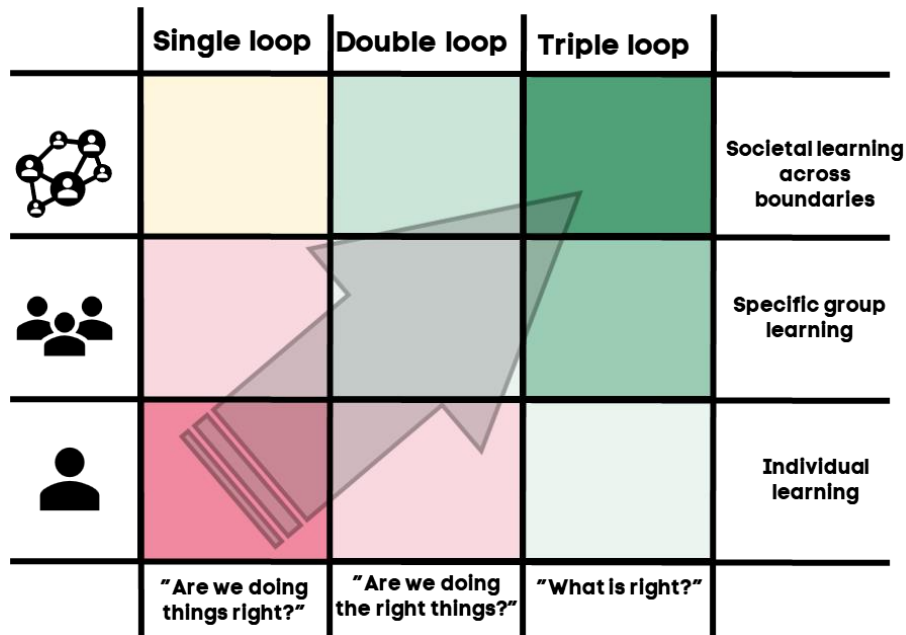


Figure 3. The connection between learning forms and social interaction in learning

The review will be presented in two parts, according to the following:

- A description of what type of rural-urban interactions that were studied, and what specific focus each reviewed article had (Chapter 2.1)
- A brief description of the connection between different types of system thinking approaches and learning objectives (specifically to RURBANIVE RUCLs) (Chapter 2.1.2)

For a deeper understanding of the work, readers are referred to the scientific review paper with the preliminary title *Review of rural and urban synergies: a complexity-informed perspective* by Shane Alan Carnohan, Tatjana Apanasevic, Pontus Svensson and Rickard Fornell (to be published).

2.1 Different rural-urban interactions in research

In this chapter, the different reviewed studies are divided into four different categories depending on how they addressed rural-urban interactions. The chapter also includes short descriptions of each scientific study.

Urban to rural

Different effects from urban development on rural areas have been elaborated in a few of the reviewed papers, and are summarized in Figure 4. Chiang et al. (2014) focused their study on how industrial development in urban areas in Taiwan affect adjacent rural areas due to industrial wastewater polluting the water ways in rural areas. The aim was to explore responses to impacts of the industrial land development and to learn about the resilience of the rural community. Juschten et al. (2019) investigated intentions of urban residents to seek refreshment in nearby mountainous regions during heat waves. They discussed the positive effects this could have on (re-)vitalization of rural near-metropolitan areas that are often characterized by depopulation and degradation of infrastructure, and the risks/challenges connected to mobility behaviour. Kusio et al. (2022) assessed the role of partners from urban centres in the concepts of local development of rural areas. They focused on case studies of urban centre involvement in innovative activities in specific agricultural regions.



Figure 4. Urban to rural interactions discussed in the reviewed papers

Rural to urban

Turning to the perspective of how urban areas are affected by changing rural landscapes, the main themes in the reviewed papers were connected to studies on migration and urbanization, as described in Figure 5. Porst et al. (2018) published a

paper where they aimed at developing understanding of the interrelatedness between different empirical evidence in the analysis of migration and its impacts.



Figure 5. Rural to urban interactions discussed in the reviewed papers

Birtchnell et al. (2019) took a more concrete approach to opportunities for migrants by studying how latent competences from migrating rural people to urban slums could be leveraged for urban greening. They also pointed out that this global south phenomenon can educate the global north on how to set up strategies for urban greening infrastructure beyond corporate objectives by using the people and latent knowledge. Continuing the urban slums perspective, Niva et al. (2019) developed a conceptualization of slums by reviewing the pushing and pulling factors of migration and their contribution to informal settlements through a socio-ecological system approach and the concept of adaptive capacity. Singh et al. (2020) explored the role of migration and commuting in addressing livelihood vulnerability from different system perspectives. They also argued that migration and commuting affect livelihood trajectories and choices beyond the migrants alone, and that understanding how these strategies affect household vulnerability over time is crucial for adaptation research. Continuing on the migration research path, Delazeri et al. (2022) explored the impacts of climate change on rural-urban migration in the Brazilian Northeast region. They concluded, among other things, that the debate on climate change and migration should no longer consider that climate change invariably results in migration but also investigate who is able to implement and take advantage of migration as an adaptation strategy.

