UNIVERSITY OF LATVIA
FACULTY OF GEOGRAPHY AND EARTH SCIENCES

ERIKA LAGZDINA

MUNICIPAL ENVIRONMENTAL GOVERNANCE DEVELOPMENT PRECONDITIONS

DOCTORAL THESIS

BASED ON A THEMATICALLY UNITED COLLECTION OF SCIENTIFIC PAPERS

Submitted for the degree of Doctor (Ph. D.) in Social and Economic Geography
Subfield: Environmental Management

Riga, 2023

The doctoral thesis has been elaborated at the University of Latvia Faculty of Geography and Earth Sciences, Department of Environmental Science, (2015-2022) and Faculty of Business, Economics and Management, Department of Environmental Management (2009-2011).

The thesis consists of Introduction, Literature Review, Materials and Methods, Results and Discussion, Conclusions and Recommendation, Bibliography, and Annexes.

Form of thesis: a collection of thematically unified scientific papers.

The research has received financial support from: The EEA programme "Environmental Policy Integration" for the project "Environmental communication and environmental policy integration", 2009–2010; The European Social Fund for the project "Support to doctoral studies in the University of Latvia" (Nr. 2009/0138/1DP/1.1.2.1.2/09/IPIA/ VIAA/004), 2009-2011; The Baltic Sea Research and Development Programme (BONUS) and national budget for the project "A Systems Approach Framework for Coastal Research and Management in the Baltic", 2016-2018; The European Social Fund and national budget for the project "Revival of academic staff and development of competences in the University of Latvia" (Nr. 8.2.2.0/18/A/ 010), 2019-2020.

Scientific advisor: *Dr. habil. paed. Prof.* **Raimonds Ernsteins**, University of Latvia

Reviewers:

1) *Dr. oec.* **Dzintra Atstaja**, Riga Stradins University, Latvia.
2) *Dr. geog., Assoc. Prof.* **Andris Klepers**, Vidzeme University of Applied Sciences, Latvia.
3) *Dr. geogr, Prof.* **Peter Schlyter**, Blekinge Institute of Technology, Sweden.

The thesis will be defended at the public session of the Joint Doctoral Committee of the Earth sciences, physical geography and environment, and Social and economic geography of the University of Latvia, at 13:00 o'clock on December 4, 2023, Jelgava Str.1, Riga, 702 aud.

The thesis and its summary are available in the Library of the University of Latvia, Raina blvd. 19, Riga.

Chair of the Doctoral Committee — *Dr.geogr., Prof.* **Agrita Briede**
Secretary of the Doctoral Committee — *Dr. geogr.* **Oskars Purmalis**

ABSTRACT

The pressure on ecosystems and processes that regulate Earth's resilience increases because of societal development, leading to an imbalance between the fundamental dimensions of sustainable development. The inability of governments to address these challenges underscores the necessity of pursuing systemic solutions, with a specific emphasis on local level. Currently, in municipalities knowledge and resources required for environmental governance are inadequate. And, the use of governance instruments, especially environmental communication, is fragmented and unsystemic. These deficiencies affect the execution and integration of environmental governance into overall local development governance processes.

The aim of the research is to determine the preconditions for the functioning and development of environmental governance in municipalities in Latvia, with the purpose of enhancing the process of local sustainable development governance.

In this research, environmental governance is conceptualized along three dimensions: process (delineated by governance instruments), stakeholders, and content. The research is structured around thematic steps, delving into the disciplinary, integrative, and communicative, as well as collaborative facets of governance. The initial sage of the research identifies that the attributes of successful environmental governance are disciplinary planning, the institutional system, and the application of environmental communication in collaboration with the stakeholders. Subsequently, the next stage explores in depth environmental communication sector, its instruments, and stakeholders, as well as conditions for its systemic development. The results indicate that environmental communication is essential for the integration of environmental governance both internally and externally, i.e., in entire development process. In the third stage, the conditions for integrating environmental governance are analysed exploring municipal integrated coastal governance, applying a System Framework Approach, the main components of which are a socio-ecological systems approach and stakeholder participation. Systemic deficiencies in coastal governance is possible to address developing collaborative governance and tools for its implementation.

By scrutinizing each of the environmental governance dimensions, preconditions for the effective functioning and development of municipal environmental governance have been identified, they are: the disciplinary understanding of environmental governance and its application in integrated development governance; the development of all complementary environmental communication instruments (environmental information, environmental education, public participation, and pro-environmental behaviour) and their application in collaboration with stakeholders; and socio-ecological system approach-based definition of governance content. The outcome of the research is an innovative for Latvia concept of a municipal coastal monitoring system, which is based on public participation and the interface between science and policy, as well as designed tools and processes to ensure its implementation within the framework of legislatively defined development planning processes.

The thesis is based on a collection of thematically related scientific publications, compiled in a unified text according to the structure and logic of the research.

Keywords: *Collaboration, environmental governance, environmental communication, governance instruments, integrated coastal governance, municipal coastal monitoring system, socio-ecological system, stakeholders.*

ABBREVIATIONS

ATR	administrative territorial reform
BaltCoast	research project "A systems approach framework for coastal research and management in the Baltic"
BAU	business-as-usual (governance model)
CDTP	Coastal Development Thematic Plan
CIS	Coastal Indicators System
CGS	Coastal Governance Survey
DPSIR	driving forces-pressures-state-impacts-response
EC	environmental communication
EE	environmental education
EI	environmental information
ELS	environmental licencing system
EMAS	environmental management and audit system
EPI	environmental policy integration
EU	European Union
ICLEI	International Council for Local Environmental Initiatives
ICM	integrated coastal management /governance
Int.	international (for conferences)
IS	Indicator System
MCMS	Municipal Coastal Monitoring System
NGO	non-governmental organization
OECD	Organization of Economic Cooperation and Development
PEB	pro-environmental behaviour
PCB	public consultative board
PP	public participation
PR	planning region
SAF	Systems Approach Framework
SES	socio-ecological system
SWOT	strength-weaknesses-opportunities-threats
NVBR	North Vidzeme Biosphere Reserve
UN	United Nations

CONTENTS

INTRODUCTION

Topicality of research

Current societal development imposes pressure on the ecosystems and processes that regulate stability and resilience of the Earth Systems (GEO, 2012). To avoid growing imbalance between key sustainability dimensions (environment, economy, and society) changes in governance approaches are needed at all levels.

Already in 1992, the UN Conference on Sustainable Development (UNCED, 1992) has acknowledged the importance of the local level governance for sustainable development (SD). Nevertheless, the capacity of municipalities in many countries, Latvia included, has not been adequately improved (Vanags, Vilka, 2003; Pūķis, 2010; LPS, 2010), in particular it refers to the environmental governance (Ernšteins, 2006). In Latvia, there is no established accepted practice for the disciplinary (sectoral) environmental governance at local level, as result the experience of integrating environmental aspects into overall local development governance and planning processes is insufficient.

Recognising the necessity for broader public involvement in addressing environmental problems, there is a need for communication and collaboration-based governance approaches and tools to ensure this, in particular environmental communication (EC) instruments, which are currently underused, i.e. non-systemic, unsystematic, and non-complementary. A prerequisite for successful governance is an adequate information flow between science and policy, which is not ensured. Locally specific environmental information is lacking or too complex, so its use in decision-making and policymaking is incomplete (Elliott et al., 2017; Dale et al., 2019).

Environmental systems are complex, dynamic, and multidisciplinary and therefore being unsuitable for conventional governance approaches (White *et al.*, 1994; Dawson, 2019). Integrated governance requires holistic approaches and solutions (Stottrup et al., 2017; Elliott et al., 2017; Dale et al., 2019), for which experience and the necessary knowledge, especially at local level are insufficient. Such knowledge can be provided by the experience of integrated coastal governance (ICM), which has its both normative background and methodological basis lying in the socio-ecological systems (SES) concept and stakeholder involvement techniques for decision-making (Ehler, 2003; Ourcoast, 2010; Mette, 2011). Systems Approach Framework (SAF) provides a multidisciplinary and transdisciplinary advice how to address governance of the complex systems through participatory approach, allowing to improve missing science-policy interface (Ostrom, 2009; Hopkins *et al.*, 2012). This offers opportunities to improve environmental governance by integrating it into the statutory municipal development planning process and performance monitoring.

Aim and tasks of research

The aim of the research is to determine the main preconditions for the functioning and development of environmental governance in municipalities in Latvia, with the purpose of enhancing the process of local sustainable development governance.

The research has been structured into thematic blocks (studied governance dimensions) forming three consecutive steps (Fig. 1).

The tasks for each of steps have been set iteratively to build on, complement and consolidate the findings from the previous steps and elaborate comprehensive understanding of the municipal environmental governance process.

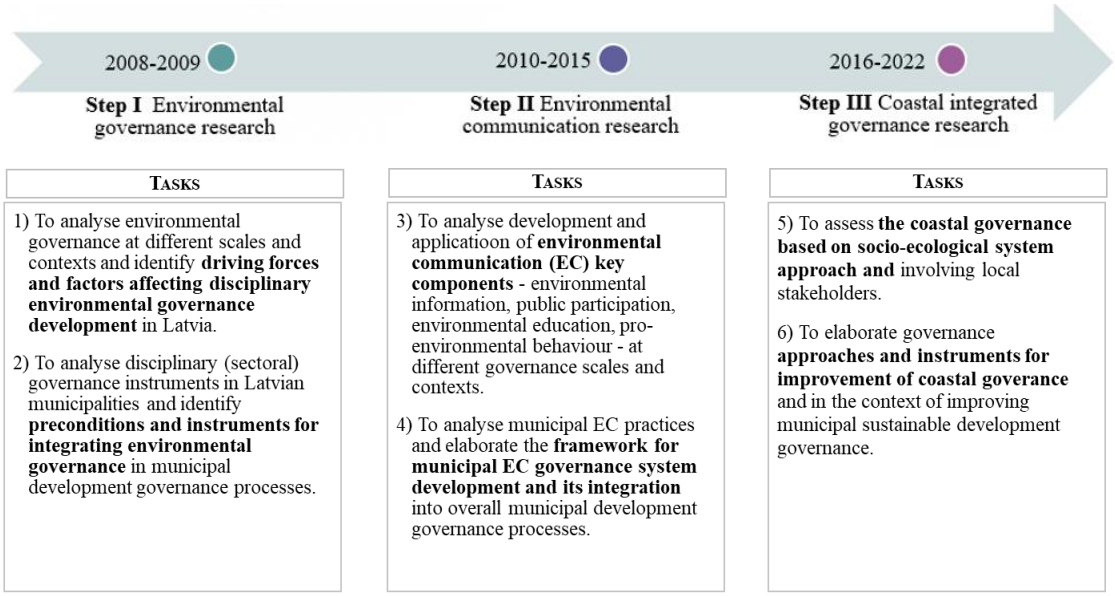

Figure 1. **The research steps and tasks. (Author)**

Proposed thesis

Principal preconditions for the successful functioning and development of the municipal environmental governance within the context of local sustainable governance process improvement are:

- disciplinary understanding of the environmental governance and its application in integrated local development governance;
- development of all complementary environmental communication instruments (environmental information, environmental education, public participation, and pro-environmental behaviour) and their application in forming collaboration with stakeholders;
- socio-ecological system approach-based definition of governance content.

Novelty of research and results applicability

1) For the first time, the comprehensive disciplinary assessment of EC in Latvia has been done, systematising periods, driving forces, and influencing factors.
2) Conceptual innovation of a coastal science-policy interface for municipal governance has been elaborated. This innovation embodies the coordinated preparation of scientific knowledge to be subsequently translated, transferred, and integrated into ICM-related decision making and implementation practice at local level.
3) A novel applied result – a conceptual model for stakeholder involvement has been elaborated – Municipal Coastal Management Monitoring System – which is a novel governance instrument incorporating elements of citizen science.

The outcomes of this research, as well as the governance models devised, have the potential for broad applicability across various municipalities and governance sectors. They are applicable for statutory municipal development planning process organization, within the realm of local sustainable development governance. The innovative coastal science-policy interface model along with its accompanying set of governance tools, holds substantial promise for adoption in other coastal municipalities in Latvia and beyond, especially in regions grappling with similar challenges. Significantly, this research contributes to our understanding of the application of a transdisciplinary and holistic approach to governance research.

Approbation of results

The main results independently or together with co-authors have been approbated in 8 scientific papers (see copies in the Annex) and discussed in 13 international conferences in Latvia and abroad, as well as at the University of Latvia annual scientific conferences. Research has been enriched from the author's the participation in three research projects. The thesis is based on a thematically coherent eight scientific publications (Papers).

PAPER 1 **Lagzdiņa E**., Ernšteins R., 2009. Municipal environmental policy planning: complementarity of disciplinary and integrative approaches [*Vides politikas plānošana pilsētu pašvaldībās: disciplinārās un integratīvās pieejas komplementaritāte*]. Proceedings. 7th Int. Scientific and Practical Conference, June 25-27, 2009, Rezekne, Latvia. *Environment, Technology, Resources*, **2,** 134-144. doi:10.17770/etr2009vol2.1026 (Scopus).

PAPER 2 **Lagzdina E**., 2010 Environmental communication instruments for environmental policy integration. *Environmental and Climate Technologies*, **5**(1), 56-64. doi: 10.2478/v10145-010-0035-2 (WoS, Scopus).

PAPER 3 Ernsteins R., **Lagzdina E**., Lontone-Ievina A., Stals A., 2017. Municipal environmental communication governance development: complementary disciplinary and integrative approaches and practice. Proceedings. *Int. Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management (SGEM)*, June 29-July 5, 2017, Albena, Bulgaria, **17**(54), 359-370. doi:10.5593/sgem2017/54/S22.046 (Scopus).

PAPER 4 Ernsteins R., Lontone – Ievina A., **Lagzdina E**., Osniece K., Kaulins J., 2017. Integrated coastal management practice case studies: deficiency of collaboration communication and socio-ecological system approaches. Proceedings. Int. Scientific Conference on Economic Science for Rural Development (ESRD), April 27-28, 2017, Jelgava, Latvia. *Economic Science for Rural Development*, **45**, 63-70 (WoS).

PAPER 5 Ernsteins R., **Lagzdina E**., Lontone-Ievina A., 2019. Municipal coastal governance process research and development: coastal socio-ecological system and its governance understanding. Proceedings. 20th Int. Scientific Conference on Economic Science for Rural Development (ESRD), May 9-10, 2019, Jelgava, Latvia. *Economic Science for Rural Development*, **52**, 29-36. doi: 10.22616/ESRD.2019.101 (WoS).

PAPER 6 Ernsteins R., **Lagzdina E.,** Kudrenickis I, Lontone-Ievina A., 2020. Municipal coastal governance system developments in Latvia: governance segments, sectors and instruments. Proceedings. 21st Int.

Scientific Conference on Economic Science for Rural Development (ESRD). May 12-15, 2020, Jelgava, Latvia. *Economic Science for Rural Development*, **54,** 87-98. doi: 10.22616/ESRD.2020.54.011 (WoS).

PAPER 7 **Lagzdina E.,** Kudrenickis I., Ernšteins R., Lontone A., 2018. Municipal coastal governance towards rural community resilience development: Scenarios and tools. *WIT Transactions on Ecology and the Environment* **226** (1), 297-309. doi:10.2495/SDP170261 (WoS, Scopus).

PAPER 8 Ernsteins R., **Lagzdina E.,** Kudrenickis I., Kaulins J., 2022. Municipal coastal governance process developments in Latvia: Non-statutory instruments towards collaborative governance system. *WIT Transactions on Ecology and the Environment*, **260,** 391-402. doi:10.2495/SC220321 (Scopus).

Author's contributions

PAPER 1. The author designed research tools, did policy documents analysis and survey, processed and analysed data, synthesized results, and contributed to the conclusions. Estimated share of the author's contribution to this paper is as follows: data collection, analysis – 100%, results synthesis, generalization – 70%, writing – 90%.

PAPER 2. Designed methodology and carried out policy document studies and survey, analysed data, synthesized results, produced conclusions, and drafted paper. 100/ 100/100 %.

PAPER 3. Carried out document studies, systematized results, contributed to analysis and conclusions, conceptualized discussion, contributed to the critical revision of the text. 40/30 /40 %.

PAPER 4. Carried out cases re-analysis, systematized findings, took part in stakeholders mapping and SES model design, conclusions and drafting the paper. 30/30/30 %.

PAPER 5. Contributed to the data collection, facilitated group discussions, analysed and systematized results, contributed to the text. 40/30/30 %.

PAPER 6. Contributed to the policy analysis and conceptualization of the approach revisiting earlier models, revised methodology, systematized results, contributed to the SWOT analysis, reviewed MCGP and conclusions. 30/30/40 %.

PAPER 7. Re-analysed climate change governance studies. Contributed to the policy document analysis; systematization of governance scenarios; conceptualization of the instruments and to writing the text. 30/30/60 %.

PAPER 8. Critically reviewed and restructured results of the SES assessment: stakeholder mapping, ecosystem services assessment, and instruments. Contributed to the scenarios; discussion on the costal municipal monitoring system; formulation of conclusions. 30/40/60 %.

The structure of thesis

The papers submitted for this thesis have been consolidated into a single comprehensive dissertation text, structured into five chapters: Introduction, Literature review, Materials and Methods, Results and Discussion, subdivided into three thematic subsections, and Conclusions and Recommendations. The Bibliography includes 150 references.

Annex list most important authors scientific publications and projects relevant to the thesis. And it contains **copies of 8 scientific Papers presented for the defence.**

1. LITERATURE REVIEW

Contextual factors of the environmental governance development

Key paradigms of the 20th century – modernization and sustainable development (SD), reflect the growing recognition of communication, participation, and integration aspects in public governance. Figure 1.1 illustrates how these paradigms overlap and resonate shaping governance practices down to the local (municipal) level.

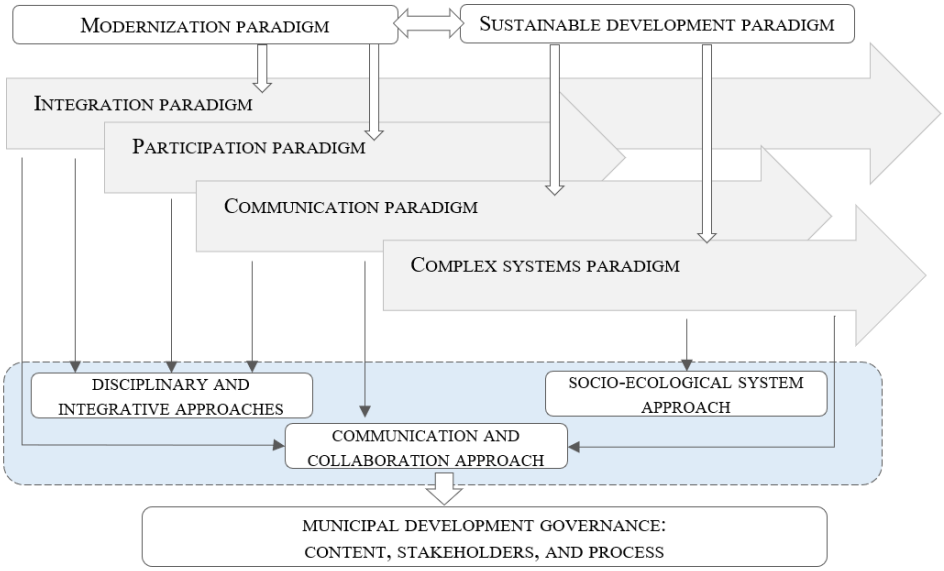

Figure 1.1. **Integrative impact of paradigms on governance. (Author)**

Modernization of governance

Modernization implies reforming public sector administration to maintain the society's trust in governments (Modernizing Government, 1999; Kohler-Koch, Rittberger, 2006; OECD, 2021a). To address current problems, commitment from different stakeholders is essential (Kooiman *et al.*, 2005). There is need for the transition from 'top-down' to multi-centred governance models based on collaboration (Lenschow, 2002; Knill, Lenschow, 2005) and a collective decision-making (OECD, 2001; Pelonen *et al*., 2008; Vos, Westerhoud, 2008; Vos, 2009). Governance shall be built on the principles of 'good governance'. They are efficiency, transparency, accountability, participation, and coordination (European Governance, 2001; Grzeszczak, 2015).

One of the mechanisms for modernising of the local level is administrative territorial reforms (ATR) (Kersting, Vetter (*eds.*), 2003). ATR merge small and ineffective local governments into bigger ones. Two factors are decisive for the success: understanding of self-governance principle and political culture (Menegat, 2002; Vanags, Vilka, 2005). In Latvia, where formation of independent, democratic local governments took place in 1990s, the success of local development has been significantly affected by insufficient capacity and knowledge in local administrations (Vanags, Vilka, 2005; Pūķis, 2010). Latvian self-governments have undergone significant reforms. Their number has been gradually reduced from 556 (albeit a two-tier system) to 119 in 2009 and 43 municipalities in 2022. Yet, as the governmental assessment (MEPRD, 2022) informs, there is no obtained significant increase in local capacity in result of implemented ATR.

Environmental policy integration

Modernisation in the environmental sector takes different forms (Stoker, 2019). Table 1.1 summarizes key transformative changes identified in the environmental sector.

Table 1.1. **Transformative changes in environmental governance. (Author)**

Paradigm shift	Key change	Policy context	References
New type of governance instruments	From control-command to communication instruments Environmental awareness Complementarity principle	Regulatory revolution in 1970s in USA and 1st EAP (1973)	Montrie, Fiege, 2013; OECD, 2001; McGrory, Souse, 2010
Strategic policy planning approach	Policy cycle approach Public participation tools Policy performance monitoring and indicators	"Environment for Europe" process, National EAPs	Tews *et al*., 2003; Sterner, 2003; Lafferty, Meadow-croft (ed.), 2000
Environmental policy integration	Institutional procedures Communication tools Stakeholder coordination Science-policy interface	Bruntland Report,1987; EU EAPs; Cardiff process, 1998	Jordan, Lenshow (eds.), 2008; Selin, VanDeveer, 2015; EEA, 2005

Report of the World Commission on Environment and Development (Brundtland, 1987) initiated change in environmental thinking towards environmental policy integration (EPI) (Jordan, Lenschow (*eds*.), 2008). Environment has been one of the EU priority policy area since the 1957 Treaty (Bailey, 2003, TEU, 2012). The EU in its Environmental Action Programmes advocates for EPI integration inviting towards consensus-oriented governance and collaboration. However, there is a lack of a national framework for the successful EPI. Cross-sectoral cooperation mechanisms alone, though efficient, cannot ensure EPI (Homeyer, 2007; Bendere, Lagzdiņa, 2010).