Moving from migration to urbanization, the study by Wang et al. (2016) investigated land governance for eco-urbanization. They argued that adaptive measures in response to climatic uncertainties, the scale and level of sustainable consumption, and the ecological intercorrelation among multiple factors, are important perspectives to

include in land governance for eco-urbanization and in order to balance between environmental conservation and economic development. Connected to urban growth Farrell (2017) introduced a multidisciplinary framework for conceptualizing rapid urban growth in developing countries. The paper argued that there is a tendency to connect urban growth to migration, thus neglecting the growing contributions of urban natural population increase and reclassification of rural areas. Giacalone et al. (2023) investigated long-term regional urbanization and suburbanization trends. A multi-indicator time series analysis was utilized to reflect different aspects of metropolitan growth and estimation of the impact of economic expansion and social change on the local development path characteristics.

Bi-directional interactions

The next perspective found in the review was papers with a focus on bi-directional interactions between rural and urban areas (research themes summarized in Figure 6). Here an expanded perspective, from urban migration towards bi-directional demographic dynamics could be found in several papers in the review.



Figure 6. Rural-urban bi-directional interactions discussed in the reviewed papers

Tian et al. (2016) investigated the interconnection between agricultural and industrial development. They explored how development, migration, and land policies synergistically might foster healthy rural-urban development dynamics. Halbac-Cotoara-Zamfir et al. (2020) explored how 'fast' and 'slow' transitions contributed to socioeconomic change in both urban and rural areas during a time period of 40 years. Zhu et al. (2022) explored the synergy of the sustainable development of the traditional village cultural landscape. They proposed a synergistic path for sustainable development of the cultural landscape in traditional villages under the perspective of

“cultural balance” in three aspects: space, society, and industry. Sadat et al. (2023) aimed at quantifying structural and functional landscape transformations during post-war metropolitan development. Finally, Rajendran et al. (2024) argued that peri-urbanisation needs to be reconceptualized as an alternative socio-spatial framework that extends the predominantly Eurocentric discourse on counter-urbanisation, making it more inclusive of the emerging rural-urban transformations in the global South.

A more general approach to the topic of bi-directional rural and urban interplay was the development of different frameworks for integrated development. Leck et al. (2018) presented a framework focused on multi-level governance and cross-border collaborations. They argued that weak inter-municipal collaboration, particularly between urban, peri-urban and rural areas within metropolitan and functional city regions, has been a significant impediment to realizing transformative adaptation within such regions. Long (2022) pursued an integration of theoretical approaches to comprehend land use transitions and associated regional development strategies. They developed a theoretical framework to explain land use transitions against the context of rapid urbanization, and deployed the theoretical method towards rural development strategies via adjusting and controlling land use transitions. Hoffman et al. (2023) developed the concept of *Rurbanity*, an integrated theoretical framework intended for empirical research. The authors presented four analytical dimensions as entry points: *Endowments and Place*, *Flows and Connectivity*, *Institutions and Behaviour*, and *Lifestyles and Livelihoods*. They argued that the framework could be an effective starting point for assessing potential contributions of Rurbanity to long-term global sustainability.

An often-highlighted interplay between rural and urban areas is the development of sustainable food systems. In the reviewed literature, there are several papers addressing this topic. Ozor et al. (2016) developed a framework that detailed the undercurrents of rural-urban interdependence in food systems. They highlighted the vulnerability of livelihood and food systems in the face of climate change, especially in developing economies where a large percentage of the population depend on agriculture for their livelihoods. Armendáriz et al. (2016) presented a qualitative framework model aimed at providing a systemic understanding on food supply and distribution systems with a focus on the integration of urban and rural structures. Armenia et al. (2019) used the framework from Armendáriz et al. (2016) to show how system dynamics modelling, and simulation could lead to the unfolding of complexity in this area of research as well as bring into the analysis the relationships across a few

goals of the Agenda 2030. As an additional result, they showed how the developed model could be applied to analyse the dynamics of food supply and distribution systems in urban environments. A more specific challenge connected to food systems was presented by Sokame et al. (2024). They proposed an integrated assessment model that combined ecological, economic, and social dimensions to analyse the multifaceted impacts of the desert locust on the rate of urbanization changes, farming expansion, and food production and how they lead to food unavailability (demand, supply, and price) and food and nutrition insecurity.

One final topic that was found in the reviewed papers connected to rural-urban interplay was the topic of ecosystem services. Hamann et al. (2016) presented a study where a social-ecological systems perspective was used to investigate the linkages between ecosystem services and human well-being. Esmail et al. (2017) developed and tested an operative approach for designing and assessing the impact of watershed investments by using the concepts of ecosystem services and boundary work. The approach included a strategic and a technical component, and was structured to facilitate negotiations among stakeholders. Finally, Clay et al. (2018) developed a place-based approach to assess ecosystem services in transitional forests (between rural and urban areas). They demonstrated how trajectories of forest composition were linked with shifting ecosystem services that both shaped and were shaped by management activities.

Factors influencing both urban and rural areas

The final focus found during the review was on factors that impact both urban and rural areas but that did not directly address the interplay between these areas. These themes are summarized in Figure 7.

The main topic in this category, and in all categories, is the topic of climate adaptation, risk and resilience. Moon et al. (2017) presented simulations that projected changes in climate change-induced risks over time and investigated policy alternatives to mitigate the risks from increases in sea level, heavy rains, and heat waves in urban and rural areas. Kirshen et al. (2018) produced a qualitative study examining how integrated urban water management could be used to manage multiple urban water stresses under present and future climates and land use conditions upon the built, natural, and social systems in a semi-rural area. Malakar et al. (2018) proposed a framework particularly tailored for marine fishing communities to identify the predominant

adaptation strategies and their drivers in fishing communities in urban, semi-urban and rural areas.

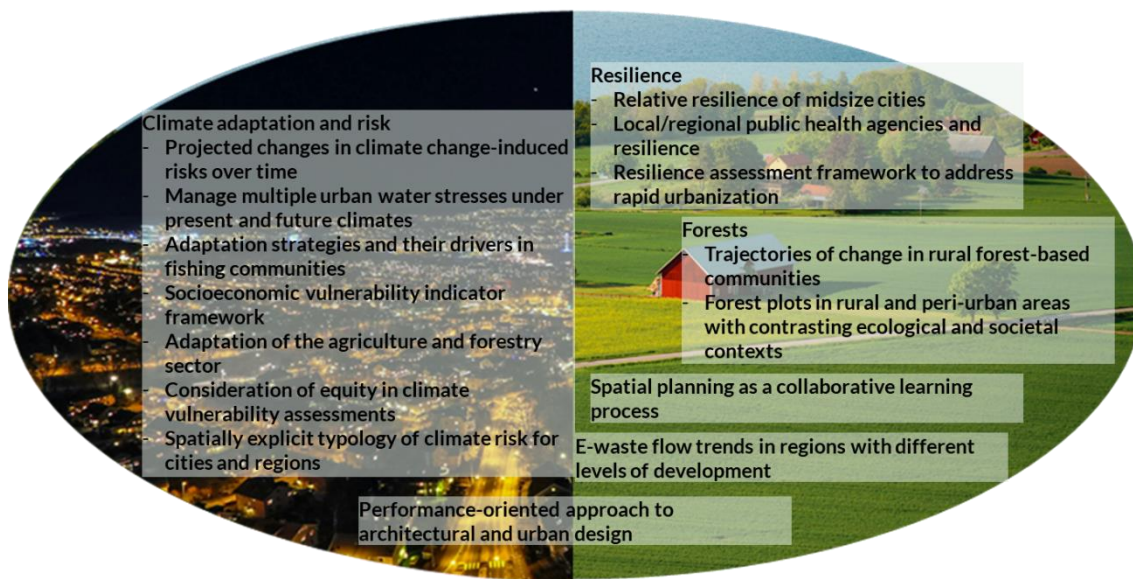


Figure 7. Topics affecting BOTH rural and urban areas discussed in the reviewed papers

Carrard et al. (2019) focused on quantitative research and generating statistics of groundwater use. Jhan et al. (2020) developed and applied a socioeconomic vulnerability indicator framework (SVIF) to various coastal communities, highlighting the potential of to the development of local adaptation frameworks. Vizinho et al. (2021) tested and assessed the usability of a tool, *Adaptation Pathways*, integrated in a participatory approach combined with scenario workshops to plan the adaptation of the agriculture and forestry sector and agroforestry farms. Lioubimtseva (2022) examined how climate adaptation plans of small cities and counties considered equity in their climate vulnerability assessments and adaptation planning goals, and how consideration of equity in existing adaptation plans related to the inclusion of diverse categories of stakeholders. Hincks et al. (2023) developed a typology of climate risk for cities and regions. They then conducted an analysis focusing on the distribution of climate risk classes, and highlighted a number of issues to inform climate change adaptation planning policy, practice and research. Pandey et al. (2015) developed a methodology for water vulnerability due to climate change at the household-level by bringing both human and natural dimensions together. Allen et al. (2016) developed approaches to estimate the relative resilience of midsize cities. Khan et al. (2018) used a qualitative design employing the structured interview matrix facilitation technique to study local/regional public health agencies. Ethics and values were considered in the

development of a framework that used tenets of complexity to support building resilience. Finally, Li et al. (2022) developed a multi-source data resilience assessment framework to address the rapid urbanization and intensification of interactions and coercive effects between various urban space subsystems.

A couple of reviewed papers were focused on forests and their role in different contexts. Morzillo et al. (2015) used a conceptual approach for characterizing trajectories of change in rural forest-based communities. Focusing on "communities in the middle," communities positioned within forested regions representing neither unpopulated wilderness nor heavily urbanized or densely populated places on the edge of urban areas. They synthesized insights on three commonly identified development trajectories and identified interactions among the resource base, connectivity to other places, and social adaptability as critical to these trajectories. Martin-Forés et al. (2020) investigated forest plots in four different landscapes in rural and peri-urban areas with contrasting ecological and societal contexts.

Finally, there were three papers that had their own focus. Elbakidze et al. (2015) examined the extent to which the spatial planning in a region could be characterised as a collaborative learning process. They analysed the main attributes of public-led spatial (i.e. comprehensive) planning in nine municipalities representing both urban and rural areas and identified the causal structure behind stakeholder participation in municipal planning processes, including main drivers and feedback loops. Hensel et al. (2019) discussed a performance-oriented approach to architectural and urban design that sought to intensify the interaction between architectures and their specific settings and environments. In the third and final paper, Yuan et al (2022) evaluated e-waste flow trends in regions with different levels of development and constructed a regional e-waste synergistic utilization model.