Change in communication paradigm

There are two fundamental approaches that diagnose the root of the development problem: (i) lack of information (determined by dominant paradigm models) and (ii) power inequalities (forming a critique of the dominant paradigm) (Waisbord, 2001). In the late 20th century, participation has become a dominant approach in the governance (Foti *et.al*, 2008) replacing traditional 'top-down' information communication models with horizontal models which are based on participation, collaboration, and deliberation (Mefalopulous, 2003; Mefalopulous, Kamlongera, 2004; Inagani, 2007).

Public participation brings many benefits. It improves self-esteem and ownership of the process, empowers at individual and organizational levels, provides opportunities for learning and use of local knowledge in development process (Alsop *et al.,* 2006; Kilvington, 2007; Norton, 2007). Collaborative approach to participation broadens stakeholder interactions; supports integration and multi-scale and holistic versus disciplinary approach; it enhances dialogue, learning, and adaptation (Agranoff, McGuire, 2004; Vodden, 2009). Finally, collaboration secures trust in governments and helps to implement 'good governance' (Kavaliauskas, 2010; Gillgren *et.al*, 2019).

Environmental governance in Latvia

The development of an independent environmental sector in Latvia dates to 1988, when the state institution, Committee on Environmental Protection, was established. The coincidence between the strengthening of environmental sector and the beginning of the national awakening movement (*Atmoda*) and the grassroot environmental activities is noteworthy. This is consistent with global experience, which shows the role of social activism in environmental sector (Doyle, McEachern, 2008). Another factor is political parties. The strong Latvian Green Party founded in 1990, has been a principal factor in the Latvian context. The influence of international processes in shaping the sector's policy is also noteworthy. Thus, in 1995 the first Environmental Policy Plan for Latvia has been elaborated following the "Environment for Europe" guidance. Next significant policy breakthrough is related to the Latvia's accession to the EU.

Reports on the capacity of Latvian municipal environmental governance (REC, 1998; 1999), shed light on the challenges faced by Latvian municipalities during the 1990s. These challenges encompassed insufficient public funding for environmental issues, a deficiency in local environmental information and adequately qualified personnel, inadequate collaboration with state institutions, and a lack of knowledge in participatory methodologies. Additionally, a separate study highlights that local leaders frequently demonstrated a lack of awareness or negligence toward environmental issues (Vanags, Vilka, 2005). As indicated by the findings of literature studies, similar conditions have played a pivotal role in shaping the evolution of environmental governance in Europe. This enables the identification of characteristic approaches prevalent in the region.

Local Agenda 21 (LA21)

Global SD frameworks have promoted public participation in development processes, especially in the context of LA21 implementation. Agenda 21 document (1992) foresaw that by 1996, local authorities would have initiated a process of consultation with their citizens on SD. Though, only 3% of municipalities in Europe implemented LA21 (EEA, 1997). 20 LA21 cases are reported in Latvia (MEPRD, 2002). International knowledge networks such as the Union of Baltic Cities, ICLEI, and other entities have played a pivotal role in the promotion of LA21 and the enhancement of local capacity. Locally, the LA21 process has been instigated either through the impetus of municipality, typically spearheaded by environmental departments, or as a grassroots-driven bottom-up initiative (Joas (ed.), 2000). Lack of national support has been reported as a typical obstacle for LA21 broader acceptance in Europe (Lafferty, Meadowcroft (ed.), 2000).

Disciplinary environmental planning

This model adopts a sectoral approach, integrates a strategic planning cycle, and employs standardized participatory tools, such as SWOT analysis and problem tree, with scoring mechanisms for prioritizing issues. Both LA21 and this model have played instrumental roles in fostering stakeholder collaboration and enhancing local capacity.

EU accession- related process

Additional experience in environmental governance was acquired during the country's accession to the EU and the fulfilment of the EU environmental requirements. This model shifted local authorities from participatory governance to project-based models, where technical expertise took precedence over citizen involvement. The positive aspect

of this model lies in the heightened capacity of local administrations in environmental matters. Municipalities lacked knowledge and gained proficiency through experience.

Integrated local governance

The need for integrated governance has arisen from environmental challenges and public health issues in urban areas (EEA, 1995). The EU Thematic Strategy on the Urban Environment (2006) mandated governments to incorporate environmental considerations into urban policies to address highly intricate problems. This strategy operates on the principle of subsidiarity, emphasizing the prioritization of local initiatives while encouraging collaboration across different decision-making levels. In Latvia, the integrated local development planning approach, legislated in 2008, aimed at integrating spatial, thematic, and temporal dimensions through the use of investments to reach objectives. The methodological guidance provided by the relevant ministry to support integration endeavours posits that an integrated approach involves aligning economic, cultural, social, and environmental aspects, along with the coordination of sectoral interests and governance levels. Subsequently, the imperative for integrated development strategies, encompassing a Strategic (policy) plan, an Action plan, and an Investment plan, has become indispensable elements of the local development planning.

Environmental communication theory and practice

Encyclopaedia of Communication Theories (Milstein, 1999), offers a concise view of the development of theories reflecting the understanding of American scholars on EC belonging to communication science, though admitting EC integrates transdisciplinary knowledge and exists far beyond information communication (Cox, 2010; ECN, 2011).

Attempt to build EC disciplinary theory is attributed to the American scholar Robert Cox, the author of *Environmental Communication and the Public Sphere* (2010).

In his work, Cox theorizes the emerging discipline of EC by extrapolating from diverse, disparate EC applications and endeavours to systematize them into theoretical constructs. Cox contends that while EC does not exclusively rely on rhetorical theories, many such theories have underpinned the theoretical foundation of EC. Some scholars have transcended the purely scientific domain of rhetoric, examining environmental rhetoric within the broader contexts of social and environmental spheres. European theoretical traditions in EC research prefer discourse analysis approach.

Cox distinguishes EC two concepts: (i) communication shapes perceptions of the environment and our relationship with it; and (ii) the public sphere mediates between different points of view that influence environmental decision-making. The pragmatic instrumental function of EC is to educate, persuade, and help to solve environmental problems, while its constitutive function shapes and structures nature and environmental problems as subjects in our understanding.

Environmental awareness-action model

The first EC models are derived from educational and behavioural theories. The environmental awareness-action model describes how knowledge, values, attitudes; motivation, interest, and behaviour interact towards building environmental awareness: (Bolscho *et al.*, 1990). This model has been used in Latvia for environmental awareness raising activities by the NGO and in the university's environmental pedagogy studies.

Environmental information communication model

The environmental information (EI) model is a top-down (government led) approach for disseminating to the public information. Though being one-way transmission process, it had several positive effects: raising public awareness of environmental issues, developing activism and civic engagement in critical environmental situations. The model has been acting in parallel with the awareness-action model.

Participatory communication model

The participatory communication model, as identified in the context of LA21 cases, found extensive application in local environmental action planning during the 1990s. This approach was notably employed by Latvian municipalities, including Liepaja, Aluksne, Cesis, Jelgava, Jurmala, and Jekabpils district municipality (REC, 1999). Drawing from Western practices of involving citizens in local development planning, this model features communication with citizens through surveys and practical capacity-building activities such as seminars and demonstrations. The drivers for this process typically originate from external knowledge centres such as universities or national and international organizations. A distinguishing feature of this model lies in its recognition of citizens not merely as passive recipients of information but as valuable sources of information themselves.

EC components and stakeholder approach-based model

This model reflects the interconnections between two dimensions of EC: the processes described through instruments and the stakeholders. It delineates how the successive and complementary applications of key EC components – environmental information (EI), environmental education (EE), public participation (PP), and pro-environmental behaviour (PEB), in their systemic unity can cultivate environmental awareness within a targeted stakeholder group. The completion of the EC cycle through the application of all EC components leads to the better environmental knowledge and understanding, the development of attitudes expressing concern for the environment, motivation within a stakeholder group to improve the environmental situation, and the cultivation of essential skills to identify and engage in addressing environmental problems through participation in activities contributing to their solution (Fig. 1.2).

In the context of this EC model, and specifically for the objectives of this research, ***stakeholders*** are defined as crucial participants in the communication process. They assume roles as information producers, mediators actively engaged in the process, and the targeted audience approached to take part in the environmental governance process while becoming cognizant of pertinent needs. The key stakeholder groups identified within this communication framework comprise state institutions; municipal entities encompassing administration, political figures, and municipal enterprises; business entities; the public; and intermediaries. The latter group is a broader segment of communication intermediaries: local and national NGOs, media, education and science people, formal and informal educators like museums, nature, and education centres etc.

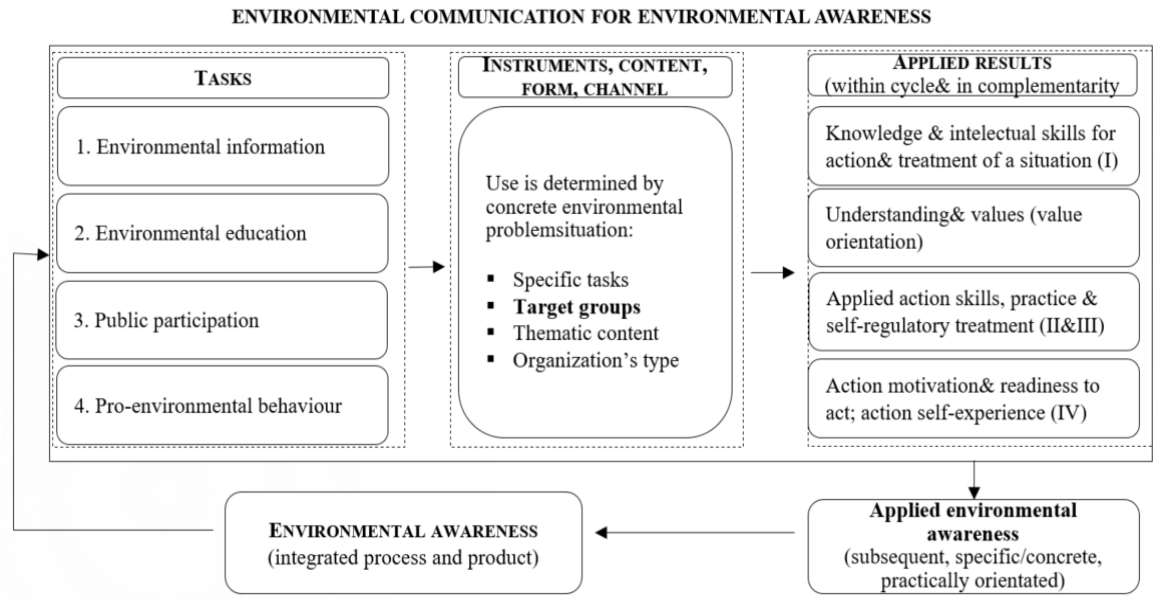

Figure 1.2. **Environmental communication model. (Ernšteins, 1999; 2003)**

Environmental communication as governance instrument

Environmental information (EI)

Built on the principles of the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (1998), the EU Directive 2003/4/EC on public access on environmental information (2003) defines EI as "*information in any form on the state of the environment, on factors, measures or activities affecting or likely to affect the environment or designed to protect it, on cost-benefit and economic analyses used within the framework of such measures or activities and also information on the state of human health and safety, including the contamination of the food chain, conditions of human life, cultural sites and built structures.*" EI is a precondition and principle for sustainability (EU Sustainable Development Strategy, 2001).

Environmental education (EE)

The development of EE has been influenced by international policy processes (Palmer, 1998; Zaļoksnis 2009; Lagzdiņa, 2010). Johannesburg Plan of Action, adopted at the UN Conference on Sustainable Development in 2002, highlights the key role of education in in achieving the SD objectives through promoting sustainable consumption and production. The same notes are in the EU Sustainable Development Strategy. IUCN defines EE as "*the process of recognising values and clarifying concepts to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture, and his biophysical surroundings. EE entails practice in decision-making and self-formulation of a code of behaviour about issues concerning environmental quality*." EE allows individuals to explore environmental issues, engage in problem solving, and take informed decisions to improve the environment (Darnton, 2008; EPA, 2022).

Public participation (PP)

Since 1970s, participatory governance is seen a major paradigm shift in environmental context and as a response to broadly reported failures related to top-down governance

regimes (Stoll-Keelmann *et al.*, 2010). In general, PP is defined *as ´ability of citizens to influence decision-making, using access to information, articulation of public opinion, right to request accountability from public institutions about their decisions in respect to environment"* (Cox, 2010). Effectiveness and forms of participation depends on many factors (Arnstein, 1969; Creighton, 2005, Mefalopulos, 2003), including participants' experience (PP, 2010). Legislation formalizes PP in the decision-making processes related to development; nonetheless, the self-organization of the public and collaboration among stakeholders remain essential factors for the effective realization of PP (Lagzdina *et al*., 2010).

Pro-environmental behaviour (PEB)

Tackling environmental problems requires changing the individual and organizational behaviours (OECD, 2017). Pro-environmental behaviour (PEB) is "*behaviour that seeks for ways how to reduce effects of one's negative impacts on environment"* (Kollmuss, Agyeman, 2002). PEB is determined by individual's environmental knowledge, values, attitudes, consequences of perceived behaviour, and opportunity to act environmentally sound. For supporting PEB learning of skills and motivation is needed (Darnton, 2008).

Socio-ecological systems governance

A change in the environmental science thinking addresses environment as a complex system, where human and natural systems and factors interact. The interaction between these systems, coupled with combinations of external factors, can resonate and precipitate rapid changes within the system. To simulate a collective response to external influences and governance choices, a comprehensive understanding of the functioning of complex systems influencing environmental problems is imperative. In the environmental domain, a vast range of variables and frequent controversies prevail, rendering any governance response inherently non-linear and highly dynamic. For effectiveness, decision-makers must engage with diverse system and problem framings, negotiating solutions. Such a practice-oriented perspective accommodates uncertainty, complexity, and conflicting interpretations, aligning with the principles of learning organizations (Scoones *et al*., 2007).

Socio-ecological system approach

Socio-ecological systems (SES) theory helps to understand complex systems thus supporting informed decision-making (Ostrom, 2009; Petrosillo *et al*.; 2015; Schlüter *at al*., 2019). The concept of governance subsystem within SES captures the complex interplay between stakeholders and institutions, and their knowledge and interests in the governance process (Vodden, 2009). SES governance (Nagendra, Ostrom, 2014; Virapongse *et al.* 2016; Dawson, 2019; Støttrup *et al*., 2019) attributes are:

- Systemic worldview: interconnectedness, multiple scales, stakeholder views;
- Trans-disciplinarity: integration of interests, institutions, and resources;
- Knowledge co-creation: respecting local and scientific knowledge;
- Adaptive governance: self-identification, formation and creating connections between and by main stakeholders at multiple organizational levels;
- Stakeholder engagement: collaboration practices.

Gap between scientific knowledge and policy

The apparent disconnection exists between information and knowledge produced by scientists and that used by policy makers (MacDonald *et al*., 2016*;* Elliott *et al*., 2017; Dale *et al.,* 2019). Usually public awareness of coastal issues is related to accidents in the seas. People are less alerted by deep socio-economic and environmental changes of the coast. The fragmented coastal visions and information flows hamper integrated understanding of the coastal system as a whole nor do they support balanced decision-making (DEDUCE, 2007). Exceptional knowledge of the coast by the locals (Evans *et al*., 2008) shall be used to bridge gap between science and society which is one of obstacles for governance. Citizen science provides a framework for locals' involvement in generation and processing information (Cohn, 2008; Levrel *et al*., 2010).

Integrated coastal governance

The coast (coastal zone) constitutes a complex system characterized by numerous interactions, overlapping scales, and dimensions encompassing ecological, economic, and social aspects (White *et al.,* 1994; Hopkins *et al*., 2011; Støttrup *et al*., 2019). Consequently, traditional governance approaches are inadequate for addressing this complexity. There is a pressing requirement for a change in thinking in governance (Vodden, 2009), necessitating enhanced knowledge, information, and tools to assist decision-makers in comprehending and effectively communicating changes within coastal systems to staleholderes (Hopkins *et al.,* 2011; Waagsaether, Ziervogel, 2012).

Regardless international guidance (OECD, 1992; Recommendation on ICZM, 2002), the world is experiencing large scale governance failures with respect to sustainability of the coastal regions (MEA 2005; Evaluation of ICZM in Europe, 2006; OECD, 2021b). Scarcity of governance resources and lack of competencies and collaboration experience are key obstacles in successful ICM at local level (DEFRA, 2009).

Coastal governance shall be built on principles of integrated governance (OECD, 1992; EEA, 2010; Dale *et al*., 2019) based on a holistic perspective (Atkinson, Klausen 2011; Strøttrup *et al.,* 2017).

ICM enables governance system capable to accommodate multiple interests through collaboration (Ehler, 2003; Mette, 2011) and communication (Ernsteins, 2010; Ernsteins *et.al*. 2011). For ICM stakeholders shall be are empowered (Virapongse *et al*., 2016; Wamsler, 2017; Cuadrado Quesada *et al.,* 2018; Schumacher *et al*., 2018).

Indicators serve as tools to aid the public tin better understanding and assessing a given situation. However, Latvia stands among the minority of EU countries where the use of indicators for coastal policy development and assessment is underdeveloped from both a policy and implementation standpoint (Kauliņš, 2015).

2. MATERIAL AND METHODS

Qualitative research approach

The qualitative approach is embedded in the very design of this research process. The research has been carried out in a real situation, thus its objectives are broadly defined and the results have been iteratively interpreted using inductive approach, the conclusions have evolved with new knowledge and, importantly, the initial hypotheses have been based on theoretical generalisations. This aligns with the overarching conceptualization of such an approach, as delineated by numerous authors (Checkland, Hollwell, 1998; Berg, 2007; Kroplijs, Raščevska, 2010).

Design of this research integrates several methodological approaches:

1) Case study research as methodological framework appropriate for exploring complex, statistically unqualified, and unique systems (Yin, 2009);
2) Action research allowing involvement of stakeholders in the governance studies (assessment, validation of findings and recommendations);
3) Systems Approach Framework (SAF) for addressing complex systems problems (Ostrom, 2009; Hopkins *et al*., 2011; Hopkins *et al*., 2012; Karpouzoglou *et al.*, 2016).
4) Research and development (R&D) approach to ensured transition from the science/academic knowledge to the governance recommendations.

The theoretical framework guiding data acquisition and analysis is constructed upon conceptual models derived from previous studies or adapted for the tasks. Contextual knowledge for interpretation. has been developed through document studies, complemented by observations and the researcher's experiential insights. Triangulation, to ensure the validity of the data, is founded on diverse sources, employing multiple methods, and maintaining consistent internal logic across all research steps.

Documents study. For the document study, the primary source of information involves examination of documents encompassing various sectoral policies, legislation, and reports across multiple governance scales and contexts, including environmental, communication, climate, coastal, and developmental domains. This also entails an examination of documents elucidating institutional practices, encompassing structures and instruments.

Respondents sampling considerations are:

- Knowledge: experts with academic background or experience;
- Multiple levels: respondents represent all levels of governance;
- Sectors: respondents represent key stakeholder groups.

Case studies sampling considerations are:

- Mix of various thematic case studies;
- Sufficient scope: municipalities with environmental governance experience.
- Geographic coverage: all country, with focus on coastal area.
- Pragmatic consideration (distance, funding, the willingness to cooperate).
- Size: different-size of municipal cases (a total of 46 municipalities out of 119).

Social survey methods

Structured interviews (face-to face) are guided by a protocol of written questions (closed and open-ended) structured into thematic blocks depending on the focus of the study. Answers recording has not been universally used due to overlapping interactions. Interview length varies among cases from minutes to hours. Designed questionnaires vary in cope and complexity and they have been designed for different purposes and levels, corresponding to the assumed knowledge and size of the respondent group. *In-depth expert interviews* conducted as face-to-face interviews provide broad context and in-depth understanding of situation. *Focus group* discussion has been used for smaller respondent groups up to 7 participants. *Thematic group interviews (seminars, discussions)* typically involved 12-26 participants representing different stakeholder groups. Dynamic of discussion has been facilitated using techniques: Brain storming, World cafe, Problem Tree, and SWOT analysis. Group dynamic has always created positive synergies. The drawback of such interview is extensive additional information and length of the entire process. *Internet-based survey (questionnaire)* on environmental governance involved 146 respondents (yet not statistically significant) in a relatively brief time slot. Participants have been invited to the survey by an e-mail letter.

Systematization and analysis methods

In qualitative research, the substance of data interpretation is to understand and explain governance process, participants, and content. Systematization of information has been based on the theoretical models adapted for the research: SD; policy cycle; SES; and EC models. *Grouping* as a flexible approach has been used to group multiple practices with aim to generalize them towards theoretical models. Quantitative data processing for internet-based survey (146 respondents) used standard Excel software for grouping answers. *Content analysis* as a key method in analysing and interpreting information from literature and documents studies is the context. It requests certain expertise in the field as involves complex key words, themes and concepts understanding and ability to see them within the studied qualitative information. Key words and concepts have been retrieved from theoretical and applied models identified during the literature review. *Analytic induction strategy* is used for developing causal explanations (causality loop analysis) in the matters of different governance systems analysis. *Multicriteria analysis* is utilized in various contexts and stages of research. The DPSIR (Driver-Pressure-State-Impact-Response) approach is employed for problem analysis, allowing for a comprehensive assessment of the causes, consequences, and responses to coastal socio-economic system (SES) changes. Multicriteria analysis is utilized for stakeholder studies, examining their relationship to coastal problems. SWOT analysis is employed to generate insights into the internal and external factors influencing governance and to identify areas for improvement. The SWOT analysis tool is utilized to evaluate governance EC sector and coastal governance.

System Approach Framework (SAF) methodology

SAF methodology and tools used for the research Step III follow a standardized six steps process developed by the international community (Hopkins *et al.*, 2011) (Fig. 2.1).

Issue Identification: The SAF application begins by identifying the governance issue through the utilization of the *Socio-economic system (SES) assessment* tool. This tool enables a more expedited response to system changes in governance compared to the

time-consuming procedures typically employed in the traditional policy cycle. The effectiveness of the feedback-loop depends upon the involvement of both policy-makers and stakeholders, with a focus on the dissemination of information and knowledge. Scenarios are constructed based on a series of questions aimed at evaluating the most optimal options. Simulation analysis givs insights into the outcomes of decisions.