2.2 Learning perspectives

Using the matrix in Figure 3, the reviewed papers were analysed in depth in order to understand what type of learning they were aimed at and who the intended audience was for the learning objectives. The analysis revealed that while many researchers claimed to use systems thinking approaches in rural-urban research, most of the reviewed papers remained focused on understanding and improving existing systems rather than fundamentally transforming them. The majority of articles within the focused review employed double-loop learning approaches, focusing on patterns and

relationships within current frameworks. Only a small number of studies demonstrated true triple-loop learning that questioned fundamental assumptions about how rural and urban areas interact. This pattern was particularly evident in the methodological approaches, where despite claims of systems thinking, most studies relied on traditional methods such as statistical analysis and case studies rather than more transformative approaches.

This tendency toward double-loop learning appeared to be influenced by the target audience of these studies, with most articles primarily addressing researchers and policymakers rather than practitioners or local communities. The few studies that did demonstrate triple-loop learning typically engaged with a broader range of stakeholders and explicitly questioned existing paradigms of rural-urban relationships. This finding suggests that achieving transformative change in rural-urban systems might require both broader stakeholder engagement and more innovative methodological approaches that move beyond simply understanding current systems to questioning fundamental assumptions about how these systems should operate.

2.3 Concluding summary

From the scientific review, it is clear that there is a lot of specific knowledge, perspectives and learnings that can be extracted and used in the RURBANIVE project. Aspects like tourism, mobility, food systems, ecosystem services and connections to human well-being, and the role of forests in urban-rural areas are relevant also for the RUCLs and RUEs in RURBANIVE. It is, however, also evident that much of the research in this field has been focused either on unidirectional issues like migration, urbanization, tourism and effects of urbanization on rural areas in terms of e.g., industrial development etc., or on external factors affecting both rural and urban areas, e.g., climate adaptation and resilience. Only a few papers have focused on broader synergistic aspects of rural-urban development, and even fewer have developed innovative methodological approaches with broad stakeholder engagement to achieve transformative change. This means that for the purpose of building an innovation framework for the RUCLs in the RURBANIVE project, there are specific learnings that can be extracted from several papers, but there is also a clear need for development related to the integration of systemic and design methods in a framework that specifically addresses the transformative aspect of rural-urban synergies and development.

3 Stock-take of previous EU-funded projects with a rural-urban focus

As part of the review, previous EU-funded projects with a rural-urban focus were surveyed with the aim of understanding what kinds of innovation frameworks were used in these projects. Below, a summary of each project surveyed will be presented.

3.1 ROBUST

Full name	Link to project	Type of project	Start date – End date
Rural-Urban Outlooks: Unlocking Synergies	https://cordis.europa.eu/project/id/727988	Research and Innovation Action	May 2018 – Oct 2022

ROBUST aimed to advance our understanding of the interactions and dependencies between rural, peri-urban and urban areas, and to identify and promote policies, governance models and practices that foster mutually beneficial relations. The project looked at the key aspects of rural, peri-urban and urban cooperation, exploring linkages and dependencies towards smart, sustainable inclusive growth, and the creation of rural jobs and the value added. Policy recommendations were made to strengthen sustainable food systems, cultural activities connecting rural and urban, new businesses and the labour market, public infrastructures and social services, and ecosystem services.

3.2 COASTAL

Full name	Link to project	Type of project	Start date – End date
Collaborative IAnd Sea inTegration pLatform	https://cordis.europa.eu/project/id/773782	Research and Innovation Action	May 2018 – Oct 2022

COASTAL aimed to improve coastal and rural synergies through co-creation of business roadmaps and policy recommendations. The project contributed to integrated coastal-rural planning and coastal and rural synergy through an online platform for knowledge exchange. As a tool for analysis, the project focused on system dynamics, including multi-stakeholder analysis, casual loop diagrams and fuzzy cognitive mapping.

3.3 RURITAGE

Full name	Link to project	Type of project	Start date – End date
Rural regeneration through systemic heritage-led strategies	https://cordis.europa.eu/project/id/776465	Innovation Action	Jun 2018 – Aug 2022

RURITAGE aimed to transform rural areas into sustainable development through heritage-led rural regeneration. Using cultural and natural heritage to address pilgrimage, local food, migration, arts and festival, resilience, landscape and barriers to participation in rural areas. The project worked with these drivers for regeneration in participatory activities, business model canvases and community-based methodology.

3.4 FUTURAL

Full name	Link to project	Type of project	Start date – End date
Empowering the future through innovative smart solutions for rural areas	https://cordis.europa.eu/project/id/101083958	Innovation Action	Jun 2023 – May 2027

FUTURAL is an ongoing project that addresses rural community needs in the domains of climate adaptation and mitigation; circular bioeconomy; biodiversity and ecosystem management; resilience to shocks; citizen engagement and quality of life; and lifelong education and training. The pilots in the project address the challenges of aging population, transport systems vulnerable to natural disasters, poor diversification of bio-derived products and production of waste, loss of crops due to local bison population, flooding, youth leaving island, water quality and shortages, availability of services and mobility provision, high dependence on tourism, bad quality water supply, underexploited natural heritage, insufficient use of space, and old deteriorating buildings. Co-creation of innovations for smart rural areas aimed at smart digital solutions, metasearch platform, networking and synergies and scale up are included in the project.

3.5 POLIRURALPLUS

Full name	Link to project	Type of project	Start date – End date
Fostering Sustainable, Balanced, Equitable, Place-based and Inclusive Development of Rural-Urban Communities' Using Specific Spatial Enhanced Attractiveness Mapping ToolBox	https://cordis.europa.eu/project/id/101136910	Innovation Action	Jan 2024 – Dec 2026

POLIRURALPLUS is an ongoing project that dives into the complexities of rural and urban interconnectivity. It looks at the rural-urban divide in terms of social, environmental and systemic issues. The project is addressing challenges with climate adaptation, income and employment disparity, social exclusion of rural areas, shrinking rural areas with ageing and depopulation, limited access to services and infrastructure, impact of digitalisation and remote work.

3.6 RUMORE

Full name	Link to project	Type of project	Start date – End date
Rural-Urban Partnerships Motivating Regional Economies	https://projects2014-2020.interregeurope.eu/rumore/	Interreg project	Jan 2017 – Dec 2021

RUMORE aimed at fostering rural-urban cooperation and partnerships to improve regional innovation policies and capacities. The project provided recommendations for how to support innovation by involving young people, setting up living labs and open innovation networks, sharing knowledge and research, and creating innovation partnerships.

3.7 RURALIZATION

Full name	Link to project	Type of project	Start date – End date
The opening of rural areas to renew rural generations, jobs and farms	https://cordis.europa.eu/project/id/817642	Research and Innovation Action	May 2019 – Apr 2023

RURALIZATION aimed to reverse the depopulation and economic decline of rural areas through a process of “ruralisation” with a focus on young people and rural

newcomers from urban areas. The project took a cyclical and systemic perspective on the regeneration of rural areas, working with an assessment of the opportunities and challenges of rural areas, young people’s dream inventory, case studies of rural newcomers, and foresight. It dealt with resources in terms social, human, cultural, political, financial, built and natural capital.

3.8 FOODSHIFT 2030

Full name	Link to project	Type of project	Start date – End date
Food System Hubs Innovating towards Fast Transition by 2030	https://cordis.europa.eu/project/id/862716	Innovation Action	Jan 2020 – Dec 2023

FOODSHIFT 2030 aimed to create a transition of the food system towards a more sustainable system by fostering collaborations between citizens, food innovators, NGOs and policymakers. The project has developed conclusions from several pilots as well as a general toolkit to support food transitions. The toolkit itself consists of 60 recommended methods for co-creation assembled into a kit under headings representing different phases of a participatory process. As a complement to this collection of methods, the project also has a Citizen Empowerment Scheme aimed at guiding innovators through a participatory process with suggestions for how to conduct it.

3.9 TExTOUR

Full name	Link to project	Type of project	Start date – End date
Social Innovation and TEchnologies for sustainable growth through participative cultural TOURism	https://cordis.europa.eu/project/id/101004687	Innovation Action	Jan 2021 – Sept 2024

The TExTOUR project has run several pilots aiming to foster sustainable cultural tourism strategies in underdeveloped areas in Europe. As a result of the project, they developed a compendium of best practices learned from the pilots that gives insights into what to issues consider when engaging in the transformation of regions through sustainable cultural tourism. These include do’s and don’ts in a number of different phases of a participatory innovation process that involves a broad set of stakeholders facing common challenges. The main focus of these recommendations are issues to consider when organizing a transformative R&I project and the majority of topics

concerns keeping stakeholder engagement and the transformational project itself going over a longer period of time.

3.10 SmartCulTour

Full name	Link to project	Type of project	Start date – End date
Smart Cultural Tourism as a Driver of Sustainable Development of European Regions	https://cordis.europa.eu/project/id/870708	Research and Innovation Action	Jan 2020 – June 2023

SmartCulTour worked with sustainable cultural tourism as a driver for regional development in Europe. The project was based on a theoretical framework that defines cultural tourism and the drivers of cultural tourism as well as governance issues that arise with the regional impact of cultural tourism to understand how to promote it in a sustainable manner. Several living labs were then run during the project duration to explore and validate the assumptions of this framework. The project applied several methods of quantitative analysis of the living labs, such as a Sustainable-Responsible Tourism (SRT) model and a Tourism Area Life Cycle Model (TALC) model. These include casual-loop diagrams and stock-and-flow models. Together with these methods, the project also developed The SmartCulTour Toolkit that presents and explains different participatory methods to be used in the living labs, as well as how to think about the design and innovation process itself.

3.11 Concluding summary

From the stock-take of previous EU-project, the main conclusion is that innovation frameworks are used in a diversity of ways in these projects, and with different aims and scope. For some, the innovation framework was related to organizational and policy aspects of innovation, for example, how to foster an innovative climate in a particular region by policy measures, funding schemes, as well as the formation of innovation hubs and cross-sectoral living labs (e.g. ROBUST, RURITAGE, RUMORE). For others, innovation frameworks operated much closer to the ground where the innovation happens with specific methods for how to conduct creative workshops and stakeholder engagement (e.g. FOODSHIFT 2030, TExTOUR). Alternatively, system modelling has been used for analysis of regions from various perspectives in the projects, but without integration into the innovation framework (e.g. COASTAL, SmartCulTour).