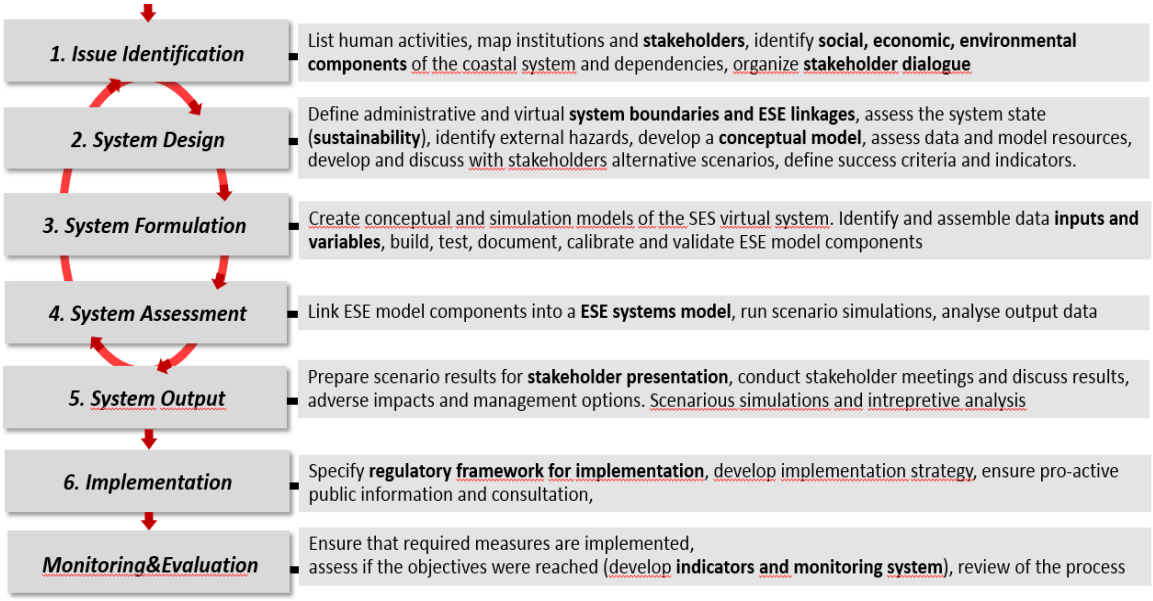

Figure 2.1. **SAF steps and tasks tools. (Baltcoast project)**

System Design: Virtual system encloses the functionality revealing relationships between impacts in the natural system with causes in SES, and those linking the impacts to response in the SES. The virtual system is simplified version of SES reflecting key functionalities. SAF uses conceptual models to plan simulation analysis and communicate to the stakeholders.

System Formulation. The step represents functionality of the virtual system for simulation and interpretation. Quantifying issues within their multi-scale connectivity is a fundamental SAF objective. According quantitative approach, inputs, processes and actions, and constraints are formulated into functional model-blocks representing cause-impact and impact-response chain. To describe model interpretative analysis is applied.

System Assessment: step assembles separate SES component models into uniform system. Model sensitivity analysis is made for selected sub-systems.

System Output: aim of the step is to consolidate all SAF process information and prepare it for presentation to stakeholders and for better interaction with relevant policy-makers.

Implementation: further steps depend on the relevant administration who authorizes SAF application acceptance of process.

Monitoring and Evaluation step is about measuring impact of selected ICM solutions.

Municipal environmental governance study (Paper 1)

The initial step involves reanalyzing the findings derived from multiple municipal studies conducted in various contexts and time periods within the municipalities of Salacgriva, Saulkrasti, Pavilosta, Kolka, Dundaga, Liepaja, Ventspils, Carnikava, Livani, Ainazi, Cesis, and Roja. Following the analysis of local policies, a questionnaire survey (interviews) was conducted with stakeholder representatives from national and regional (n=28), municipal (n=25), business, and mediators (NGOs, science/education,

and media) groups. It provided data for the analysis of planning, institutional, and communication instruments use in municipalities. Additionally, content analysis of 14 municipal environmental policy documents and 16 municipal integrated development programmes was done. To study institutional structures and processes, a content analysis of 46 municipal websites wad done. In terms of the EPI assessment, 5 facilitated discussions (15-29 participants) in 5 regional locations of Latvia, one of whom held in Dundaga to discuss with the stakeholders the coastal governance integration.

EC disciplinary and integrated study (Paper 2&3)

The assessment of EC has been constructed based on the analysis of policy and institutional documents and practices, conducting interviews, and examination of the websites at national and local levels. Documents study covers 17 national policies and 13 legal acts. Social survey methods (interviews) involve 26 NGOs, 11 business, and 2 media representatives. A facilitated focus group discussion with 30 environmental educators from both formal and informal sectors has been held for EE study. A focus group interview with national NGOs (n=20) being members of the Environmental Consultative Board. Group interview was held also with media sector. Questionnaire-based integrated internet survey (n=146) on national environmental governance and EC targeted respondents representing all stakeholder groups around the country. Consolidated results have been presented and validated at the national conference held in Riga (n= 52 representatives from all stakeholder groups). For systematization of discussions, group techniques and SWOT analysis has been used to fix feed-back.

Thematic EC case studies have been conducted in three nature protection territories (North Vidzeme Biospehere Reserve, Vestiena Protected Landscape Area, Kemeri National Park) and through risks communication perspective in Ventspils and Salacgriva municipalities using for data collection institutional and policy analysis and social survey (the latter was implemented by the research colleagues).

The integrated assessment of EC governance development encompasses the study of national and municipal policies. Content analysis of policies in eight city and rural municipalities (Ventspils, Riga, Cesis, Liepaja, and Valmiera cities and Livani, Salacgriva, Ogre rural municipalities) covers the period from 2001 to 2015. Furthermore, a re-analysis of previous studies conducted through collaborative projects between the Liepaja city's administration and the University of Latvia from 2010 to 2015 is undertaken. The choice to focus on Liepaja for an in-depth study is justified by its extensive experience in the application of systemic EC instruments and the municipality's traceable governance process history.

ICM experience reanalysis in the Baltic Sea Region (Paper 4)

To identify the relevance of SAF elements in the successful ICZM, retrospective re-analysis of 19 cases from nine countries around the Baltic Sea Region has been done also covering cases from Latvia: Ventspils Municipal Environmental Licensing System, Pavilosta Grey Dune Nature Reserve, and Liepaja Coastal Development Thematic Planning. Information has been gathered from document studies and interviews. Findings analysis has been structured around SAF tools and elements.

Coastal SES assessment (Papers 5-7)

In-depth assessment of coastal resources undertaken in the pilot territory of Salacgriva municipality has gathered information on the state of the coast summarizing the results

from multiple sources: planning documents of various levels (9 national, 4 local) monodisciplinary empiric studies carried out by the research fellows, and statistics. It was supplemented by on-site visual recording of the physical condition and coastal infrastructure and interviews with 19 coastal residents, as well as group interviews conducted by a student group in 15 local organizations and businesses.

9 of interviewed residents live less than 300 m from the beach. Stakeholder wise 7 respondents represent different interest groups (women, fishermen) or NGOs, 3 represent educational sector, 6 – local business, 3 – work in municipal administration.

The results were discussed in an interdisciplinary expert group (Reference group) and a coastal stakeholder seminar. Preliminary findings discussed in a multi-disciplinary expert (Reference group) have resulted in the list of 16 coastal problems later presented to and discussed with stakeholders in a seminar. By integrating the information obtained from scientists and stakeholders, a list of 19 coastal problems was created, which were further clustered into blocks, leading to the identification of one central issue of governance to be addressed by applying SAF methodology.

The overall process of coastal SES assessment is presented in Fig. 2.2.

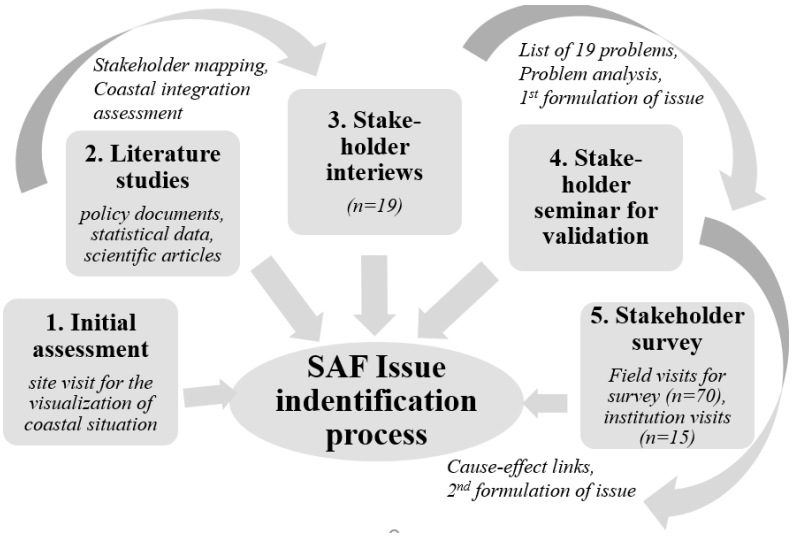

Figure 2.2. **Issue Identification methodology. (Author)**

DPSIR tool for the coastal SES analysis addressed (D) Driving forces: Human needs (of coastal citizens, visitors, and the society). (P) Pressures: Activities of coastal citizens to ensure self-sustainability. Visitors' activities and impact to the coast depend on coastal governance. (S) State of the coasts through its subsystems (Nature, Economy, Social, and Governance). (I) Impact: Loss of quality of coastal nature and culture heritage. (R).

To complement the knowledge on coastal SES, an integrated climate change governance study in the Salacgriva municipality has been undertaken. It included analysis of policies and legislation, public reports; reanalysis of survey on climate risk (flooding, sea surge) communication which involved 130 households.

Governance subsystem assessment is built on analysis of 105 local stakeholder projects financed from the EU Leader programme. Projects have been assessed from three perspectives: spatial (where), thematic (what) and their relationship to the natural environment. Spatially, the coast is understood as coastal villages and coastal elements (beach, dunes). In a broader sense, the coast also includes the area where activities stimulate development processes in the sparsely populated coastal areas in general. In

the context of the scale considered, the coast only very conditionally includes the territory of municipalities and towns bordering on the sea. The thematic relevance of the project to the coast is assessed as direct and indirect. The project's relationship to the natural environment (unified natural and cultural heritage) has also been assessed as direct or indirect.

Stakeholder analysis and institutional mapping (Papers 6, 8)

Complex systems are characterized by multidisciplinarity due to the diverse interests of coastal stakeholders. Analysing them helps to improve understanding of overlapping, shared, and contradicting interests. In SAF, stakeholders' concerns and preferences are clarified in the consultation process. Through multicriteria analysis, each of the 19 coastal problems was associated with a specific societal group (stakeholders) whose actions or choices are linked to or causes that problem. Similarly, a group interested in its solution was identified. An analysis and mapping of the institutions involved in coastal governance allowed for the identification of the decision-making stakeholders. In total, 130 individuals and the organizations they represented were identified. They were categorized into five segments: state institutions (30); municipal institutions (26); business (22); mediators (21) and local interest groups and NGOs (39) (Lagzdina *et al.*, 2017).

SDM design and science-policy interface

Virtual System Dynamic Model (SDM) interprets the coastal zone as a complex system consisting of natural, cultural, socio-economic, and governance resources available within defined geographical and administrative boundaries. For describing coastal SES, System Components, Elements, and Material Flows have been defined and parameters (and values) identified. Given that complex systems are open, external hazards (risks) were identified (Lagzdina *et al*., 2017). SDM building is iterative process and it involves questioning approach (Kudreņickis *et. al*., 2016; 2017). Undertaken reductionist approach enabled SDM translation into the modelling language.

SAF *System Formulation and Appraisal steps* focused on developing justification for transition from research stage to the governance stage, namely, from SDM (SES parameters) as a science-based model to the Coastal Indicator System (CIS) as a proposed governance decision-making tool (Kudrenickis *et al.,* 2016; Lontone *et.al*., 2017). Statutory local development planning process has been selected as a framework for practical implementation of such indicator-based approach.

Coastal governance scenarios definition (Papers 7&8)

SAF objective of the scenarios building is to investigate how the current practice of the ICM can be improved by selected decisions (affecting SES behaviours). Interpretative analysis of the municipal governance resources, knowledge from previous coastal studies made it possible to define four governance scenarios principal for similar type of municipalities in Latvia. Analysis of the governance scenarios and instruments thereof has been done to identify most effective for the ICM scenario. The study identifies municipal coastal governance instruments and groups them into categories: planning, legislative, economic/financial, infrastructure, organizational, and communication instruments.

3. RESULTS AND DISCUSSION

3.1. Municipal environmental governance research

3.1.1. External driving forces and internal factors (Paper 2)

Municipal governance studies show that development of environmental governance in municipalities has been to significant extent influenced by external driving forces:

- primarily, those are global and the EU SD policy processes;
- democratisation of society and recognition and public participation;
- modernisation of public administration leading to various governance reforms;
- expansion and changes in national environmental governance system;
- bottom-up driving forces, rooted in the public environmental concerns and dependent on society's self-organisation ability.

Interviewed in 2009 municipal experts point out that legislation (Law on Environmental Protection and Law on Local Governments) does not contain a specific requirement for a separate environmental policy, and it is a municipal voluntary initiative, the success of which is determined by various municipal internal factors:

- institutional resources: environmental specialist and environmental department;
- human capacity: staff environmental knowledge and motivation for change;
- municipal self-experience: gained through participation in projects, networking;
- necessity driven by the environmental situation and problems;
- political support and leadership at higher level.

Interaction of external factors and municipal internal factors resulted in different approaches and sustainability of environmental governance process in Latvia. Thus, environmental governance development in Latvian municipalities during 1991-2010 must assessed as fragmented and insufficiently implemented, particularly from disciplinary standpoint.

3.1.2. Environmental governance instruments (Papers 1&2)

A previous assessment (REC, 1999) and 2009 questionnaire interviews of 13 most experienced in environmental matters municipalities show, the experience in Latvian municipalities for governance instruments application has evolved gradually. During this period, a top-down governance approach characterized by investment project-oriented instruments prevailed in municipalities, which can be explained by the then existing centralized approach to public finances planning. Interviews reveal that local administrations prefer 'top-down' approach and characteristic it financial and administrative instruments, followed by technical and infrastructure instruments and to more limited way – planning instruments. Use of communication and economic instruments is marginal (Fig. 3.1).

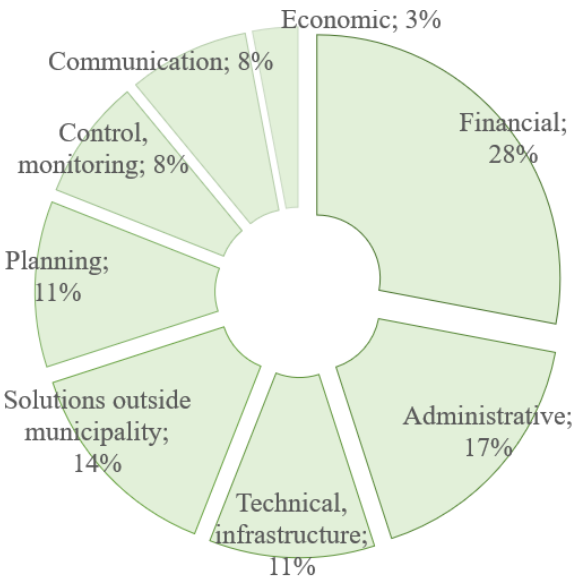

Figure 3.1. **Municipal environmental governance instruments, 2009. (Paper 1)**

Assessment of planning instruments and integration aspects

Acknowledging the practices of environmental governance, different approaches to its organization at the local level have been identified:

- Standardised environmental management systems (EMAS, ISO: 14001) are used in Riga, Jelgava, Daugavpils, and Preili municipalities.
- Undertaking international commitments: Aalborg commitments (Riga); Global Covenant of Mayors for Climate (7 municipalities fixed during study);
- Municipal declaration related to environmental governance: Salacgriva Green Declaration, Cesis Zero Waste Commitment, Livani MunicipalityDeclaration on Environmental Collaboration;
- EE frameworks: Eco schools programme and Blue Flag programme. The latter has been implemented in Jurmala, Ventspils, and Liepaja coastal municipalities.
- Disciplinary environmental governance approach (sectoral policy and units).

Until 2009, the environmental policy as a systemic sectoral planning document has been developed in 12 Latvian municipalities (Table 3.1). The first environmental policies have been elaborated by large cities (Liepaja, Ventspils, Riga, Jurmala, Jelgava) where the existing environmental situation determined the need for urgent measures. Pilot projects have been implemented in few rural areas (Gaujiena, Jekabpils, Preili). However, in general, these individual cases have not ensured overall systemic innovations in Latvian municipal practice as regards environmental sector.

Content analysis of environmental policies reveals a lack of a unified methodological approach, manifested through variations in the quality of current situational analyses, the scope and scale of addressed problems, and the methodologies employed for prioritization. Notably, the absence of a cohesive framework results in the non-cascading alignment of local environmental goals with national policies, indicative of a frail vertical integration across governance levels. Municipal specialists identify weak cooperation and communication with national-level institutions as an obstacle to effective policy implementation.

Further, the analysis of 16 Municipal Integrated Development Programmes developed until 2009 as requested to be entitled to EU funds for development, reveals deficiencies

of EPI into strategic directions and goals, performance indicators, and investment planning. To conclude, completeness of EPI (coverage of topics, integrated analysis, integrated goals, and instruments) in the local development programmes is insufficient. The municipalities with disciplinary environmental governance experience have demonstrated better EPI into their programmes. Another integration deficiency, only few municipalities (Salacgriva, Cesis, Livani) have adopted policies targeted to improving collaboration with local stakeholders (Ernšteins *et al*., 2010).

Table 3.1. **Municipal environmental policies, 1992-2009. (Paper 1)**

Year	Document and context
1992	Ventspils Environmental policy plan (risk management focus)
1995	Ventspils Environmental policy plan – 2 (update)
2000	Jurmala Environmental protection policy plan (LA21process)
2000	Riga Environmental strategy 2000-2010 (LA21 process, international collaboration)
2000	Gaujiena local community Environmental action plan (collaboration project)
2001	Ventspils Environmental policy plan 2000-2010 (update)
2001	Liepaja Environmental action programme 2002-2010
2001	Jekabpils district Environmental protection action plan (collaboration project)
2001	Preili district Environmental health action plan (collaboration project)
2002	Riga Environmental strategy action programme 2002-2010
2003	Jelgava Environmental policy plan and action programme 2003-2007
2005	Jelgava municipality Environmental policy (ISO:14001 approach)
2005	Cesis Environmental policy plan 2005-2017 (collaboration project)
2007	Preili rural municipality Environmental policy and environmental declaration (EMAS project)
2007	Daugavpils Environmental policy and environmental declaration (EMAS approach)
2008	Livani rural municipality environmental policy and integrated environmental collaboration declaration; Environmental vision and action guidelines 2008-2014 (collaboration project)
2009	Rezekne Environmental policy plan 2009-2015 (not approved by the council)
2009	Environmental concept for Ogre rural municipality 2009-2019 (collaboration project)

Administrative and institutional instruments

Administrative and institutional instruments in municipalities are used complementary to other, though fragmented used instruments such as regulatory, planning, economic, financial, and technical or infrastructure instruments.

Amended Law on Local Governments (1994) entitles municipalities to define their own administrative structure. The analysis of 40 structures shows that a staff position for environmental specialist is established only in 11 municipalities out of 119 municipalities. In 5 municipalities (Riga, Ventspils, Liepaja, Jelgava, and Jurmala) environmental departments are set up employing 2 to 15 specialists. The tasks of these departments depend on the size, complexity of issues and capacity of the municipality.

Typically, environmental issues are dealt with in development planning or communal and housing departments. Compliant with said in the interviews, this study shows that institutional resources, which are important in the development and implementation of environmental policies, are insufficiently developed in Latvian municipalities.

Three typical municipal mechanisms for environmental decision-making are identified:

1) full-fledged Environmental Committee as it acts in Ventspils, Liepaja, Jelgava, and Cesis. This approach is said to be the most beneficial for environmental governance integration (EPI) and decision-making;
2) joint Committee of Development and Environment as it acts in Riga, Jurmala, Bauska, Rezekne. This model ensures partial EPI, and
3) Environmental Commissions (*ad-hoc* or permanent bodies) with advisory rights acts in Ventspils, Tukums, Ilukste, Gulbene, Liepaja, Valmiera, Cesis, and Jurmala municipalities.

To summarize results from multiple case studies, the following successful, though geographically scattered, applications of disciplinary environmental governance instruments in Latvian municipalities have been identified:

- municipal leadership (politicians) declared political commitment toward SD,
- environmental action planning implemented disciplinary or integrated;
- local environmental regulations (water, waste, air, and other fields);
- environmental management systems based on international standards,
- environmental departments/ position for environmental specialist;
- organized process of EI acquisition, also by involving different stakeholders;
- institutional and motivation mechanisms for participation are established,
- active external communication using traditional and new social media;
- structured environment content on the municipal website.

Communicative factors affecting governance

Interviews show that in municipalities the development of communication-orientated environmental governance is determined by internal factors. They represent the communicative, self-experiential and subjective/human groups of factors.
Communicative factors affecting governance implementation are determined by:

- The availability of local EI, which is necessary to form the public awareness and attitude towards environmental issues and the desire to get involved.
- Formal PP mechanisms that develop democratic practices and promote stakeholder engagement.
- Application of innovative governance tools within the municipal administration and in its relations to the local stakeholders.

3.1.3. Conclusions arising from governance research (Papers 1&2)

Inadequate progress in the systemic development of municipal environmental governance in Latvia is attributed to external driving forces emanating from international, EU, and national policies. The interaction of these forces with bottom-up initiatives and the self-organizational potential of local stakeholders, coupled with internal factors such as limited municipal capacity and experience in collaboration, has been instrumental in shaping this insufficiency.

The incompleteness of municipal environmental policies notably embodied in these policies as voluntary local planning documents, is a consequence of weak horizontal and vertical integration across levels and environmental sub-sectors. Additionally, there is a deficiency in the systematic and systemic utilization of communication instruments.

Identified weaknesses in the disciplinary understanding of environmental governance contribute to the insufficient integration of environmental policies into local development processes, particularly in the realm of planning.