4 Conclusions and future work

Based on the findings in the scientific review and the stock-take of previous EU-projects, **we conclude that:**

- There is a need for the RURBANIVE project to **define its use of the concept of an innovation framework in a transparent way and be clear about its purpose.**
- **RURBANIVE can find its niche in the integration of innovation and design processes with systems thinking and methods for mapping system dynamics that puts the single innovation process in a broader context of a transformation needed in a particular ecosystem of stakeholders around a certain challenge.** Since innovation frameworks already exist on policy and organizational level, as well as many methods available for stakeholder engagement and workshops, The innovation framework under development in RURBANIVE should follow a middle way between supporting the creative participatory design process and gaining an understanding of the broader systemic issues at stake, meant to be used by researchers and practitioners in navigating complex rural-urban problem spaces and design opportunities.
- The RUBANIVE approach should, when iterated, tested and validated, be able to **serve as a complementary approach to the ones presented in the surveyed EU projects and at the same time address the gap found in the scientific review** in relation to applied triple-loop learning focused innovation frameworks for synergistic development of rural-urban areas.

The findings in this deliverable will be incorporated in **the future work in the RURBANIVE project in the following ways:**

- Insights gained from the review are included in the initial work with Co-creation Labs, to **capture the thoughts and perspectives of the different stakeholders in the project.**
- The **design of a draft of the RURBANIVE innovation framework that will be shared and discussed with participants** in the project during the next period will be based on learnings from the review, ending in Milestone 7, a 1st version of the RURBANIVE innovation framework to be tested by the RUCLs.
- The RUCL at Milos Island is being used as **an initial pilot to test the usefulness of early versions of the innovation framework.** A need has been expressed by the RUCL for methods that are able to engage a broad network of stakeholders in exploring system dynamics related to the development of the ecosystem challenges that face the island. And an initial prototype of a method developed by RISE tailored for this purpose will be tested in early 2025 with the intention of being able to be used by the RUCLs themselves going forward.
- Finally, as the RURBANIVE project has a focus on immersive innovation ecosystems, **the potential for utilizing immersive technologies for triple loop learning in larger stakeholder groups** will be explored during the development of the RURBANIVE innovation framework.

5 References

- Adem Esmail, B., Geneletti, D., 2017.** Design and impact assessment of watershed investments: An approach based on ecosystem services and boundary work. *Environmental Impact Assessment Review* 62, 1–13. <https://doi.org/10.1016/j.eiar.2016.08.001>
- Allen, C.R., Birge, H.E., Bartelt-Hunt, S., Bevans, R.A., Burnett, J.L., Cosens, B.A., Cai, X., Garmestani, A.S., Linkov, I., Scott, E.A., Solomon, M.D., Uden, D.R., 2016.** Avoiding decline: Fostering resilience and sustainability in midsize cities. *Sustainability (Switzerland)* 8. <https://doi.org/10.3390/su8090844>
- Armendáriz, A., Armenia, S., Atzori, A.S., 2016.** Systemic analysis of food supply and distribution systems in city-region systems—An examination of FAO’s policy guidelines towards sustainable agri-food systems. *Agriculture (Switzerland)* 6. <https://doi.org/10.3390/agriculture6040065>
- Armenia, S., Pompei, A., Barreto, A.C.C., Atzori, A.S., Fonseca, J.M., 2019.** The rural-urban food systems’ links with the agenda 2030: From fao guidelines on food supply and distribution systems to a dairy sector application in the area of bogota. *Systems* 7. <https://doi.org/10.3390/systems7030045>
- Birtchnell, T., Gill, N., Sultana, R., 2019.** Sleeper cells for urban green infrastructure: Harnessing latent competence in greening Dhaka’s slums. *Urban Forestry and Urban Greening* 40, 93–104. <https://doi.org/10.1016/j.ufug.2018.05.014>
- Carrard, N., Foster, T., Willetts, J., 2019.** Groundwater as a source of drinking water in southeast Asia and the Pacific: A multi-country review of current reliance and resource concerns. *Water (Switzerland)* 11. <https://doi.org/10.3390/w11081605>
- Chiang, Y.-C., Tsai, F.-F., Chang, H.-P., Chen, C.-F., Huang, Y.-C., 2014.** Adaptive society in a changing environment: Insight into the social resilience of a rural region of Taiwan. *Land Use Policy* 36, 510–521. <https://doi.org/10.1016/j.landusepol.2013.09.026>
- Clay, N., Yurco, K., Agrawal, A., Persha, L., 2018.** Ecosystem Services in a Transitional Forest Landscape: Shifting Trajectories in Southeast Michigan, USA. *Society and Natural Resources* 31, 457–472. <https://doi.org/10.1080/08941920.2017.1413692>
- Delazeri, L.M.M., Da Cunha, D.A., Oliveira, L.R., 2022.** Climate change and rural–urban migration in the Brazilian Northeast region. *GeoJournal* 87, 2159–2179. <https://doi.org/10.1007/s10708-020-10349-3>