A content analysis of 16 municipal integrated development programmes reveals that the state-driven requirement for integrated planning, while considering sectoral, temporal, and spatial integration, fails to comprehensively incorporate environmental concerns into the development planning processes. Notably, this approach also alters the municipalities' perceptions of the necessity for disciplinary environmental planning.

Given the identified constraints, the opportunities available to municipalities, and the legislative requirements, it has been determined that the future development of environmental governance in Latvian municipalities should be situated within the context of integrated development. This integration should be implemented as part of an overall enhancement of the local development governance process.

This transformation necessitates the systematic engagement of all governance levels and sectors. It can be achieved through a collaborative governance approach, underpinned by the development and purposeful utilization of four key EC instruments complementary to other governance mechanisms. The reorganization of processes within municipal administration, interdepartmental collaboration, and interactions with stakeholder groups in society should be structured to facilitate this communication-based collaborative governance. This approach should synthesize the appropriate elements from both top-down and bottom-up governance approaches, promoting stakeholder involvement and expanding the EC content, forms, and channels.

3.2. Environmental communication research

3.2.1. Environmental communication at national level (Paper 2)

External driving forces and internal factors

A comprehensive and multidisciplinary study of multiple sources enables the identification and categorization of critical processes, driving forces, and factors that impact the development of EC in Latvia starting from 1990s. Overall, it is discerned that the advancement of EC is shaped by a combination of external and internal driving forces and factors at the national and local levels. These factors are akin to those influencing the broader development of the environmental sector. Figure 3.2. illustrates complexity and interactions of these factors towards EC development.

Late 1980s mark the first manifestations of environmental activism in Latvia. In 1990s various informal EE initiatives, NGOs activities and networks boomed. It was followed by Local Agenda21 and local environmental planning self-experience process, where first public involvement and collaboration practices have emerged.

Systemic application of the EC is related to national Environmental Communication and Education Strategy (2001). Ratification by the Parliament the Aarhus Convention in 2002 has strengthened public environmental rights putting them into normative framework regulated by the Law on Environmental Protection (2000). It provided base for EC institutional and human resources development. It was a promising yet under-used turning point in EC development. Apart from reporting to the Arhus Convention's Secretariat and national Environmental Communication Plan, systematic coordination

or systemic approach to EC process at national level has not been introduced in Latvia, due to lack of resources and ownership of the process, as said by ministerial officials.

Content analysis five consecutive national environmental policy framework documents (Environmental Policy Plan for Latvia, 1995 and Environmental Policy Guidelines 2003, 2009, 2014, and 2022 developed for 7 years period) shows that EC is incorporated yet incompletely using either disciplinary (EC instruments/ components approach) or integrated approach where EC has instrumental role in all traditional environmental governance subsectors (air, nature, climate, water, and waste), or a hybrid of both these approaches (Lagzdiņa, 2013; Lagzdiņa, Ernšteins, 2017).

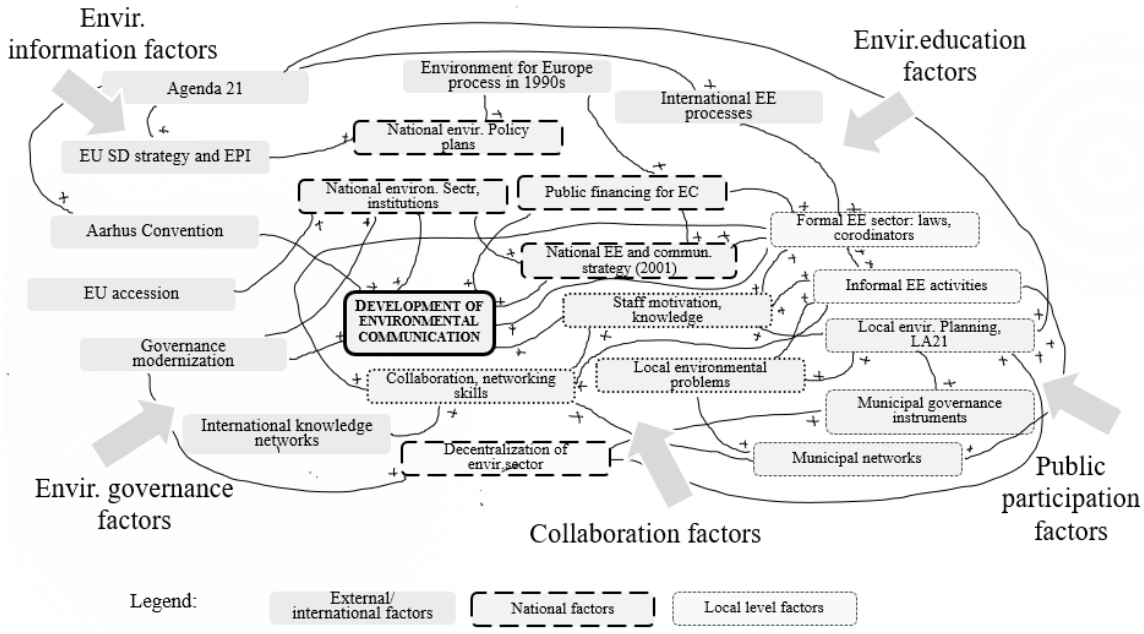

Figure 3.2. **Driving forces and factors affecting environmental communication development in Latvia during 1990-2010. (Author)**

Disciplinary assessment of EC sector: stakeholders and instruments

Internet survey (2009) of stakeholder groups on significance and use of EC instruments reveals that half of the respondents rate the quality and quantity of EI available from the public institutions as sufficient and almost sufficient, while 13% rate it as insufficient. Respondents criticism of the quality of EI is formulated as "*sufficient but completely incomprehensible; voluminous but very fragmented; quality problems due to infrequent analysis, aimed at professionals rather than the public; chaotic, overlapping and outdated*". Asked about usefulness of EI, its timeliness, usability, accuracy, comprehensibility, respondents rate it positively (as useful or almost useful). 81% of respondents consider EI on nature as the best-covered topic, followed by information on water and waste (72%) and climate and air protection (60%). Positive ratings are also given to the availability of information on PP opportunities (65% of respondents) and business-generated EI (61%). NGOs (highlighting the Latvian Fund for Nature and the Environmental Protection Club) are ranked as the most important actors in EC field, followed by specialized environmental media (journal and TV broadcasts) given equal scores, then comes education and research institutions. A surprising finding is that EE is not considered by majority of respondents a key function of ministries and state institutions and thus it might be eliminated, if resources are limited.

As regards questions on the effectiveness of PP, 52% of respondents give positive and 49% negative answers. 13% of respondents are strongly convinced PP is effective. NGO activists stress that for effective participation they lack skills, resources and knowledge of legislation, and some coordination by experienced NGOs is needed. Many comments highlight lack of cooperation between stakeholders as a major factor hindering PP.

Survey of environmental NGOs opinion shows that NGOs consider scope of generated EI as sufficient, but difficult for searching. Over 70% of respondents suggest EI content does not correspond society's concerns. As for EE in the country, NGOs rate it satisfactory as regards EE in the educational system t all levels (schools, universities).

Although the level of environmental awareness of the public is considered by the interviewed experts to be sufficiently high (there are also some opposing views), it does not ensure pro-environmental behaviour (PEB), as insufficient attention is paid to the development of attitudes and values and other important motivating factors are not provided. When asked about the factors limiting the PEB, NGO representatives mention "*human factors, low environmental awareness and poor understanding of the place of the environment in human life, insufficient information social inequalities problems, lack of infrastructure and lack of public pressure*".

In the opinion of school teachers whose daily work involves EE aspects, the prevailing opinions is: "The language is too complicated. Everything is done at the policy level, EE is included in the standards. EE still depends on personalities: teacher commitment and competence." Interviewed teachers acknowledge that although EE formally is integrated into curricula, most of the knowledge and skills are provided to thorough out of school activities, and interest education. 77% of respondents think that EE at all educational stages (school, university, and lifelong learning) is effective or rather effective. Multimethod disciplinary assessment of the EC based on stakeholder views, documents, and institutional practice, is summarized in Table 3.2. as SWOT analysis

Table 3.2. **SWOT analysis of environmental communication. (Author)**

EC	Strengths	Weaknesses
Environmental information	- Legislation defines EI scope, system, and institutional responsibilities - Normative regular environmental reporting (State of Environment reports, Environmental Indicator reports) - State financing supports EI system - EI is integrated in all sectors - EI dissemination channels diversify - EI is integrated into licencing system - Stakeholders are involved in EI collection and dissemination (NGOs) - EI is a part of development planning process	- Disintegrated national EI system - Insufficient resources to implement environmental monitoring - EI is expert-orientated and does not meet stakeholder needs - Dissemination of EI is mostly electronic, insufficient printed materials - Limited analytical content, mostly data - Insufficient EI circulation between levels - Lack of specific local level data - Insufficient EI integration into planning - Informally produced EI is not integrated in overall EI system
Environ. education	- Legislation requests EE integration in curricula at all educational levels - Collaboration between EE institutions - Environmental ministry supports EE - Many stakeholders implement EE - Developed EE institutional mechanisms - Developed EE infrastructure in nature protection field and business sector - EE is diverse and tailored to the needs of stakeholders	- Lack of understanding in the public sector about role of EE for SD - Lack of state sector interest to lead EE coordination process - EE governance instruments are not integrated - Insufficient resources for EE financing, especially for informal EE activities - Lack of EE integration into life-long learning
Public participation	- PP is stipulated by the law - Increased public understanding on PP process in all sectors and policy cycle - Numerous communication channels and tools for PP, many e-governance tools - NGOs PP experience and knowledge is transferred and multiplied in the society	- Underdeveloped social networks - Insufficient financing for continuous PP activities at all levels - Ineffective practical application of PP procedures and violations of the law - Limited use of formal participatory mechanisms (public consultative boards) - Lack of innovative approaches to PP
Environ. behaviour	- Positive public attitude towards environment and readiness to action - Stakeholders actively promote PEB - Business sector has interest in PEB to improve its public relations - Experience is gathered in application of numerous PEB communication tools - PEB as a lifestyle is broadly promoted in the media	- Lack of PEB in the policy targets - Uncoordinated and sector-fragmented use of PEB instruments - Lack of examples and best practices dissemination motivating society for PEB - Underdeveloped green public procurement - Limited use of PEB systems in consumption and business (eco-labelling)

Table 3.2 cont.

	Opportunities	Threats
Environ. communication	- Environmental (climate) concerns have high priority in global and EU policies - Environmental integration requirements in the EU policies - Better available financial resources for projects, studies, and infrastructure - Synergy between state and stakeholders EC activities improves - Modern of communication tools - Interest in social responsibility - Society's environmental awareness	- Low environmental priority for politicians - Impacts of 2008 crisis on EC public financing and resources at regional level - Unstable public interest in environmental issues due to prevailing social problems - Dominating consumer behaviour - Negative environmental narrative in media - Economic lobby limits impact of PP - Administrative burden is obstacle for PP - Uncertainty and economic constraints for PEB and choices

3.2.2. Environmental communication at local level (Papers 2&3)

Development of EC practices in Latvian municipalities has been determined by factors akin to those influencing the development of the municipal environmental sector. Overall, municipal governance situation shows that EC instruments are integrated (though incompletely) in the municipal communication practices.

Environmental information

In general, national environmental and development planning regulation facilitates EI. Yet, municipal studies show that EI governance in municipalities (especially in small and rural ones) is underdeveloped. At the same time local citizens would like to be more informed about environmental situation (survey in Liepaja and Salacgriva).

Transition to the e-governance contributes to positive dynamics in this regard. Content analysis of 46 municipal websites in 2009 reveals situation with EI availability in the public space. The growing number of municipalities create environmental content on their websites (Environment, Green Corner).

Access to EI, however, is not effective, due to several factors: information is incomplete, nonsystemic and unsystematic. Local EI covers the domains of water quality, waste management, and air quality. However, EI is primarily provided by larger municipalities (Liepaja, Riga, Ventspils, Jurmala, and Rezekne). Information about bathing water quality is provided by both state and municipal authorities, but it is available for registered bathing sites, whereas the public would prefer information for all locations. In smaller municipalities, information preparation is significantly reliant on local utility companies and collaboration with state environmental and nature conservation institutions at regional level. Respondents from business sector consider that timely and complete EI reduces citizen complaints on service quality and helps to raise public environmental awareness, affecting individual behavioural choices. A considerable proportion of local EI is generated by regional knowledge centres such as universities, national NGOs, and consultancies. To improve EI governance, collaboration among all stakeholders involved in EI is need.

Public participation

Government Communication Guidelines (2008) and planning regulation requires public institutions to involve public in the development planning process. Institutional websites are main source for distributing information on public hearings, surveys, and planning process, including strategic impact assessment reports. Yet, interviewed stakeholders consider traditional PP mechanisms insufficient to ensure representation of their interests. Capacity (administration's skills and resources) in municipal administrations for pro-active empowerment of the society in planning is underdeveloped. Content analysis of the Environmental reports shows incompleteness in representation of locally specific environmental content in the planning documents which means that environmental issues are not adequately integrated into development planning content and process.

Environmental education and pro-environmental behaviour

The resources utilized for EE are notably different across municipalities. The most comprehensive resources are in municipalities involved in the Environmental Education Foundation's Blue Flag and Eco-school programs. Other typical forms are EE coordinator networks in schools providing a platform for learning. Eco-school program has grown from 130 organizations in 2009 to 190 in 2022 creating the empowering medium for stakeholder collaboration. The Blue Flag program which has started in few coastal municipalities (Liepaja, Ventspils, Riga, Jurmala), in 2022 has expanded to 94 schools in Latvia. Interviews show, that such EE forms enable systemic integration of environmental content into municipal governance process.

In municipalities, communication promoting PEB is informal and fragmented, and relies on collaboration with other stakeholders. It is implemented through campaign-style approaches (Environmental Day, Day Without A Car, Environment Day, Shopping Free Day Clean up campaigns, City Festival etc.) using diverse forms (demonstrations, exhibitions, school contests, children's games, expert discussions, art performances). As practices show, the success factor of such efforts is collaboration among municipality and other stakeholders.

Collaboration communication in nature protection

Collaboration communication studies in three nature protection areas in Latvia (the Kemeri National Park, the Vestiena Protected Landscape Area, and the North Vidzeme Biosphere Reserve (NVBR)) reveal that stakeholder interests are overlapping and even contradicting, as regards the use and protection of natural resources in large territories, thu stakeholder involvement in development issues is of utmost importance.

The most comprehensive collaboration experience created during landscape ecological planning process implemented in NVBR has been analysed. NVBR has its value as the only UNESCO biosphere reserve established in Latvia. The NVBR's administration has set up participatory model to support stakeholder engagement in governance (protection, use and planning) of the territory, and most importantly, has found ways how to address an issue of insufficient environment/landscape information necessary for planning and decision-making. Model has been built on the following elements:

- NVBR Council as a consultative mechanism for stakeholder involvement;
- Interactive website platform for information exchange and broad use by anyone;

- Public Volunteer Monitoring Programme, providing tools and methodological support for volunteers involved in data collection and phenomena monitoring;
- Practical environmental management measures (river clean ups and restoration activities, salmon saving campaigns) jointly with stakeholders;
- NGO forum as a stakeholders meeting point and knowledge sharing platform;
- Collaboration with the regional university attracting its research potential;
- EE networks in communities to coordinate information and training;
- Grants to motivate and support local small business sustainable practices.

The NVBR's model approach in its entirety informs on the prerequisites for systematic and systemic involvement of stakeholders in governance process, particularly – acquisition of information necessary for environmental governance in the circumstances of limited administrative resources. Importantly, the process has improved collaboration among different stakeholders, sectors, and levels, namely, regional environmental, nature, and forest institutions; municipalities; local business and activists; and particularly mediators (teachers, NGO activists, librarians etc.) active in EE field.

Municipal environmental communication governance system

EC studies in municipalities show that elements necessary for setting up an independent EC disciplinary governance sector are present in many municipalities, though articulated differently (Table 3.3). Yet, overall picture reveals lack of systemic approach to the EC governance in each separate municipality. The analysis of EC governance fragmented elements leads to understanding that consolidation of these elements into uniform system would allow for setting up an independent EC disciplinary governance sector completing all steps of the governance cycle.

Table 3.3. **Environmental communication governance components. (Paper 3)**

Year	Municipal policy document	EC governance element
2001	Ventspils Environmental Policy Plan 2000-2010 (3rd consecutive policy plan)	Environmental awareness development as a governance sector
2002	Riga Environmental Strategy's Action Programme 2002-2010	Three EC sectorial governance components: EI, EE, PP.
2005	Cesis Environmental Policy Plan 2005-2017	EC as a separate disciplinary governance sector
2008	Livani Environmental Sector's Vision and Action Guidelines 2008-2014	EC as a separate disciplinary governance sector
2008	Livani Integrated Environmental Collaboration Declaration	Collaboration of all stakeholder groups
2009	Liepaja's Environmental Action Programme 2009-2014	EC as a priority disciplinary governance sector
2010	Salacgriva Green Municipality Declaration	Political commitment: Visionary statement on role of EC
2011	Ogre Environmental Strategy	EC as a disciplinary governance sector
2011	Livani Integrated Development Programme	EC as a disciplinary governance sector
2013	Valmiera Development Programme	Environmental awareness chapter
2015	Valmiera Environmental Declaration	Political commitment: Visionary statement including EC

Liepaja municipality EC case study

Liepaja has been selected for detailed EC governance assessment as it is one of the most advanced municipalities in Latvia as regards environmental governance and related successful application of EC instruments. Study has been based on re-analysis of the earlier findings from collaboration projects done in 2010-2015.

Municipal audit in 2006 has assessed EC from a disciplinary perspective, illustrating the situation, that occurs to be quite characteristic to the other municipalities in Latvia:

- limited locally available EI and few dissemination/communication channels;
- insufficient municipal capacity for emerging bottom-up EE initiatives;
- underdeveloped internal and external municipal communication/ collaboration;
- local people interest in PEB is limited, but they expect better environmental management from the municipal administration's side.

To address identified in the study EC shortcomings, the municipality initiated a new EC chapter in the Liepaja Environmental Action Program 2009-2014 (further – Programme) during its revision process A disciplinary EC governance framework has been planned for implementation. In 2010, an assessment of the Programme's achievements was conducted, considering the perspectives of both the municipality and stakeholders. Municipal employees have acknowledged that improvements in internal cooperation and communication have led to enhanced knowledge and experience in the environment. Stakeholders, particularly citizens, have observed improvements across all components of the EC. However, there is a need for further enhancements in terms of integrating EC instruments and fostering collaboration. To address this issue, the University's team has developed Guidelines for EC Action Program, outlining objectives and tasks for the development of EC from both a disciplinary (EC as a sector) and integrative (EC as a horizontal governance instrument) standpoint.

The EC assessment in 2012 has focused on assessment of collaboration and stakeholder aspects. Overall, results show positive change. Established by the municipality Environmental Commission and joining two governance sectors under unified Environment and Health Department has improved EC integration (institutional). In the context of stakeholder integration within the EC, there has been a notable increase in the involvement of informal mediators in communication processes. In conclusion, the municipal administration has made significant efforts to implement the recommendations for improving EC governance that were suggested by the research team.

The integrated assessment of the EC in 2015 indicates positive progress, although no significant breakthrough has been observed. Out of the 30 NGOs operating, only two have demonstrated a genuine interest in environmental issues. Furthermore, there has been no notable increase in the inclusion of environmental content in communication efforts. However, a positive change has been identified in the institutional integration of the Public Participation and Environmental Management Departments. The integration of the Environmental Action Program and Public Participation Strategy into the Municipal Development Strategy is a risk. This assumes that the planning integration may lead to reduced emphasis on disciplinary environmental planning.

3.2.3. Conclusions arising from communication research (Papers 2&3)

The study reveals a diverse range of experiences concerning the use of utilization of environmental communication (EC) forms, content, and channels. These experiences, though scattered across time and space, are observed at various levels of governance and among different segments of stakeholder groups. However, the effectiveness of EC is hampered by several key factors. Firstly, there is a lack of systemic understanding of EC at all governance levels. This deficiency results in the inadequate implementation of EC, particularly from a disciplinary governance perspective. Such an approach necessitates the completion of the governance cycle and the comprehensive application of all essential instruments for EC governance. Secondly, internal integration of governance instruments, stakeholder groups, and EC content is insufficient, both in the vertical and horizontal dimensions. This lack of integration hinders the harmonious functioning of EC. Lastly, the integration of EC into the local development governance process faces challenges. Despite these barriers, the study concludes that the essential prerequisites for establishing systematic EC governance at the local level within Latvian municipalities exist. This system can be further integrated into local development governance and planning processes, and municipal routines.

3.3. Municipal integrated coastal governance research

The initial conceptual approach followed to establishment coastal resources governance system based on SAF methodology is illustrated in Fig. 3.3.

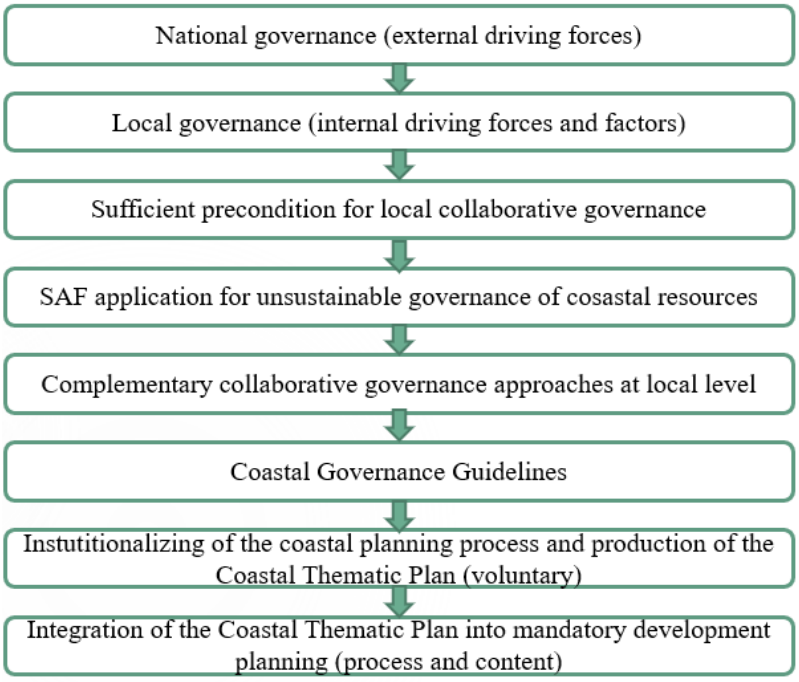

Figure 3.3. **Conceptual model for coastal governance. (Lagzdina *et al.*, 2017)**

3.3.1. Factors affecting coastal governance (Papers 4&6)

Multi-level and sector-based coastal governance

Coastal governance in Latvia is implemented at three governance levels: national, regional, and local. Sustainable Development Strategy of Latvia until 2030 (2010) acknowledges the nature's capital and outstanding value of the coast for SD and calls for the protection of coast in its wholeness as the unified nature and culture heritage. Medium term National Development Plan 2014-2020 (2012) envisages support to development of coastal businesses and public infrastructure. Subordinated sectoral policy –Coastal Spatial Development Guidelines 2011-2017 (2011) – specifies coastal priorities, among whom is a need for policy coordination and stakeholder collaboration.