Elbakidze, M., Dawson, L., Andersson, K., Axelsson, R., Angelstam, P., Stjernquist, I., Teitelbaum, S., Schlyter, P., Thellbro, C., 2015. Is spatial planning a collaborative learning process? A case study from a rural-urban gradient in Sweden. *Land Use Policy* 48, 270–285. <https://doi.org/10.1016/j.landusepol.2015.05.001>

Farrell, K., 2017. The rapid urban growth Triad: A new conceptual framework for examining the urban transition in developing countries. *Sustainability (Switzerland)* 9. <https://doi.org/10.3390/su9081407>

Giacalone, M., Turco, R., Mosconi, E.M., Alaimo, L.S., Salvati, L., 2023. The Way Toward Growth: A Time-series Factor Decomposition of Socioeconomic Impulses and Urbanization Trends in a Pre-crisis European Region. *Social Indicators Research*. <https://doi.org/10.1007/s11205-023-03124-7>

Halbac-Cotoara-Zamfir, R., Cividino, S., Egidi, G., Salvia, R., Salvati, L., 2020. Rapidity of change in population age structures: A local approach based on multiway factor analysis. *Sustainability (Switzerland)* 12. <https://doi.org/10.3390/su12072828>

Hamann, M., Biggs, R., Reyers, B., 2016. An exploration of human well-being bundles as identifiers of ecosystem service use patterns. *PLoS ONE* 11. <https://doi.org/10.1371/journal.pone.0163476>

Hensel, M.U., Sørensen, S.S., 2019. Performance-oriented architecture and urban design. *FormAkademisk* 12. <https://doi.org/10.7577/formakademisk.2963>

Hincks, S., Carter, J., Connelly, A., 2023. A new typology of climate change risk for European cities and regions: Principles and applications. *Global Environmental Change* 83. <https://doi.org/10.1016/j.gloenvcha.2023.102767>

Hoffmann, E.M., Schareika, N., Dittrich, C., Schlecht, E., Sauer, D., Buerkert, A., 2023. Rurbanity: a concept for the interdisciplinary study of rural–urban transformation. *Sustainability Science* 18, 1739–1753. <https://doi.org/10.1007/s11625-023-01331-2>

Jhan, H.-T., Ballinger, R., Jaleel, A., Ting, K.-H., 2020. Development and application of a socioeconomic vulnerability indicator framework (SVIF) for local climate change adaptation in Taiwan. *Sustainability (Switzerland)* 12. <https://doi.org/10.3390/su12041585>

Juschten, M., Brandenburg, C., Hössinger, R., Liebl, U., Offenzeller, M., Prutsch, A., Unbehau, W., Weber, F., Jiricka-Pürerer, A., 2019. Out of the city heat-way to less or more sustainable futures? *Sustainability (Switzerland)* 11. <https://doi.org/10.3390/su11010214>

Khan, Y., O’Sullivan, T., Brown, A., Tracey, S., Gibson, J., Génèreux, M., Henry, B., Schwartz, B., 2018. Public health emergency preparedness: A framework to promote resilience. *BMC Public Health* 18. [https://doi.org/10.1186/s12889-018-6250-](https://doi.org/10.1186/s12889-018-6250-7)

[7](#)

- Kirshen, P., Aytur, S., Hecht, J., Walker, A., Burdick, D., Jones, S., Fennessey, N., Bourdeau, R., Mather, L., 2018.** Integrated urban water management applied to adaptation to climate change. *Urban Climate* 24, 247–263. <https://doi.org/10.1016/j.uclim.2018.03.005>
- Kusio, T., Rosiek, J., Conto, F., 2022.** Urban–Rural Partnership Perspectives in the Conceptualization of Innovative Activities in Rural Development: On Example of Three-Case Study Analysis. *Sustainability (Switzerland)* 14. <https://doi.org/10.3390/su14127309>
- Leck, H., Simon, D., 2018.** Local authority responses to climate change in South Africa: The challenges of transboundary governance. *Sustainability (Switzerland)* 10. <https://doi.org/10.3390/su10072542>
- Li, G., Cheng, G., Wu, Z., 2022.** Resilience Assessment of Urban Complex Giant Systems in Hubei Section of the Three Gorges Reservoir Area Based on Multi-Source Data. *Sustainability (Switzerland)* 14. <https://doi.org/10.3390/su14148423>
- Lioubimtseva, E., 2022.** The role of inclusion in climate vulnerability assessment and equitable adaptation goals in small American municipalities. *Discover Sustainability* 3. <https://doi.org/10.1007/s43621-022-00071-0>
- Long, H., 2022.** Theorizing land use transitions: A human geography perspective. *Habitat International* 128. <https://doi.org/10.1016/j.habitatint.2022.102669>
- Malakar, K., Mishra, T., Patwardhan, A., 2018.** A framework to investigate drivers of adaptation decisions in marine fishing: Evidence from urban, semi-urban and rural communities. *Science of the Total Environment* 637–638, 758–770. <https://doi.org/10.1016/j.scitotenv.2018.04.429>
- Martín-Forés, I., Magro, S., Bravo-Oviedo, A., Alfaro-Sánchez, R., Espelta, J.M., Frei, T., Valdés-Correcher, E., Rodríguez Fernández-Blanco, C., Winkel, G., Gerzabek, G., González-Martínez, S.C., Hampe, A., Valladares, F., 2020.** Spontaneous forest regrowth in South-West Europe: Consequences for nature’s contributions to people. *People and Nature* 2, 980–994. <https://doi.org/10.1002/pan3.10161>
- Moon, T.H., Kim, D.-H., Park, C.S., Lee, D.-S., 2017.** Policy analysis to reduce climate change-induced risks in urban and rural areas in Korea. *Sustainability (Switzerland)* 9. <https://doi.org/10.3390/su9040524>
- Morzillo, A.T., Colocousis, C.R., Munroe, D.K., Bell, K.P., Martinuzzi, S., Van Berkel, D.B., Lechowicz, M.J., Rayfield, B., McGill, B., 2015.** “Communities in the middle”: Interactions between drivers of change and place-based characteristics in rural forest-based communities. *Journal of Rural Studies* 42, 79–90. <https://doi.org/10.1016/j.jrurstud.2015.09.007>