National Long-Term Thematic Plan for Development of the Baltic Sea Coastal Public Infrastructure (2016) aims at balancing the protection of coastal nature and culture heritage with economic development needs by selecting 29 localities for infrastructure investment. Intermunicipal collaboration has been defined in this Plan as a precondition and factor for multi beneficial investments.

The tasks of local governments in respect to the coast are defined by sectoral legislation. The Law On Land Management (2014) stipulates that local government is a possessor of marine coastal waters adjacent to their administrative territory, as well as of the land part of marine coast and inland public waters in its administrative territory if there are no other state or private possessors. It means that protected nature territories (reserves, reserve zones of national parks) are under national (ministry) responsibility. The Law sets tasks for local governments as regards coordination; beach management; ensuring public access to the beach and maintaining its cleanness; implementing spatial and detailed planning of the coastal territory; and ensuring the operation of rescue services in the bathing sites on the local beaches. The Law On Protective Belts (1997) specifies requirements on public parking places to ensure access to the beach. Coastal issues are regulated also in the Law on Ports (1994), Law On Fishery (1995), laws on culture heritage protection, and some other. Coastal planning shall take place according the Spatial Development Planning Law (2011) that requests municipalities to prepare local SD Strategy, Development Programme, Spatial Plan, Local and Detailed Plans, and voluntary Thematic Plans in critical fields of governance.

Sparsely populated coastal areas and strict environmental protection regime

While European coastal policies address pressures from human activities on coastal eco-systems due to overpopulation (OECD, 2021b), the Latvian coast stretching for 496 km, is neither overpopulated, nor urbanized, except of cities (Riga, Jurmala, Ventspils, and Liepaja). Vast coastal territories are in good natural conditions covered with sand dunes and beaches, meadows, and pine forests. The coastal zone in general is under the strict nature protection regime that is considered by the stakeholders less advantageous for economic activities compared to the inland situation.

Anthropogenic pressure on the coastal beaches is seasonal and fragmented due to limited access and insufficient public infrastructure. Regardless high recreational potential, 78% of the all beaches are insignificantly visited (CTP, 2016). It is stated in the 1st Assessment of the Baltic Sea's coast attendance, created loads on the environment and infrastructure (2020) that the number of coastal visitors in 2019 compared to 2015 almost doubled. The North Vidzeme coast is reported as a popular destination.

Main coastal problems identified in the national planning documents are: loss of natural resources and social and aesthetic values; limited access to the coastal resources due to different restrictions; limited coastal natural resources for economic development; vulnerability of coastal ecosystems and human systems due to climate change.

Until ATR in 2021, the Latvian coast of the Baltic Sea and the Riga Gulf has been administratively divided into 17 municipal territories (Fig. 3.4). After 2021, the number of coastal municipalities has been reduced to nine. The Salacgriva municipality has been merged with the Limbazi municipality (*novads*) where it belonged until 2009.

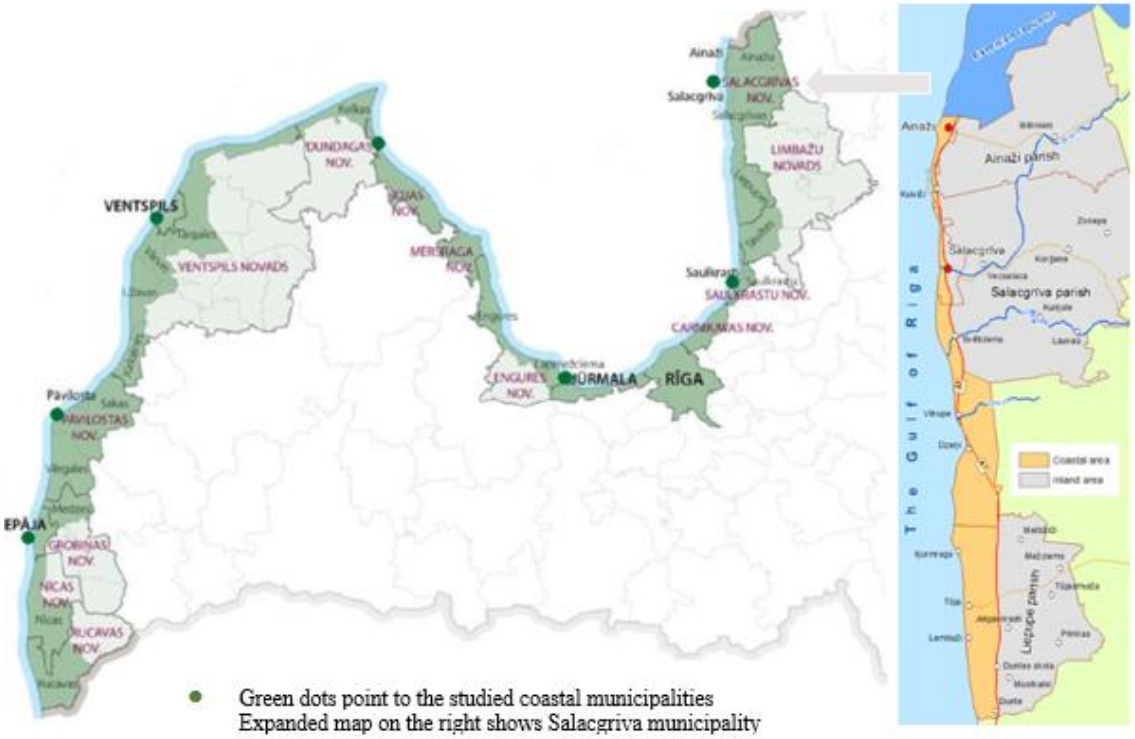

Figure 3.4. **The Latvian coastal zone and municipalities, 2021 (CTP, 2016).**

Climate change governance

Climate-related risks in the coastal areas are the sea level rise, change of precipitation and winds regimes, and ice cover– all together causing impact on biophysical coastal ecosystems manifested as coastal erosion and loss of habitats and species. Extreme weather events cause flood-risks. Over 3,4 % of the territory of Latvia are under flood danger. Climate change is reported as a factor affecting coastal infrastructure.

The National Plan for Adaptation to Climate Change until 2030 (2019) introduces 80 measures in six policy areas to build climate resilience. These areas are: landscape and tourism, biodiversity and ecosystem services, civil protection and disaster management, construction and infrastructure, health and welfare, agriculture, and forestry. Flood risk mapping and action planning required by the EU Water Framework Directive (2000) is ensured in the update periodically Flood Risk Management Plans elaborated for all four river basin districts, all of them are bordering with the Baltic Sea or the Riga Gulf., National Environmental Policy Guidelines for 2021-2027 recommend municipalities to develop climate adaptation plans to mitigate climate change impact at local level.

Coastal governance shortcomings in Latvia

Re-analysis of the findings from the coastal studies in Latvia (Ernsteins, 2010; Ernsteins *et al*., 2011; Ernsteins *et al*., 2017) brings to the identification of the most typical governance gaps common for the coastal municipalities in Latvia, those are:

- Deficiencies in the basic planning principles implementation (Table 3.4);
- lack of appropriate coastal management instruments at all levels of governance;
- insufficient institutional capacity and lack of governance focus on coastal issues;
- insufficient stakeholders' knowledge and public awareness and interest in efficient and sustainable use of the coastal resources and overall potential;
- insufficient knowledge for integrating different level policies and coastal issues;
- limited knowledge in coastal communication instruments and their application.

Table 3.4. **Deficiencies in application of planning principles for ICM. (Paper 6)**

Principle	Deficiencies in principle's application
Sustainability principle	Lack of systemic consideration of all SES elements. Coastal risk governance addresses technical and environmental problems though social-economic (and cultural) problems are not sufficiently considered
Integration principle	Integration with other sector is incomplete (dominates tourism, transport, and energy). Insufficient integration of governance levels (vertical integration
Participatory principle	Insufficient communication within stakeholder groups (between municipal administration, other public bodies, coastal businesses sector, educators, citizens, media, and NGOs)
Information principle	Existing municipal communication tools and channels are not used for the coast specific communication, including for risk communication.
Precautionary principle	Coastal risk communication is insufficiently integrated in environmental and other risks management policies and mandatory municipal development planning processes and relevant documents

3.3.2. ICM best practice reanalysis (Paper 4)

Experience from the coastal ICM cases in Europe under the SPICOSA project (Hopkins, *et al*., 2012) and additional analysis of 19 cases from the Baltic Sea Region (Jansen, Ernsteins, 2016) has confirmed a generic nature of coastal governance problems, which are: insufficient integration of all SES dimensions and governance instruments, particularly, communication and collaboration instruments.

Re-analysis of ICM cases in Latvia carried out from three governance perspectives confirms the pivotal role of EC in collaboration in successful ICM implementation.

Bottom-up governance model in the Pavilosta Grey Dune advocacy case

The Pavilosta Grey Dune case has been qualified for study as the most comprehensive and well-fixed PP initiative, where success has been built on communication and participation instruments used to influence decision-making which is one of the SAF tasks. A bottom-up initiative by local activists aimed to reach the protection status for the coastal ecosystem. In 1999, upon a citizens' initiative, the Council set up the Coastal Protection Commission which has been unjustly dismissed. In response local activists have initiated awareness raising campaigns involving national NGOs, culture groups,

and school pupils. In 2007, Grey Dune has been given a status of nature reserve (Natura2000 site) for protection of the widest coastal dune in Latvia (1,5 km long and 812 m wide) and its valuable biotopes and species found in the territory of 42 hectares.

Top-down governance model in the Ventspils environmental licencing case

The Ventspils Environmental Licensing System (ELS) is unique at the Latvian scale. It shows benefits of the systemic EC application for enhancing participatory decision-making in risk governance case. ELS has been institutionalized in 2004 by the municipal regulations as a voluntary business compliance scheme. Introduced control mechanisms and decision-making through the consultation process have improved public access to EI about the impacts of business operations on the quality of the neighborhoods; promoted entrepreneurs' knowledge and skills in pro-environmental business practices, and improved business collaboration with the municipality and citizens. ELS improved risk preparedness and revealed stakeholders and local media role in risk communication. All this process has enabled more systemic municipal environmental governance.

Collaboration governance in the Liepaja coastal thematic planning case

The Liepaja municipality has been qualified for ICM case due to its unique experience in preparing the first in Latvia Coastal Development Thematic Plan (CDTP). The case informs on benefits and synergies achieved through the application of top-down and bottom-up governance elements and targeted use of EC instruments in the planning process. CDTP has been designed in a participatory way ensuring deliberations to reach agreement among stakeholders on coastal governance. SAF tools in this case are multidisciplinary studies and stakeholder involvement. The process has facilitated integration of the Liepaja Environmental Action Program 2009-2015 and related Municipal Environmental Communication Action Plan.

3.3.3. Coastal socio-ecological system assessment (Papers 5-8)

A pilot territory of the study – the Salacgriva municipality is located on a 5-15 km wide and 55 km long coastal strip along the Eastern side of the Riga Gulf. This length corresponds to approximately 10 % of the Latvian coastline. Municipality occupies 638 km^2 and its population size in 2018 was 8660 residents. Municipality belongs to a group of small and rural coastal municipalities, typical to Latvia. An average density of the population is low, around 12 pers./km^2, and in the costa areas it is even lower.

Adaptation of the SAF methodology for application in the municipal governance case is based on a systemic understanding of the coastal territory as a unified governance territory, where the interests of the levels, sectors, and communities overlap.

Nature resources

The coast presents diverse geomorphological and bio-geographical characteristics, and has typical to Latvia sandy beach, and unique coastal meadows. The value of natural resources is acknowledged by designating the only in the country biosphere reserve (NVBR) and many specially protected nature territories (Natura2000 sites) to protect landscape, geology, and fragile and unique coastal and water ecosystems. The whole coastal zone of the Riga Gulf is under strict nature protection regime.

The assessment of the municipality's resources and the aggregation of the results according to quadruple SD model show, the territory's natural resources and ecosystem

services are diverse and valuable. Protected nature areas, rivers and coastal habitats are particularly important. These are complemented by cultural traditions and industrial heritage. Together, these make it possible to identify the rich natural and cultural capital of the coast, the management and governance of which requires a thoughtful and effective approach, as set out in the country's coastal development planning documents. Although at this stage no significant threats to the natural and cultural coastal capital have been identified, this is a complex issue and there are several factors which, if left unaddressed, could lead to the loss and degradation of coastal resources.

Monodisciplinary studies of coastal litter and coastal dynamics have contributed significantly to coastal knowledge, allowing for a scientifically sound assessment of coastal SES (Ernstein *et al.,* 2016; 2017; Lontone *et al*., 2017a; b). Coastal erosion and retreat data collected by the research colleague J. Lapinski show that in some stretches of the coast, prolonged (the period considered is 2005-2015) short-term erosion during extreme storms poses a significant coastal management problem. Approximately 25% of the municipal coastline shows an average retreat rate of 0.3-0.6 meter a year. Long-term negative impacts of the coastal defence structures and harbours have been identified. Those accelerate erosion of adjacent vulnerable shoreline.

As results from the coastal voluntary monitoring executed under the Initiative "My Sea" inform the amount of litter on the municipality's beach is higher than elsewhere in Latvua, and it has tendency to increase (Ulme *et al*., 2017; Cepurītis *et al*., 2017). The surveys of beach visitors show that they are informed about environmental issues, but do not consider littering a real threat. However, clean, and secluded beaches such as Salacgriva beach are seen as a local asset and an excellent tourism destination.

Economic resources

From economic perspective, a significant coastal resource is large forest area 39 % of which belongs to the state. Agricultural lands are not fertile. An essential element is the transport subsystem (Via Baltica motorway, two ports). A yachts port has been certified for a Blue Flag. Two fisheries provide for the local employment. The income base in the territory is better than in many other rural coastal municipalities. Tourism in the territory has high potential due to nature, and attractive coastal lifestyle, history, and culture. Cycling and walking routes along the coast are popular and of European importance. Coastal infrastructure (trails, information stands, parking) is fragmented and insufficient. The study concludes that the problem of land tenure is a threat to current coastal governance. This confirms the need for collaborative coastal governance.

Social resources

Most worrying is the fact that the area's population is declining by 10% per year. The 'brain outflow' to the capital is having a serious impact on social capital. Promising elements of social capital are networking opportunities and various NGOs and interest groups, which are participatory factors. The most active are the local fishermen's association, youth, and women's organisations. There are schools at all levels of education, cultural groups and museums, and a tourist centre and the Nature Education Centre of the NVBR.

Governance resources

Coastal governance from a municipal perspective is determined by the content of key policies. The Sustainable Development Strategy 2038 (SDS) identifies climate change adaptation and the conservation of the coastal cultural landscape as elements of local development. Spatially, the SDS covers 18 elements related to coastal functionality (tourism, fisheries, border area, maritime transit, passenger, and leisure tourism (yachting)). In the monitoring phase, out of 16 performance indicators, four are related to the coast (parking, beach access roads, number of ports/marinas, freight turnover).

The Salacgriva Municipality Development Programme 2015-2021 (DP) does not reflect the coastal aspects mentioned in the SDS, coastal resources are poorly described and the potential is not assessed. The performance indicators add one indicator related to bathing water. Investment Plan which belongs to the development document package, includes eight coastal infrastructure projects. In conclusion, the local policies analysis shows that coastal content, as well as climate and risk content (the latter being an important part of coastal communication), is not integrated into planning documents.

On the positive side, the municipality has adopted the Green Municipality Declaration (2010) and the Climate Change Adaptation Strategy (2011) which both are considered as voluntary innovations in local governance. In addition, the municipality has enacted 'Village elders' institution – a microlevel tool to improve information flow between the central administration and communities. Municipality has established participation mechanisms (Consultative Boards) and Project Fund for initiatives.

As the stakeholder interviews conclude, the municipality's capacity to deliver coastal management is insufficient, due to the limited knowledge and experience needed to identify, assess, and understand coastal resources to successfully plan SD.

Stakeholder perspective has been analysed using multiple sources and methods.

EU Leader programme projects

More detailed knowledge on governance resources has been obtained analysing projects implemented by the local partnerships, and financed by the EU Leader programme. Results show that only 19 % of projects are implemented directly on the coast attracting the smallest portion (15 %) of financing. Even less (16 %) projects have explicit coastal thematic (coastal protection facilities, parking, and recreation sites, cycling services and the Kuivizi marina infrastructure). 6 % of the projects using a mere 1.4% of the funds deal with the coastal nature objects, which is exceptionally low given the importance of the coast for the development of the municipality, and even more so in the context of a declared Green Municipality. Although the municipal institutions are the most active participants in the partnership, having implemented 19 projects, only one has been linked directly to the coast. Other participants represent business orientated citizens under the local NGO *Tujaskrasts* with five projects implemented on the coast.

Risk communication in municipality

Re-analysis of the risk communication study (Ernsteins *et al*., 2016; Lontone *et al*., 2017a; b) is one of in-depth multidisciplinary studies for the coastal SES assessment. Findings from the 130 households survey inform that majority of inhabitants do not consider climate change a threat to their households, still they list flooding, rain falls, storm surge, and the sea level raise as issues. Latter two cause the most concern. 50 %

of interviewed did not recognize that have ever heard climate and particularly flood risk information from the any of sources, 25 % recall some information in local media. Overall respondents believe that information on flood risks at local level is insufficient.

Coastal citizen survey

19 interviews with local people living near the sea (up to 3 km) show that people are attracted to the sea as a source of recreation with social and cultural value, and to a lesser extent (only 1/3 of the responses) as an economic resource. 63% of respondents have historical (family) ties or property on the coast. These people have noticed change in coastal occupations as traditional coastal fishing has declined. In general, the coast is seen as a local asset, even if this cannot be explained verbally. There is limited understanding of how the coast relates to the overall management of the municipality. The coastal management is seen as waste collection. When asked about coastal risks, 58% of respondents do not recognise that climate change is having a significant impact and that it has been exacerbated recently, as the older generation recalled the big storms in the 1960s. Coastal pollution is recognised as a problem by 74% of respondents. Some are convinced that pollution comes from the sea, as one of the main problems in recent times has been the increase in algal blooms and the visual degradation of the beach, including odours which limit the use of the areas. Experienced fishermen believe that this is due to the cessation of traditional fishing techniques during last 20 years.

64 % of respondents consider the national legislation (Law On Protective Belts and other nature protection laws) limits coastal management and development of infrastructure, which results in littering and illegal activities. Violation of the laws has been mentioned.

When asked about the municipal policies, more than half of the respondents recalled the Green Declaration, and considered it important for image. When asked about its practical implementation, people mention tourist information, the Kuivizi marina's Blue Flag award. None can specify any EE activity. Awareness of other local planning documents is limited. In general, respondents are positive about the work of the municipality, but acknowledge that communication on coastal issues is insufficient. Interviews show that local stakeholders do not consider the coast to be personally involved because it is too far away. People feel limited in its use of and benefits from the coast. This situation is not motivating for involvement. Moreover, the experience of stakeholders in self-organisation and collaboration, which is essential for governance, is underdeveloped. When scoring in a 6 points system the importance of 16 coastal problems, most answers score between 2.0 and 3.5 points which means that there is not a single of few problems having high priority, and most of problems are seen as medium important in a view of respondents. The highest scored (over 3 points) coastal problems are shown in Figure 3.5.

Stakeholder consultations

Stakeholder seminar held in Salacgriva corresponds to the SAF methodology envisaging consultation process with people to decide what are necessary improvements in ICZM.

The discussion focused on the findings from the expert studies and stakeholder survey. Discussion content to large extend echoes answers received in the survey. Most of the complaints are about restrictions for coastal use set in the national environmental, health, construction, and entrepreneurship requirements. Development of the coastal infrastructure is hardly possible – it manifests in the coastal littering and worsening

quality of the beach and dunes, and causes fragmentation of the biotopes. Restricted access to the coast and inefficient use of the coastal resources could not provide economic benefit. Participants regret that restrictions for the use of mechanical transport behind the coastal dunes and on the beach limits beach maintenance and delivery of seasonal services. Active sea users cannot bring their equipment to the seashore. People think that coastal forests in the protected zone are poorly managed. Construction restrictions limit opportunities to develop small infrastructure for sport, recreation, also public facilities, and infrastructure for the people with special needs. They also limit private housing development. Though, in some places the access to the beach and sea is impossible due to newly built residential houses and fences thereof.

Municipal coastal management activities and capacity are considered insufficient. Communication with the municipal services is considered adequate, though not coast specific. Some NGOs hesitate about cooperation interest among themselves and the willingness of administration to develop partnership with the business for the coastal maintenance. Small businesses interests are seen as underrepresented in the Business' Consultative Board. Some informed that municipality not always reacts on citizens' complaints, especially to the problems outside centres. Village's leaders have been recognized as an essential element of the local governance but its effectiveness has been doubted. Some problems have been mentioned as regards waste management and control of the contracts concluded by the individual households for the waste collection.

This group discussion has demonstrated that there is not uniform understanding among participants on what are the actual coastal problems. There are few problems, but they are dispersed and place specific, and differently perceived by various stakeholders.

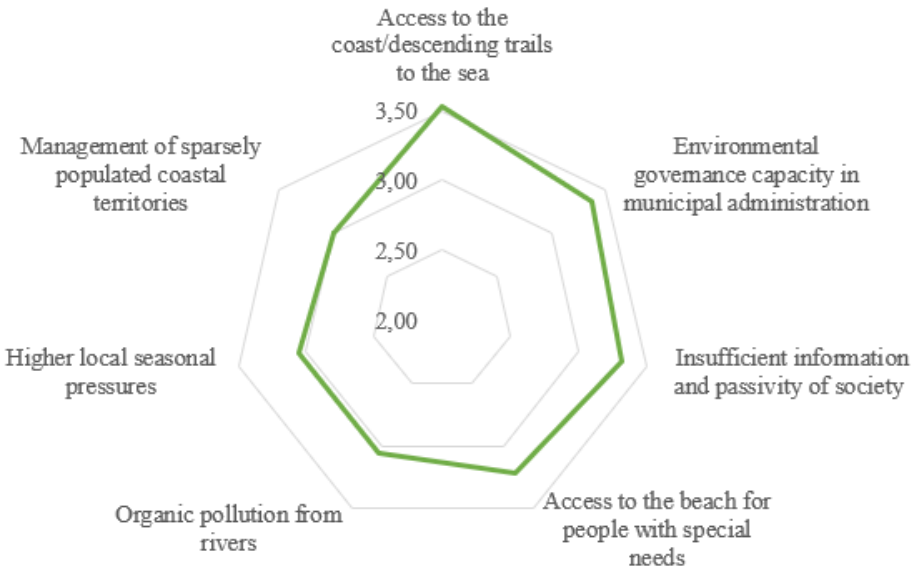

Figure 3.5. **Coastal problems from the stakeholder perspective. (BaltCoast report)**

Stakeholders have suggested directions for the coastal governance development:

- Inclusive stakeholder discussion to establish shared vision on role of each stakeholder group (NGOs, business, educators, media, state institutions etc.) in identifying, using, protecting, and developing further diverse municipal coastal resources as central value of municipality for the common benefit.
- Municipal thematic planning has been found as appropriate framework to build consensus among stakeholders on integration their concerns and interests.
- "Villages' leaders shall better assist local communities and NGOs shall better coordinate among themselves activities.
- There is need for adequate coastal infrastructure as pressure from visitors grows and threatens coastal resources protection and use.

Conclusions drawn from the integrated coastal resources assessment show that:

- in some coastal territories coastal resources are over-exploited and/or used for narrow interests, thus creating additional pressures, and causing their further degradation, which creates inconveniences and limitations to other stakeholders;
- at the same time, there are coastal territories where coastal resources are not used and managed which possess risks of their degradation due to this condition.

The inductive analysis reveals key factors affecting negatively coastal management:

- disperse and low-density population on the coastal zone limits the resource basis upon which sustainable coastal management can be maintained;
- stakeholders (incl. municipality) insufficient understanding of the coastal potential for the local development;
- incomplete and non-reliable information about local coastal resources necessary for decision-making.

Assessment of the science and stakeholder perspective brings to the commonly agreed coastal governance issues (Tables 3.5; 3.6.).

Table 4.6 summarizes factors related to the coastal governance strength, opportunities, weaknesses, and threats.

Table 3.5. **Coastal problems from different knowledge perspectives (Paper 5)**

Expert/science-based perspective	Stakeholder perspective
1. Management of sparely/ and low populated coastal territories	1. Management of sparsely populated territories
2. Overall municipal capacity for environmental management	2. Municipal capacity for environmental management
3. Coastal communication deficiency	3. Insufficiently informed local society and institutions and passivity in communication
4. Threatened sustainability of the unified natural and cultural coastal heritage	4. Access to the sea and beach due to limited access points and information
5. Marine litter and beach littering.	5. Organic pollution from rivers to the sea
	6. High seasonal pressures in recreational areas and hence coastal littering.

Table 3.6. **Analysis of the coastal governance situation. (Paper 6)**

Strengths	Threats
- Evolving positive attitude of local people towards coast as the integrative whole and multi-dimensional value - Different, active, and mature citizen self-organization forms (NGOs Village Elders), though not yet coast-oriented - Presence of local opinion leaders in the local communities (villages) - General interest of people in the coastal management improvement - Public awareness and support to the municipal political Green Declaration - Active municipal public relations - Diverse and long coastline substantiate its attractiveness for the whole society - Absence of critical and urgent problems on the coast - Improvement of the coastal quality - Local business relies on the **coastal resources.**	- Tourism flow reduction due to deteriorated coast (during algae blooming season; after storms, due to invasive plants) - Increased unregulated flow of visitors - Visitors behaviour degrades valuable biotopes, which accelerates due to lack of management - Increased coastal littering after holidays-seasonal pressures - Transboundary pollution affects bathing waters quality - Impacts of climate change becomes more severe and frequent (storms, floods, heat) - Coastal erosion and other processes degrading coastal quality - Limited fish stocks and invasive species causes reduction of the coastal fishery - Restrictions for economic/construction activities in the coastal zone of 5 km and in 150 m (300 m outside villages) zone.
Weaknesses	**Opportunities**
- Insufficient citizen awareness and understanding about coastal resources - Insufficient citizen knowledge and trust in participation in the planning process - Limited Village Elders' responsibilities - Limited, though diverse NGOs activities - Coastal diversity and restrictions limit access and affects management - Lack of sufficient coastal infrastructure limits physical access to the coastal - Invasive species expand on the coast reduce its recreational value - Fragmentation of coastal problems and lack of their urgency in public view - Strong reliance on the project financing for the coastal management - Irresponsible behaviour of locals and visitors causes littering and degradation - Limited human capacity in municipal administration and passive coastal management and policy integration - Limited interest and practice for public monitoring, despite collaboration experience from the NVBR project**.**	- Coastal access improvements due to better infrastructure and services reduce human pressures on the coastal ecosystems - Coastal science knowledge is used for planning needs and specific zoning - Presence of ZVBR administration in the territory, and its Nature education centre - Information platforms and media activation in the coastal information - PEB business practices (eco-farming) reduce disperse (agriculture) pollution - Lobbying change in the legislation and enforcement to lose coastal restrictions - Provision of standardized models for small-scale coastal infrastructure - Municipal networks (incl. international) - Activation of coastal planning at national level, incl. programming of activities and financial resources and mechanisms Availability of the EU and national financing for the coastal infrastructure. - Coastal governance monitoring at national level (policy monitoring).

Coastal Issue Identification

The assessment of the coastal situation and aggregation of problems leads to the definition of the key coastal issue to be addressed by ICM (Fig. 3.6.). Analysing relationship among 19 coastal problems, three generic problems have been identified:

1) insufficiently managed underpopulated coastal territories;
2) insufficient municipal environmental management and governance capacity, and
3) limited application of environmental (coastal) communication instruments.

As the result, *Identified Issue* for SAF application is "Unsustainable governance of the coastal resources." Results of the SES analysis are presented in Tables 3.7 and 3.8.

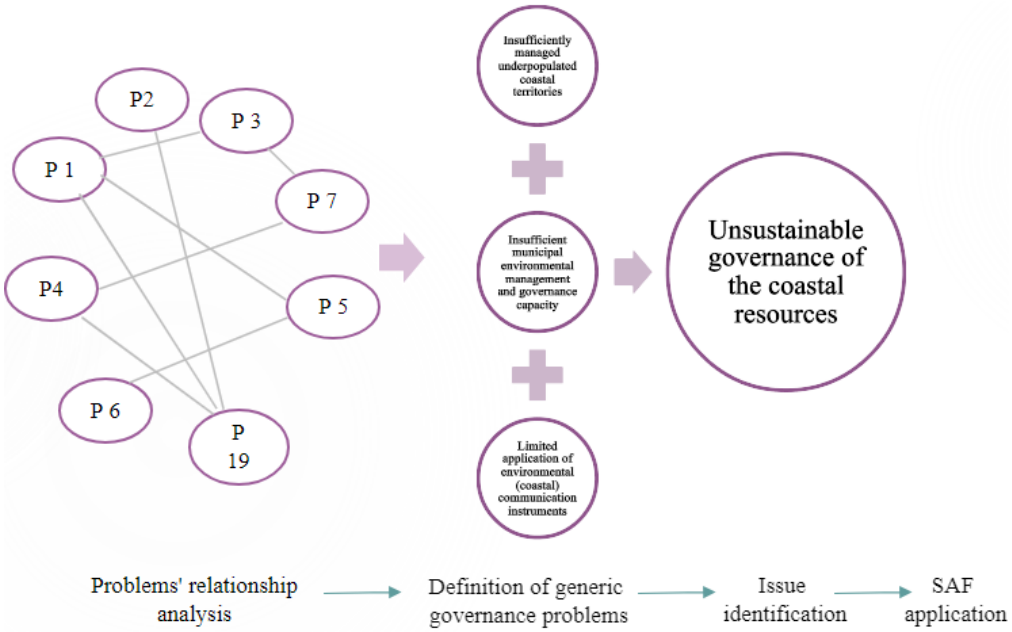

Figure 3.6. **Iterative process of the Issue Identification. (Author)**

Table 3.7. **Analysis of relationship between coastal problems. (BaltCoast report)**

Nr.	Coastal problems	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	Σ
1.	Restricted access to sea		3	3	0	0	2	0	1	0	0	0	1	2	1	3	3	2	0	3	24
2.	Coastal erosion	3		0	1	3	2	1	0	0	0	2	0	1	1	3	1	3	3	2	**26**
3.	Access of coast for people with special needs	3	0		0	0	0	0	1	0	0	0	0	1	0	1	2	3	0	1	12
4.	Coast erosion	0	1	0		3	1	1	1	0	0	2	1	2	3	0	1	1	1	1	19
5.	Over flooding during storms	0	3	0	3		1	2	1	0	0	3	1	3	3	0	1	0	1	1	23
6.	Risks to valuable biotopes	2	2	0	1	1		0	0	2	2	0	0	1	1	0	1	2	3	3	21
7.	Sea water quality	0	1	0	1	2	0		2	2	3	2	0	3	0	2	1	0	1	0	20
8.	Human safety in bathing /swimming places	1	0	1	1	1	0	2		1	2	1	1	3	0	3	0	3	0	1	21
9.	Nutrients pollution from rivers	0	0	0	0	0	2	2	1		2	1	2	2	1	0	0	1	2	1	17
10.	Indvidual households' wastewaters	0	0	0	0	0	2	3	2	2		0	0	2	0	3	1	3	2	2	22
11.	Potential pollution form industrial sites	0	2	0	3	3	0	2	1	1	0		0	2	1	0	1	0	1	0	17
12.	Forest damage	1	0	0	1	1	0	0	1	2	0	0		0	2	1	2	1	1	0	13
13.	Marine litter	2	1	1	2	3	1	3	3	2	3	2	0		0	2	0	1	2	1	**29**
14.	Risks to nature and culture capital	3	2	0	3	3	1	0	0	1	0	1	2	0		0	2	3	2	3	22
15.	High local seasonal pressures	3	3	1	0	0	0	3	3	0	3	0	1	2	0		0	1	1	0	21
16.	Construction of residential buildings on coast	3	1	2	1	1	1	1	0	0	1	1	2	0	1	0		2	1	2	20
17.	Insufficiently managed low-populated areas	2	3	3	1	0	2	0	3	1	3	0	1	1	3	1	2		3	3	**32**
18.	Low environmental governance capacity	0	3	0	1	1	3	1	0	2	2	1	1	2	2	1	1	3		2	**26**
19.	Limited coastal communication	3	2	1	1	1	3	0	1	1	2	0	0	1	3	0	2	3	2		**26**

Table 3.8. **DPSIR analysis of coastal SES. (BaltCoast report)**

DPSIR element	Assessment of the coastal SES
DRIVERS: Needs of human society (3 levels of needs)	- Need for qualitative environment for living and adequate services to local citizens - Visitors– need for recreation space and related recreation activities, as well as space for large scale public events - Human society need for valuable coastal nature & cultural capital.
PRESSURES: Human activities stressing environment	- Unregulated activities in coastal dunes, - Damage caused to valuable nature biotopes and coastal forests - Pollution loads from households and agriculture activities - Seasonal (visitors) pressure - Ill/illegal construction & business practice in coastal zone - Illegal coastal resources use and harmful behaviour activities - Unregulated activities of citizens while protecting property.
STATE: Changes in conditions of environment, economic and social situation	- Nature: loss of biodiversity; degradation of coastal cultural landscape - Economic state: loss of recreational and tourism environment; drop in visitors number; insufficient safety and rescue services; market loss; drop in property value; lack of preconditions for remote working opportunities - Social state: drop in population size; outflow of brain and young people; loss of local cultural traditions.
IMPACTS: undesirable disturbance	- Loss of quality of unified nature & culture heritage - Coast cannot serve as resource for resilience; - Economic opportunities for coastal development are underused - Outflow of people cause negatively impact on coastal territories self-sustainability.
RESPONSE: Development respone – improving ICZM	- Development of „bottom-up" self- governance opportunities - Interaction of municipal «top-down» and local „bottom-up" processes - Implementation of environmental communication initiatives - Effective action plans for attracting financing for IZCM.

3.3.4. Stakeholders analysis and institutional mapping (Papers 6&8)

Stakeholders involvement is a key SAF principle and requirement. Multidimensionality of the stakeholders and their interests is a characteristic of complex systems the coast represents. Institutional mapping method provides information on the powers and influence structures, and helps to identify key actors involved in the coastal decision-making. Analysis of the coastal stakeholders follows the four stakeholder segments, differentiating state institutions; municipal institutions (incl. administration and services providers); business; mediators (NGOs, village/community representatives; formal and informal educators; media, and experts as the science segment) (Table 3.9).

From the document and institutional studies and expert knowledge, a consolidated list of 130 institutions and stakeholders involved or having a potential interest in the coastal governance have been identified (Fig. 3.7). Stakeholders' consultation showed limited interest in cooperation. There is a need for more inclusive discussion with stakeholders to establish the role of each stakeholder group in the coastal governance process.

Table 3.9. **Coastal stakeholder groups and institutions (Paper 6)**

Group	Representatives
State sector	- Nature Protection Agency (NPA) regional office (NVBR administration), - State Environmental Service: state inspectors, communication and EE specialists, information/data specialist
Municipal sector	- Political level/administration: Chair of the Council; council members - Members of Business and Youth Consultative Boards (2) - Executive level: Executive director; Deputy executive director; Head of finance; Head of Information; HR specialist; Municipal education specialist; Buildings and territory manager; Energy engineer; Construction supervisor; Policemen (2) - Municipal services: Salacgriva Water Utility (2)
Business sector	- Port services (1); Fishery factory (2); - Small local entrepreneurs: tourism (3); farmers (2)
Mediators	- NGOs: Pensioners' society; Fishermen society; NVBR's society; coastal NGO Jurkante (environment-related); Former Svetciems village elder - Media: Salacgriva Municipality News - Formal education: Local secondary schools' directors (2) - Informal education: Tourism information centre head/staff (2); Head of Salacgriva museum; Head of local Youth Centre; - Culture groups: a local folklore group

Figure 3.7. **Result of institutional mapping. (Paper 8)**

3.3.5. Designing coastal system dynamic model

The development of the Coastal System Dynamic Model (SDM) involved the definition of coastal SES components, along with the selection of parameters to characterize material flows in each coastal subsystem. Given that complex systems are open, external hazards (risks) were identified that could influence their behaviour. This analysis is selectively illustrated in Table 3.10. Subsequently, through several iterations, a virtual coastal SDM was designed.

Table 3.10. **Coastal SES components. (Lagzdina *et al.*, 2017)**

SES	SES subsystem components	Material flows	Hazards (risks)
Ecological subsystem	- Shore line - Beach and coastal dunes - Valuable biotopes and habitats - Coastal forests - Marine resources (fish, algae) - Water quality - Sand and stones	- Marine litter - Nutrients flow - Sediments - Coastal erosion - Floods - Wind falls	- External hazards: - Climate risks (storms, floods, rain falls, extreme weather) - Ship pollution - Algae blooming - Forest fires
Social subsystem	- Residents (long-term) - Local people (as newcomers) - Seasonal visitors - Residential buildings - Communal services - Cultural heritage - Local NGOs - Welfare situation - Education situation - Coastal civil protection	- Litter/municipal waste - Nutrients flow (in coastal territories and land) - Communal waste and water flows - Loss of traditions	- Brains outflow (loss of intelligent/active people) - Disappointment in voluntary activities - Urbanization
Economic subsystem	- Local business enterprises - All municipal services - Municipal budget - Residents' income - Land market - Sea and yacht ports	- Visitors/tourists flow - Investment flows (private, municipal, state) - Value added	- Loss of visitors' interest - Legal restrictions for economic activities - EU funding requirements
Governance subsystem	- Municipal regulations - Specialists in environmental/ nature/culture fields - Information and participation mechanisms - Local NGOs	- EC materials - Specialists in environmental/ nature/culture fields	- Admin. territorial reform - Conflict between local and national development interests - Brains outflow

The initial iteration of the System Dynamics Model (SDM) employed a questioning approach to delineate system blocks. These questions included inquiries such as: "What constitutes Coastal Resources?" "Which components form the system for characterizing change?" "What factors influence system behavior?" and "How should benefits be defined?" (Kudreņickis et al., 2016). Subsequent iterations of the SDM are structured around five distinct subsystems (model blocks): Economic, Social (with households as its central element), Transit, Pollution (defined by the issue of coastal litter), and Governance. The external subsystem is intricately linked to the impacts of climate change and international policies affecting the national level, as well as broader economic systems (Fig. 4.8). The Governance system operates at both the national and local levels, influencing the Social and Economic systems by establishing the Coastal Protection Regime, which consists of rules and requirements. Human behaviours and choices that impact any subsystem are integrated into the block of Environmental Action Models. Stakeholder groups are actively encouraged to make pro-environmental choices. This interaction yields a direct positive impact on Pollution reduction, contributing significantly to the protection of coastal resources, as illustrated by the arrows in the accompanying Figure 3.8.

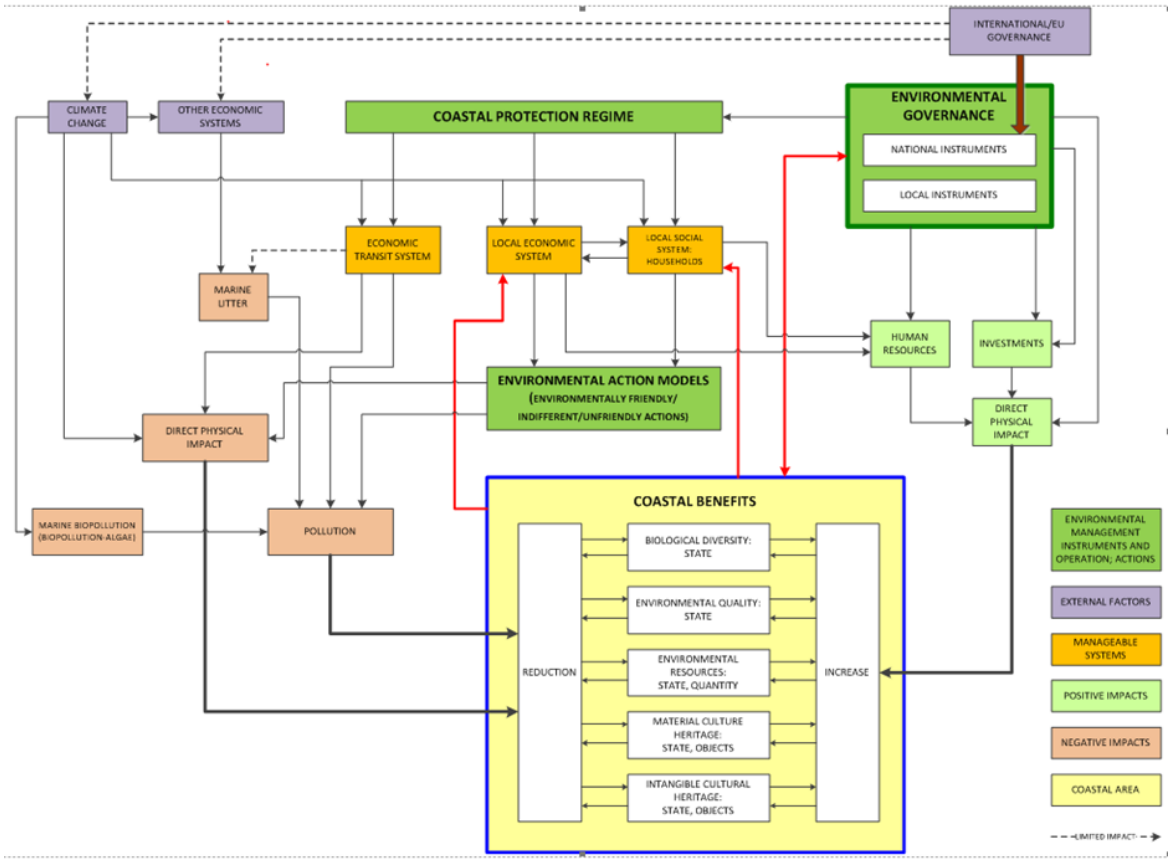

Figure 3.8. **Coastal system dynamic model. (Lagzdina *et al.*, 2017)**

The outcome from interpretive analysis is the understanding that 'Environmental Action Models' approach put in centre of entire system (Fig. 3.8) allows to establish systemic links between:

- municipal environmental governance and instruments (existing or necessary);
- stakeholder groups that are representing or related somehow to the coastal SES;
- the application of specific governance models (approaches) and instruments influencing stakeholders towards coastal friendly activities/behaviours; as a result, creating a positive direct impact on reducing pollution and coastal resources degradation.

For modelling needs, conceptual model has been downscaled to the three system blocks:

1) *Environmental system*: includes coastal problems: coastal erosion, marine litter, biotopes degradation, forest damage, sea water quality, and algae blooming;
2) *Socio-economic system*: reflects pressures from human activities (tourism impacts, restricted access to the sea, lack of coastal infrastructure, inadequate safety and rescue services, household-related pollution, and flooding);
3) *Coastal governance system*: represents governance instruments and decisions.

As the next task in SAF, variables and parameters have been sought by the Reference group to describe the state and dynamics of the coastal SES, and to understand the natural and socio-economic processes and their interactions. Modelling exercise confirms options to downscale/upscale model, for focusing on specific sectors or excluding scenarios with marginal impact on the sustainability of the coastal SES (Kudrenickis *et al.*, 2017; Šteinberga *et al*., 2017).

3.3.6. Definition of coastal governance scenarios (Paper 7)

SAF objective of the scenarios building is to investigate how the current practice of the ICM can be improved by selected decisions (affecting behaviors). Interpretative analysis of the municipal governance resources, knowledge from previous coastal studies made it possible to define governance models (being basis for scenarios) principal for similar type of municipalities in Latvia (Table 3.11).