- Niva, V., Taka, M., Varis, O., 2019.** Rural-urban migration and the growth of informal settlements: A socio-ecological system conceptualization with insights through a “water lens.” *Sustainability (Switzerland)* 11. <https://doi.org/10.3390/su11123487>
- Ozor, N., Enete, A., Amaechina, E., 2016.** Drivers of rural–urban interdependence and their contributions to vulnerability in food systems in Nigeria – a framework. *Climate and Development* 8, 83–94. <https://doi.org/10.1080/17565529.2014.998605>
- Pandey, R., Kala, S., Pandey, V.P., 2015.** Assessing climate change vulnerability of water at household level. *Mitigation and Adaptation Strategies for Global Change* 20, 1471–1485. <https://doi.org/10.1007/s11027-014-9556-5>
- Porst, L., Sakdapolrak, P., 2018.** Advancing adaptation or producing precarity? The role of rural-urban migration and translocal embeddedness in navigating household resilience in Thailand. *Geoforum* 97, 35–45. <https://doi.org/10.1016/j.geoforum.2018.10.011>
- Rajendran, L.P., Raúl, L., Chen, M., Guerrero Andrade, J.C., Akhtar, R., Mngumi, L.E., Chander, S., Srinivas, S., Roy, M.R., 2024.** The ‘peri-urban turn’: A systems thinking approach for a paradigm shift in reconceptualising rural-urban futures in the global South. *Habitat International* 146. <https://doi.org/10.1016/j.habitatint.2024.103041>
- Sadat Nickayin, S., Egidi, G., Cudlin, P., Salvati, L., 2023.** Investigating metropolitan change through mathematical morphology and a dynamic factor analysis of structural and functional land-use indicators. *Scientific Reports* 13. <https://doi.org/10.1038/s41598-023-27686-1>
- Singh, C., Basu, R., 2020.** Moving in and out of vulnerability: Interrogating migration as an adaptation strategy along a rural–urban continuum in India. *Geographical Journal* 186, 87–102. <https://doi.org/10.1111/geoj.12328>
- Sokame, B.M., Agboka, K.M., Kimathi, E., Mudereri, B.T., Abdel-Rahman, E.M., Landmann, T., Rwaheru, M.M., Abdalla, O., Mafabi, M.M., Lubango, L.M., Tonnang, H.E.Z., 2024.** An Integrated Assessment Approach for Socio-Economic Implications of the Desert Locust in Eastern Africa. *Earth’s Future* 12. <https://doi.org/10.1029/2023EF003841>
- Tian, Q., Guo, L., Zheng, L., 2016.** Urbanization and rural livelihoods: A case study from Jiangxi Province, China. *Journal of Rural Studies* 47, 577–587. <https://doi.org/10.1016/j.jrurstud.2016.07.015>
- Vizinho, A., Avelar, D., Fonseca, A.L., Carvalho, S., Sucena-Paiva, L., Pinho, P., Nunes, A., Branquinho, C., Vasconcelos, A.C., Santos, F.D., Roxo, M.J., Penha-Lopes, G., 2021.** Framing the application of Adaptation Pathways for agroforestry in

Mediterranean drylands. Land Use Policy 104.

<https://doi.org/10.1016/j.landusepol.2021.105348>

Wang, Z., Deng, X., Wong, C., 2016. Integrated land governance for eco-urbanization. Sustainability (Switzerland) 8. <https://doi.org/10.3390/su8090903>

Yuan, Q., Gu, Y., Yang, M., Wu, Y., Hu, G., Zhou, G., 2022. Synergistic utilization mechanism of e-waste in regions with different levels of development: A case study of Guangdong Province. Journal of Cleaner Production 380.

<https://doi.org/10.1016/j.jclepro.2022.134855>

Zhu, X.-G., Li, T., Feng, T.-T., 2022. On the Synergy in the Sustainable Development of Cultural Landscape in Traditional Villages under the Measure of Balanced Development Index: Case Study of the Zhejiang Province. Sustainability (Switzerland) 14.

<https://doi.org/10.3390/su141811367>