Table 3.11. **Municipal coastal governance models. (Paper 7)**

Characteristics	Implementation	Reasons for deficiencies
BAU governance model		
Corresponds to the minimum of requirements set in the development planning legislation requesting (mandatory) integration of the coastal issues into local planning.	Governance works partially in large municipalities (cities), but is not working in small municipalities.	Municipal planning departments have insufficient capacity and lack of interest in integration, thus only formal integration is ensured (yet incomplete).
Top-down governance model		
ICM is integrated in general municipal governance system (content, products, and process). Municipality undertakes full responsibility for coastal governance with at least formal involvement of local stakeholders.	Municipalities are not capable nor genuinely interested to undertake full, comprehensive responsibility for the coast	Regardless a few environmental planning initiatives and tools in place, there is not enough initiative to undertake coastal planning Coastal municipalities (excluding large cities) have limited capacity and resources (financial, institutional, and human,) to implement ICM. Financing coastal development depends on limited external resources.
Bottom-up governance model		
To considerable extent coastal governance is already implemented by coastal stakeholders in partnership with municipal institutions, thus function delegation has been identified in such cases	Bottom-up stake-holders are important actors in coastal infrastructure management, but is not possible to ensure municipal scale implementation relying just on bottom-up elements	Bottom-up initiatives are local and are narrow-focused on stakeholder groups interests. Coastal communication and stakeholder collaboration is limited due to lack of shared understanding and experience in collaboration. Coastal investments depend on external sources thus they are subject to national/EU funding rules primarily targeted to socio-economic issues, not to the coast.

Baseline governance scenario

The Baseline (business-as-usual) scenario ensures compliance with the statutory requirements for the planning process, content and participation, and partial vertical integration of the policy. It is ‘law-driven’ approach. Spatial Development Planning

Law (2011) requests local governments to develop local development strategy, development programme, spatial plan, local and detailed plans, and thematic plans.

Top-down governance scenario

This scenario involves voluntary initiatives. In Salacrgiva municipal case those are Green Municipality Declaration (2010) and Climate Change Adaptation Strategy (2011). Both documents are considered innovations in governance within the Latvian context. Additionally, a body of 16 village elder institutions and several consultative mechanisms for stakeholder engagement have been established. Collectively, they constitute the foundation of bottom-up governance, although they are insufficient to ensure ICM

Bottom-up governance scenario

Local 'bottom-up' governance resources are comprised of participatory opportunities and self-organization forms of the local society. As assessed before, the local NGOs are small, and not highly active. Local people experience and interest in cooperation is not explicit. 'Village elders' institution is not using its potential in full, limiting its activities to passive information exchange. Coastal participation targeted communication in the municipality exist, but to a limited extent. Overall, bottom-up activities in the municipality are immature and poorly organized, and as such they cannot provide sufficient basis for mutually beneficial cooperation.

Since none of traditionally used scenarios, if implemented alone, can provide for adequate ICM, and a new type of collaborative governance scenario is needed.

Collaborative governance scenario

Collaborative governance in this research is defined as an interactive and adaptive process for transforming social relationships, creating new knowledge among collaborating factors, interests, and methods for exploring and solving complex environmental (coastal) governance issues. It serves as an instrument for improving the governance process and the implementation of policy, promoting public understanding of governance, and enhancing the involvement and participation of stakeholders in it.

It is necessary that this scenario meets the SAF methodological requirements:

- It is based on multidisciplinary knowledge provided by thematic research;
- can offer tools that utilize scientifically quantifiable information;
- is related to and complements other governance instruments;
- includes a comprehensive component for the stakeholder participation;
- incorporates valuable elements from other governance scenarios.
- makes a significant contribution to coastal development planning and ICM.

A crucial requirement for the collaborative governance scenario is the complementary use of governance instruments. The study identifies municipal coastal governance instruments that represent all instrument categories: planning, legislative, economic/financial, infrastructure, organizational, and communication instruments (Table 3.12). However, they are used in a non-systematic and non-complementary manner, not adequately addressing the coastal specifics. Additionally, coastal (and climate risks- related) communication instruments are almost unused.

Table 3.12. **Collaborative coastal governance instruments. (Paper 8)**

Instruments	Practical applications
Planning instruments	- Coastal problematics integration in planning documents (SD programme, spatial plan, development programme), - integration monitoring; - coastal sustainability report (present situation assessment); - coastal thematic plan; - coastal problem areas/sectors detail plans/local plan; - coastal municipalities indicator system and monitoring.
Legislative instruments	- Local regulations specific to the coastal management; - local regulations for communal services use (incl. for visitors).
Policy instruments	- Coastal (or environmental) consultative board at the Council; - coastal sustainability/green declaration; - commitments by the Council (like the Mayors' Climate Pact); - municipality's sustainability report.
Economic, financial instruments	- Penalties, discounts for coastal management activities; - entrance fees/ permits (also outside the beach zone); - project support (from LEADER and other programmes); - environmental/coastal budget as a chapter in municipal budget.
Infrastructure instruments	- Parking places and access roads; - foot-bridges/paths; nature trails and watching towers/platforms; - information signs/instructions/boards; - summer piers/boat docks, other boats management solutions; - solutions for fortification of coastal dunes ecosystems; - alternative energy (solar, wind) generators to lit nature trails.
Organizational instruments	- Coastal (environmental) management commission/committee; - coastal monitoring and management staff (seasonally); - coastal development and infrastructure planner/manager; - coastal NGO villages associations/elders with delegated tasks.
Communication instruments	- Coastal state monitoring (incl. citizen science); - coastal topics in all education levels' curricula and projects; - coastal citizen science mobile app and educational brochure; - institutional internet site section devoted to the ICM.

3.3.7. Science-policy interface principle and tools (Papers 7&8)

The development challenges of ICM are evident at both ends of the governance process (cycle): concerning the interaction between science and policy, as well as the integration of the coast into municipal planning and implementation practices. Opportunities for improving ICM can be seen in the integration of coastal SES factors and the development of the science-policy interface to translate coastal science knowledge into decision-making.

This could be done incorporating scientific data into the new type of coastal governance instrument – *Municipal Coastal Monitoring System* (MCMS), and use of the developed natural and social science factors (including citizen science) and their interactions'

monitoring into the designed voluntary planning document – *Coastal Governance Survey* intended to prepare development planning process and content.

For organization of the local coastal socio-ecological and governance parameters, and for their integration and use for quantitative and qualitative characterization of the coast in a coherent multilevel approach, *indicators* are principal component at all stages of municipal development governance cycle. The relevance and suitability of the indicators approach for science-policy integration is determined by the interaction of few factors:

- definition and quantification of each indicators shall be strictly science justified;
- selected indicators use for decision-making shall be based on stakeholders' values which are reflected in real activities determined by the municipal policies.

A developed SDM, allows:

- to find the optimal number of parameters (necessary and sufficient) to characterise the state of the coast as a subject of the municipal governance;
- to understand the natural (ecological) and socio-economic processes happening on the coast and their interaction; and, importantly,
- to establishing science-policy interface linking scientific information with the coastal decision-making.

To ensure transition from the SAF designed SDM to the Coastal Indicators System (CIS) as a suggested practical decision-making tool, a systemic process description has been designed illustrating envisaged structure in realizing a science-policy interface based on indicators concept (Fig. 3.9).

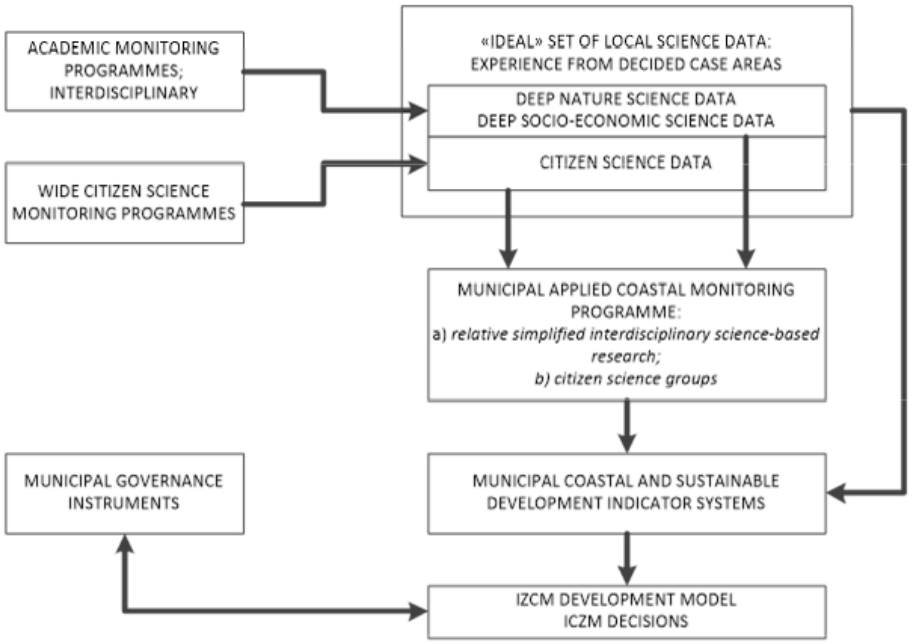

Figure 3.9. **Principle of the science-policy interface. (Kudrenickis *et al.*, 2016)**

Coastal indicators system (CIS)

Decision-makers and politicians at all governance levels have insufficient science-based information and understanding to cope with the ICM, and to integrate the coastal issues into development planning process. In general, data and knowledge on the coast from the applied natural and social science is available, but insufficient in terms of the local coast-specific knowledge. As it is concluded in the project "Assessment Model for the

Sustainable Development of European Coastal Zones" (DEDUCE, 2007) the most of available indicators systems (IS) are not suitable for ICM at local level as the scale of measurements, data interpretation, and designations for their use are inapplicable for the local level decision-making. Thus, there is need for designing a locally relevant and applicable IS which meets the following criteria:

- is suitable to predict local coastal situation and improves ICM;
- supports collaboration among stakeholders and collaborative decision-making.

Figure 3.10 illustrates the framework for implementing an indicator-based science-policy interface within the statutory planning process, the delineation of which is governed by the local SD strategies and its corresponding performance evaluation system (SD IS). It is important to note that the elaboration of indicators/parameters falls outside the scope of this thesis, as it is addressed by other research colleagues.

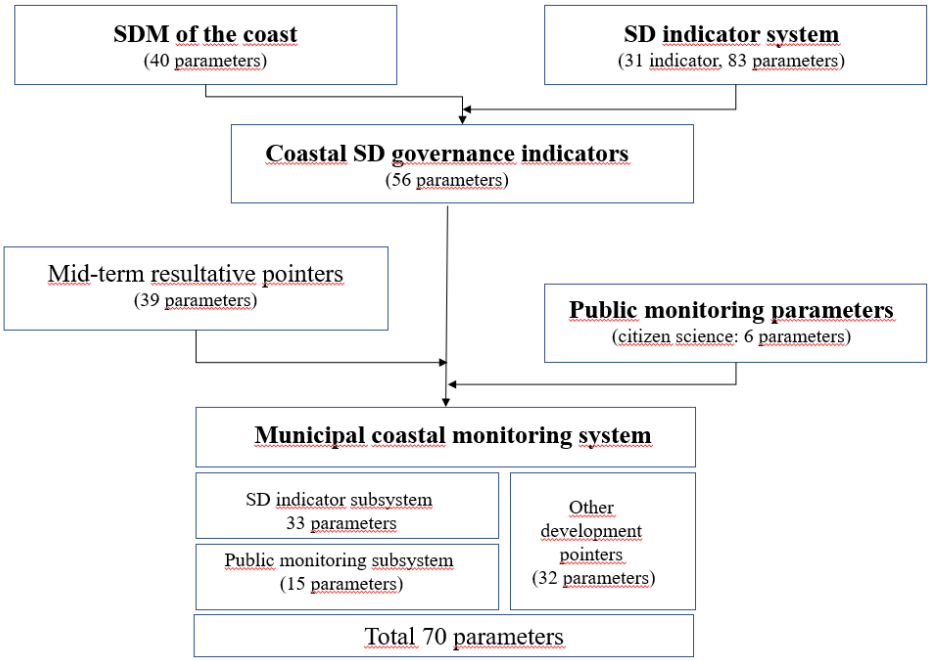

Figure 3.10. **Science -policy interface framework. (Lontone *et al.*, 2017b)**

As a single complex system, the Coastal indicators system (CIS):

- describes the state of the coast, characterizing the stability of coastal ecosystem and the coastal SES, and its recovery potential;
- shows stakeholders' concerns reflecting their coastal awareness and shared vision of the coastal development through the key parameters which can be improved through the participatory process; besides
- the set of indicators, included in CIS, are necessary and sufficient to adequately represent the functionality of the coastal system and the impacts of actions performed in the coastal area.

Municipal Coastal Monitoring System

MCMS is a complex monitoring system of different parameters, which makes it possible to evaluate (i) implementation of mandatory planning documents (primarily, local SD strategy, and (ii) the general situation concerning local sustainability and its governance within the municipal territory that includes the coast. Information from monitoring shall

be used for the formulation of the short, mid-, and long-term policies in the statutory municipal planning documents; and directly for the decision-making.

Introduction of the locally tailored monitoring system at the municipal level, initially based on available academic inter-disciplinary science information, and further promoted through development of specific CIS, including citizen science, all sufficiently suitable for unambiguous interpretation of the coast situation and governance conditions, becomes an instrument that could be applied by municipality and used in practice for coastal policy development, implementation, and assessment.

In the context of municipal governance, there are three levels of the CIS application:

1) Strategic level: full-scale application of the CIS, measured twice a year for highly dynamic indicators and at least every five years for less dynamic indicators. The main obstacles/challenges for its implementation are measurement costs and availability of human resources.
2) Tactical level: short-term measurements of indicators that are highly relevant for coastal change characterization. The costs of such measurements are reasonable and municipal staff or local community, or both can be involved in the measurements. Indicators should be measured annually. It is crucial that the tactical level monitoring is linked to current municipal development objectives.
3) Operative level: seasonally/monthly observation of the coastal processes in critical areas. Data should be immediately processed and analysed, and based on it – operative coastal management decisions taken and implemented in time.

Municipal Coastal Monitoring Programme (MCMP)

The application of the CIS and MCMP has been validated against identified four governance scenarios, by answering the following questions:

- What data are already collected and for which indicators (in BAU scenario)?
- What additional data could be collected by municipality (top-down approach)?
- What data stakeholders are interested to collect (bottom-up approach)?
- What kind of collaboration should be established between municipal authorities and stakeholders and what new added value will it bring (collaborative scenario)?

The exploration of situation in above matters has led to the understanding that CIS and the related MCMP shall be based on:

1) modifying and making better use of the available governance component – municipal administrative and institutional capacity, and better organisation of the assessment of the available information (and collected new parameters);
2) additional new component – Citizen Monitoring System which is a bottom-up initiative organized in coordinated and complementary way, and based on the scientific methods and citizen initiatives;
3) integration of new component and optimisation of the existing components will enhance new assessment perspective and will led to new governance decisions.

Implementation of MCMP shall be based on monitoring measures carried out by:

- the staff of municipal administration and subordinated organizations/services;
- organisations, who perform delegated municipal functions (like utility services);
- and interested citizens and volunteer groups, thus ensuring better PP through the elements of the citizen science; and

– additional experts-done empirical studies/assessments, as necessary.

Citizen Monitoring System

Local volunteers-based monitoring shall become an integral part of MCMS. Citizen activities can provide additional opportunities for data acquisition that would otherwise be under-resourced or omitted. To ensure continuity of the process, citizen involvement shall be institutionalized in a formal agreement document between the municipality and stakeholders' representatives (interested NGOs, Eco-schools, and other groups). Such document shall contain municipality's commitment both to support implementation and, most importantly, to use public monitoring results for decision-making.

Discussion: SAF application for coastal governance case

The overall approach to developing a framework of coastal governance tools to address SAF issue "*Unsustainable governance of the coastal resources*" within collaborative governance scenario is illustrated in Figure 3.11.

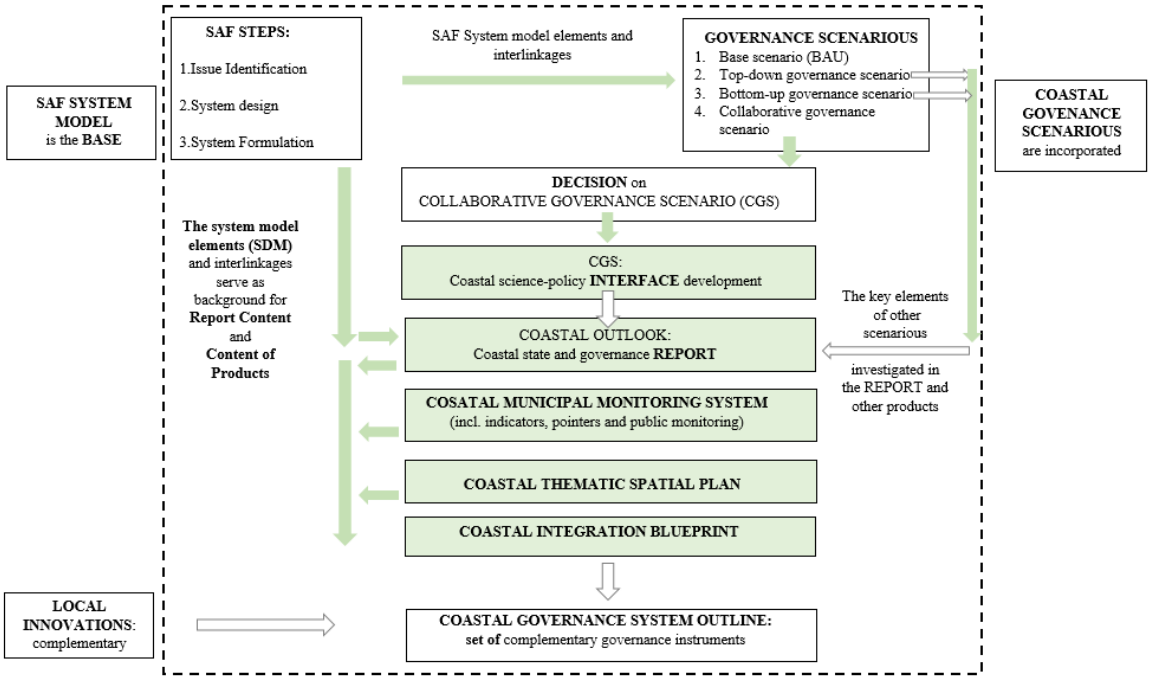

Figure 3.11. **Innovative SAF application for the collaborative governance case. (Paper 8)**

The novelty of SAF application in this research, is the conceptual innovation of a coastal science-policy interface for municipal governance case, which means integrated preparation of scientific knowledge that could be subsequently translated, transferred, and integrated into ICM-related decision making and implementation practice at local level. This requires elaboration of the required background and tools for both the transfer process and products, to manage interpretation of scientific data into language understandable by the local-decisionmakers and by the public.

1) First, the challenge for local governance and the first interface element and step is coastal ***multi-thematic research and support*** for its results as it can provide necessary scientific basis for development of the ICM.
2) The second interface element is ***Coastal Governance Survey*** (CGS) which is a document for coastal policy formulation and decision-making. SDM provides basis

for the content of CGS to be based on bottom-triple line sustainability dimensions and complementary governance dimension.

Chapters forming CGS content shall address: typical characteristics of the territory; coastal definition; structured description of all SES subsystems; characteristic of the anthropogenic loads (pollution) and risks, and governance system. The description must be accompanied by an analysis.

3) For the third interface element, the key nature-society process and impact parameters and its system are transformed within the ***framework of coastal governance system content and the process*** that forms a fundament for the coastal governance assessment system to be designed and applied to the successive steps under the governance cycle – including as a MCMS, but later also as a CIS, which both are complementary and designed accordingly.
4) The fourth challenge is development and application of both the municipal SD and coastal ***indicators systems*** (respectively IS and CIS). The IS contribute simultaneously to both municipal ICM and assessment and achievement of the development goals set in the local development planning policies.
5) The fifth interface element and development step are a ***Coastal Governance Thematic Plan*** consistently with the disciplinary governance approach. Such a Plan provides higher spatial resolution and spatial use detailing (zoning), this it can significantly contribute to the quality of statutory spatial planning content.
6) The sixth and decisive step of the coastal governance interface is ***integration*** of the single outcome from all previously elaborated scientific-applied results into municipal development planning process and instruments, both mandatory and voluntary documents, as well as investment plans, and municipal budget.

The insights derived from SAF application pertain to practical facets crucial for ICM development. Specifically, these insights encompass governance considerations related to policy effectiveness, sustainability science applications involving transdisciplinary approaches to address socio-ecological issues, simulation analysis techniques for quantifying dysfunctions within complex systems, and the establishment of partnerships among research entities, municipalities, and stakeholders, and providing a quantitative foundation for collaborative decision-making.

3.3.8. Conclusions arising from coastal governance research (Papers 4-8)

1) Coastal governance research reveals that deficiencies are currently observed in all coastal governance segments. Stakeholders have limited understanding of the coastal SES, lack vision for sustainable coastal resource use, and, therefore, their interest in ICM is limited. Coastal governance instruments are not used adequately, that is, neither complementary nor comprehensive, to address all coastal issues. Elements of coastal SES and its governance system are not fully represented in the governance content. Municipal coastal planning and governance processes need to be systematically developed by integrating the content of coastal governance, covering all sustainability dimensions - economic, social, environmental, and governance.
2) To address the shortcomings of ICM, coastal collaboration communication must be developed concerning relevant coastal topics that are selectively and multi-disciplinarily oriented, based on the involvement of stakeholders and the mutually complementary application of all coastal communication instruments.

3) However, the main factor for success remains the continuous proactive collaboration among all stakeholder groups, and what is crucial compulsory use of all communication/collaboration instruments to facilitate interdisciplinarity and cross-sectoral (horizontal) integration, thereby preventing any governance sector or stakeholder group from being excluded from the ICM.
4) The research shows that coastal governance needs to be based on the development of a knowledge-based governance system, for which the development and application of novel approaches and tools is a prerequisite. The research demonstrates the process of transition from individual disciplinary studies to a comprehensive multidisciplinary study. Such multidisciplinary research is based on a combination of academic and citizen science. Community (bottom-up) initiatives improve coastal governance knowledge, understanding and missing capacities.
5) Successful SAF application in a pilot case allowed to design methods and tools to:
   - improve coastal development planning and governance at local level based on stakeholder involvement;
   - establish a municipality owned and adequate for the local conditions coastal information governance system;
   - propose an innovative coastal governance interface (module) with specific ICM tools with high transferability potential to other coastal municipalities in Latvia.

4. CONCLUSIONS AND RECOMMENDATIONS

The research has been successfully concluded, encompassing all planned tasks. It has significantly expanded our understanding of both theoretical and practical dimensions of environmental governance, particularly in the context of its implementation and development within municipalities. The integrative findings derived from all three stages of the research are organized into main conclusions, accompanied by relevant recommendations where applicable. A fifth conclusion presents a theoretical generalization of all results, substantiating the key elements posited in the hypothesis.

1. **Precondition for development of environmental governance is a disciplinary (sectoral) environmental governance** understanding and its implementation in municipal governance based on complementary application of all governance instruments groups, in particular, communication and collaboration instruments.

Recommendations:

Given the imperative for future municipal development planning to adhere to an integrated development planning approach, the advancement of environmental governance in municipalities is contingent upon its thorough integration into the enhanced development governance process of the entire municipality.

To overcome the deficiencies in environmental policy integration, an emphasis on enhancing the stakeholder dimension in local development processes is crucial. This can be achieved through the development and application of communication and collaboration instruments, fostering interaction and complementarity both within the municipal administration and externally with all stakeholder segments. This approach ensures a more effective multisectoral and multidisciplinary integration within local development.

2. **Key four environmental communication (EC) components** – environmental information, environmental education, public participation, and environmentally friendly behaviour – provide a set of complementary instruments, whose application synergy **contributes to** the development of environmental awareness and stakeholder involvement into the **municipal environmental governance processes, creating necessary preconditions for collaborative environmental governance.**

Recommendations:

For **successful EC governance development in municipalities**, it is necessary to apply complementary approach, combining elements from:

– disciplinary approach, which entails developing EC as a new horizontal governance sector alongside other traditional environmental governance sectors, ensuring that all EC components (environmental information, environmental education, public participation, and environmentally friendly behaviour) are internally integrated through complementary and successive planning;
– integrative approach: EC becomes an integrative component in the whole municipal environmental governance cycle from the planning, implementation to monitoring, designing for that necessary procedures for process organization in municipal administration; and

– interrelated (interactive) approach that combines disciplinary and integrated EC application practices.

3. Studies in integrated coastal governance and development, grounded in a quadruple sustainable development model (economic, social, environmental, and governance), have yielded the insight that the framework for designing and developing a **municipal environmental governance system should be rooted in three essential governance segments: content, process, and stakeholders.**

4. **Municipal Coastal Monitoring System** (MCMS) and related nature-social science factors and their interaction-based monitoring provides for a novel approach and instrument for translation and **transfer of science knowledge into ICM related decision-making and municipal governance process.**

Recommendations:

MCMS design shall be supported by all necessary science-policy integration tools, which are: (i) multi-disciplinary coastal science; (ii) complementarity between all groups of governance instruments and (iii) collaborative governance –all to be brought into municipal governance implementation through its main driver: (iv) collaborative communication, consisting of four complementary instrument groups: information, education, participation and coastal friendly behaviour, with aim to improve stakeholders understanding of the coastal processes – coastal governance and related actions.

5. The study of each of the three dimensions of governance separately within this thesis i.e. the study of governance process through disciplinary governance instruments; the study of governance stakeholders through communication and collaboration perspective, and the study of governance content through complex coastal system governance has allowed to identify **preconditions for the successful functioning and development of the municipal environmental governance** within the overall local sustainable development governance process development, they are:

- disciplinary understanding of the environmental governance and its application in integrated development governance;
- development of complementary environmental communication instruments and their application in collaboration with stakeholders; and
- socio-ecological system approach-based definition of governance content.

ACKNOWLEDGEMENTS

The author expresses her sincere gratitude to her colleagues from the University of Latvia, especially scientific advisor Prof. Raimonds Ernšteins for his advice, continuous support, and guidance during this long journey. The author appreciates knowledge shared by all co-researchers and co-authors with whom we have collaborated in projects and field studies, particularly to Ivars Kudreņckis, Jānis Kauliņš, Anita Lontone-Ieviņa, Aigars Štāls, Krista Ošeniece, Iveta Šteinberga, Jānis Lapinskis, Jānis Ulme and many others. This work will not be possible without encouragement received from my family, my beloved daughter, friends, and colleagues, as well as generous support from the EU funds and the understanding from my superiors at the Ministry of Environmental Protection and Regional Development.

BIBLIOGRAPHY

1. Agranoff, R., McGuire, M. (2004). *Collaborative Public Management: New Strategies for Local Governments*. Washington DC: Georgetown University Press, 2004, p. 232.
2. Alsop, R., Bertelsen, M., Holland, J. (2006). *Empowerement in practice: from analysis to implementation*. Washington DC: Wold Bank, 2006, p. 317.
3. Arnstein, R. (1969). *A Ladder of Citizen Participation*. *JAIP*, **35** (4), 216-224.
4. Aarhus Convention (1998). *Convention on Access to information, Public Participation in decision-making and Access to Justice in Environmental Matters*. Aarhus, Denmark, June 25, 1998. Retrieved: https://unece.org/DAM/env/pp/documents/cep43e.pdf (06.04.2011).
5. Atkinson, R., Klausen, JE. (2011). Understanding sustainability policy: governance, knowledge and the search for integration. *Journal of Environmental Policy and Planning*, **13**(3), 231-251.
6. Ansell, CA. (2007). Collaborative governance in theory and practices. *Journal of Administration Research and Theory*, **18**, 543-574**.**
7. Bailey, I. (2003). New Environmental Policy instruments in the European Union: Politics, Economics and Implementation of Packaging Waste Directive. England: Ashgate Publishing Ltd, 2003, p. 223.
8. Bendere, R., Lagzdina, E. (2010). Recommendations for collaboration integration based on the assessment of environmentalpolicy integration in sectors of economics. [*Rekomendācijas par sadarbības integrāciju balstītas uz vides politikas integrācijas novērtējumu tautsaimniecības sektoros*]. Project report. EEA grant and national programme "Environmental Policy Integration" financed project Nr.3 "Environmental communication and environmental policy integration", 2010, p. 41. (Unpublished).
9. Berg, LB. (2007). *Qualitative Research Methods for the Social Sciences*. 6th edit. Pearson/ Allyn& Bacon, 2007, p. 384.
10. Bolscho, D., Eulefeld, G., Rost, J., Seybold, H. (1990). Environmental education in practice in the Federal Republic of Germany: an empirical study. *International Journal of Science Education*, **12**(2), 133-146.
11. Brundtland, G. (1987). Report of the World Commission on Environment and Development: Our Common Future. United Nations General Assembly document A/42/427.
12. Cepuritis, E., Ulme, J., Graudina-Bombiza, S. (2017). Development of beach litter monitoring on the Latvian coastline: the citizen science perspective. J*ournal of Social Sciences, Regional Formation and Development Studies*, **1** (21), 7-18.
13. Checkland, P., Holwell, S. (1998). Action Research: Its nature and Validity. *Systemic Practice and Action Research*, **11**, 9-21.
14. Cohn, JP. (2008). Citizen Science: Can volunteers do real research? *BioScience*, **58** (3), 192-197.
15. Cox, R. (2010). Environmental Communication and the Public Sphere. 2nd edit. Sage, 2010, p. 385.
16. Creighton, L. (2005). The Public Participation Handbook: Making Better Decisions Through Citizen Involvement. 1st edit., Jossey Bass Pub., 2005, p. 304.

17. Cuadrado Quesada, G., Klenke, T., Mejía-Ortíz, LM. (2018). Regulatory Challenges in Realizing Integrated Coastal Management – Lessons from Germany, Costa Rica, Mexico and South Africa. *Sustainability* (2018) **10**, 3772.
18. Dale, P., Sporne, I., Kinght, J., Sheaves, M., and others (2019). A conceptual model to improve links between science, policy and practice in coastal management. *Marine Policy*, **103**, 42-49
19. Darnton, A. (2008). *Government Social Research: Behaviour Knowedge Review*. Reference report: An overview of Behaviour change models and their uses. University of Westminster, UK. Retrieved: http://www.civilservice.gov.uk? Assets/Behaviour_change_reference_ report_ tcm6-9697. ppf (03.04.2011).
20. Dawson, L. (2019). Unravelling sustainability. The complex dynamics of emergency environmental governance and management systems at multiple scales. Dissertation. Stockholm University, 2019, p. 742.
21. DEDUCE, 2007. Indicator Guidelines. To adopt an indicator based approach to evaluate coastal sustainable development. Project document. Retrieved from https://www.vliz.be/projects/deduce/PDF-NewsLetter/indicators_guidelines.pdf (03.02.2016).
22. DEFRA (2009). Understanding the processes for community adaptation planning on the coast. Project report. FD2624. DEFRA. Retrieved: http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=16353 (04.09.2010).
23. Doyle, T., McEachern, D. (2008). *Environment and Politics*. 3rd ed. Routledge, 2008, p. 301.
24. EEA (1997). Towards sustainable development for Local Authorities: approaches, experiences and sources. *Environmental Issues*, **5**, EEA, Copenhagen, 1997, p. 155.
25. EEA (2005). *Environmental policy integration in Europe: State of play and evaluation framework*. EEA Technical report. No. 2, Copenhagen: EEA, p. 70. Retrieved: http://www.eea.europa.eu/ publications/technical_report_2005_2 (17.09.2009)
26. EEA (2010). Environment Europe 2010: state and perspective. Summary. Copenhagen: EEA, 2010.
27. ECN (2011). Environmental Communication Network. Retrieved: http://www.esf.edu/ ecn/whatisec.htm (11.04.2011.).
28. Ehler, C.N (2003). Indicators to measure governance performance in integrated coastal management. *Ocean & Coastal Management*, 46, 335-345.
29. Elliott, M., Burdon, D., Atkins, JP. *et al*. (2017). "And DPSIR begat DAPSI(W)R(M)!" - a unifying framework for marine environmental management. *Mar. Pollut. Bull.* **118** (1-2), 27-40.
30. EPA (2022). USA Environmental Protection Agency document. Retrieved: www.epa.gov (10.06.2022).
31. Ernsteins, R. (1999). Development of environmental science education [*Videszinātniskās izglītības attīstība*]. Monograph. Riga: Apgads Vide, 1999, p. 342.
32. Ernšteins, R. (2003). *Environmental Communication*. Manual. Leonardo da Vinci Community vocational training action programme. Institute for Environmental Science and Management. Riga: Apgads Vide, p. 87.
33. Ernšteins, R. (2006). Local Agenda 21 process facilitation: environmental

communication and self-experience development in Latvia. In Filho, L.W., Ubelis, A., Berzina, D. (eds.). *Sustainable Development in the Baltic and Beyond*. Frakkfurt: Peter Lang Europaicher Verlag der Wissenschaften, 2016, 305-318.
34. Ernsteins, R. (2010) Sustainable coastal development and management: collaboration communication and governance. Human resources – the main factor of regional development. *Journal of Social Sciences*. Klaipeda: Klaipeda University, **3**, 247-252.
35. Ernšteins, R., Kaulins, J., Lice, E., Stals, A. (2011). Integrated coastal Management for Local Municipalities in Latvia: Sustainability Governance and Indicator system. *WIT Transaction*, **149**, 29-40.
36. Ernsteins, R., Lagzdina, E., Lapinskis, J., Lontone, A., Kudreņickis, I., Kaulins, J. (2016). *Coastal resources understanding and local governance development: socio-ecological system and indicators prerequisite*. Thesis. 1st Baltic Earth Conference. Multiple drivers for Earth system changes in the Baltic Sea region, June 13-17, 2016, Nida, Lithuania, 191-193.
37. Ernsteins, R., Lagzdina, E., Lontone, A., Graudina, S., Kudrenickis, I., Kaulins, J., Lapinskis J. (2017). Local Coastal Collaboration Governance System Development: Municipal Participatory Monitoring. Thesis. 15th Int. conference Environmental Science and Technology, August 31- September 2, 2017, Rhodes, Greece, p. 5.
38. European Governance (2001). *European Governance. A White paper*. Retrieved: https://ec.europa.eu/commission/presscorner/detail/en/DOC_01_10 (05.04.2012).
39. EU Sustainable Development Strategy (2001). Communication from the Commission A Sustainable Europe for a Better World: A European Union Strategy for Sustainable Development (Commission's proposal to the Gothenburg European Council). COM/2001/0264 final. Retrieved: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX: 52001DC0264 (05.04.2012).
40. Evaluation of ICM in Europe (2006). Evaluation of Integrated Coastal Management in Europe. Technical document. Reprecht Consult. Germany, International Ocean Institute, Malta, 2006, p. 360. Retrieved: http://ec.europa.eu/environment/ iczm/pdf/evaluation_iczm_report. pdf. (04.09.2016).
41. Evans, SM., Gebbels, S., Stockill, JM. (2008). 'Our shared responsibility': Participation in ecological projects as a means of empowering communities to contribute to coastal management process. *Marine Pollution Bulletin*, **57**, 3-7.
42. Foti, J., de Silva, L., McGray, H., Shafter, L.,and others. (2008). *Voice and choice. Opening the door to environmental democracy*. Washington: WRI, 2008, p. 113.
43. GEO (2012). Global Environmental Outlook 5 for Local Government: Solving Global Problems Locally. UNEP, 2012, p. 31. Retrieved: https://www.unenvironment.org/ resources/geo-5-local-government (07.08.2018).
44. Gillgren, C., Stottrup, J., Schumacher, J., Dinesen, GE. (2019). Working together: collaborative decision-making for sustainable Integrate Coastal Management (ICM). *J Coast Conserv*, **23**, 959-968.
45. Grzeszczak, R. (2015). The Concept and Practice of Good Governance in the European Union. *Inter. Journal of Social, Behavioural, Educational, Economic, Business and Industrial Engineering*, **9**(2), 449-453.

46. Homeyer, I. (2007). Environmental Policy Integration and Multi Level Governance. EPIGOV Papers No. 15. Berlin: Ecologic Institute for International and European Environmental Policy, 2007, p. 16.
47. Hopkins, TS., Bailly, D., Stottrup, J.G. (2011). A Systems Approach Framework for Coastal Zones. *Ecology and society*, **16**(4), p. 25.
48. Hopkins, ST., Bailly, D., Elmgren, R., Glegg, G. *et al.* (2012). A Systems Approach Framework for the transition to SD: potential value based on coastal experiments. *Ecology and Society*, **17**(3), p. 39.
49. Inagani, N. (2007). *Communicating the Impact of Communication for Development. Recent Trends in Empirical Research*. World Bank Working paper Nr. 120. Washington: EBRD, World Bank, 2007, p. 257.
50. Joas, M. (ed.) (2000). *Local Agenda 21 Models and effects. An analysis of LA21 Activities in Finland and the Baltic Sea Region*. Abo Academy, 2000, p. 182.
51. Jordan, A. J., Lenschow, A. (ed.) (2008). *Innovation in Environmental Policy? Integration Environment to Sustainability*. Edward Elgar Publishing, 2008, p. 365.
52. Kauliņš, J. (2015). Sustainable development governance indicators systems. [*Ilgtspējīgas attīstības pārvaldības indikatoru sistēmas*]. Dissertation. University of Latvia, Riga, 2015, p. 160.
53. Kavaliauskas, P. (2010) Sustainable and Balanced Development of Lithuanian Curonian Spit and Neringa Municipality: Planning and Political Aspects. *Technological and Economic Development of Economy*, **16**(1), 58-74.
54. Kersting, N., Vetter, A. (eds.) (2003). Reforming Local Government in Europe: Closing the gap between Democracy and Efficiency. Opladen: Leske+Budrich, 2003, p. 349.
55. Kilvington, M. (2007). Social learning as a framework for building capacity to work on complex environmental problems. Retrieved: http://learningfor sustainability.net (21.02.2011).
56. Kooiman, J., Bavinck, M., Jentoft, S., Pullin, R. *(eds.)*. (2005). Fish for Life: Interactive Governance for Fisheries. *MARE Publication Series*, **3**. Amsterdam: Amsterdam Univ. Press.
57. Karpouzoglou, T., Dewulf, A., Clark, J. (2016). Advancing Adaptive Governance of Social-Ecological Systems through Theoretical Multiplicity. *Environmental Science &Policy*, **57**, 1-9.
58. Knill, C., Lenschow, A. (2005). Compliance, Communication and Competition: Patterns of EU Environmental Policy Making and Their Impact on Policy Convergence. *European Environment*, **15**, 114-128.
59. Kohler–Koch, B., Rittbergerg, B. (2006). Review article: The „Governance Turn" in EU studies. *JSMS*, **44**, 27-49.
60. Kollmuss, A., Agyeman, J. (2002). Mind the Gap: why do people act environmentally and what are barriers to pro-environmental behaviour? *Environmental Education Research*, **8** (3), 239-260.
61. Kroplijs, A., Raščevska, M. (2010). *Kvalitatīvās pētniecības metodes sociālajās zinātnēs* [Qualitative research methods in social sciences]. 2nd ed. Riga: RaKa, p. 190.
62. Kudrenickis I., Kaulins J., Ernsteins R., Lagzdina E. (2016). System dynamic concept of municipal governance of coastal territories. [*Piekrastes teritoriju municipālās pārvaldības sistēmdinamiskais concepts*]. Thesis. The University of

Latvia 74th Scientific Conference. Geography. Geology. Environmental Science. Riga: University of Latvia, 2016, 400-406.
63. Kudreņickis, I., Lagzdiņa, Ē., Šteinberga, I., Ernšteins, R. (2017) System analysis methodology framework adaption for governance development scenarios: Salacgriva coastal municipality. Thesis. University of Latvia 75th Scientific Conference Geography, Geology, Environmental Science. Riga: University of Latvia, 2017, 344-348.
64. Lafferty, W. & Meadowcroft, J. (eds.) (2000). *Implementing sustainable development: strategies and initiatives in high consumption societies*. Oxford: Oxford University Press, 2000, p. 499.
65. Lagzdiņa, Ē. (2010). Environmental Education in Latvia: Assessment of management instruments and target groups. [*Vides izglītība Latvijā: pārvaldības instrumentu un mērķa grupu novērtējums*]. *Economics and management*. *Acta Universitatis Latviensis,* Riga: University of Latvia Academic Press, 2010, **754**, 349-361.
66. Lagzdiņa, Ē. (2013). The role of communication instruments in achieving environmental policy goals: the assessment of the Latvian Environmental Policy Guidelines for 2009-2015 case [*Komunikācijas instrumentu loma vides politikas mērķu sasniegšanā: Ļatvijas vides politikas pamatnostādņu 2009.-2015.gadam situācijas analīze*]. Thesis. University of Latvia 71st Scientific Conference. Geography. Geology. Environmental Science, Riga: University of Latvia, 2013, 449-451.
67. Lagzdiņa, Ē., Bendere, R., Ozola, A., Brizga, J., Kauliņš, J. (2010). Environmental communication and environmental policy integration [*Vides komunikācija un vides politikas integrācija*]. Riga: REC Latvia, University of Latvia, authors, 2010, p. 134.
68. Lagzdina, E., Ernsteins, R. (2017). Assessment of environmental communication integration in environmental governance: sectoral development overview. [*Vides komunikācijas integrācijas iespēju novērtējums vides pārvaldībā: sektora attīstības pārskats*]. Thesis. University of Latvia 75th Scientific Conference. Geography. Geology. Environmental Science. Riga: University of Latvia, 2017, 315-319.
69. Lagzdina, E., Kudrenickis, I., Ernsteins, R., Kaulins, J. (2017). Coastal sustainable development studies in Latvia: integrated local social-ecological systems governance. *Journal of Social Sciences. Regional Formation and Development Studies*, **1**(21), 83-96. doi: 10.15181/rfds.v21i1.1411
70. Lenschow, A. (2002). Environmental Policy integration Greening Sectoral policies in Europe. London: Earthscan, 2002, p. 241.
71. Levrel, H., Fontaine, B., Henry, PV. *et al*. (2010). Balancing state and volunteer investment in biodiversity monitoring for the implementation of CBD indicators: A French example. *Ecological Economics*, **69**(7), 1580-1586.
72. Lontone A., Ernšteins R., Lagzdiņa Ē., Vanaga M., Šteinberga Z. (2017a). Flood risk governance and communication development for coastal municipalities: information and education, participation and practise self-experience. Proceedings. *17th Int. Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management (SGEM)*, June 29-July 5, 2017, Albena, Bulgaria, **17**(52), 373-385. doi: 10.5593/sgem2017/52/S20.049
73. Lontone, A., Ernsteins, R., Lagzdina, E., Graudina, S., Kudrenickis, I., Kaulins, J.,

Osniece, K., Lapinskis, J. (2017b). Local coastal governance: science-policy interface and municipal monitoring. Proceedings. *13th Int. MEDCOAST Congress on Coastal and Marine Sciences, Engineering, Management and Conservation (MEDCOAST 2017)*, October 31-November 4, 2017, Mallieha, Malta, **1**, 105-116.

74. LPS (2010). Latvian Self-governments Development Guidelines [*Latvijas pašvaldību attīstības vadlīnijas*]. Congress document. 21th Congress of Latvian Self Governments Association, Stalbe, Latvia, May 21, 2010. Retrieved: http://www.lps.lv (12.07.2010).
75. MacDonald, BH., Soomai, EM., De Sano, EM., Wells, PG. (eds.) (2016). *Science, Information and Policy for Effective Coastal and Ocean Management*. Boca Raton FL: CRC Press, 2016. p. 474.
76. Markowitz, P., 2000. Guide to implementing Local Environmental Action Programs in Central and Eastern Europe. REC, ISC, 2000, p.166.
77. McGrory, K.C., Souse D. (2010.) Beyond Gridlock: Green Drift in American Environmental Policymaking. *Political Science Quarterly*, **125**(3), 443-463.
78. MEA (2005). Millennium Ecosystem Assessment. Ecosystems and Human Well-being: Wetlands and Water. Synthesis. World Resources Institute, Washington DC, USA, 2005.
79. Mefalopulous, P. (2003). Theory and practice of participatory communication: the case of the FAO project "Communication for development in Southern Africa". Disertation. The University of Texas at Austin, 2003. Retrieved: http://repositories.lib.utexas.edu/bitstream/handle/2152/776/mefalopulosp039.pdf ?sequence=2 (17.02.2010).
80. Mefalopulous, P., Kamlongera, C. (2004). *Participatory Communication Strategy Design*. Rome: FAO, 2004, p.111.
81. Menegat, R. (2002). Participatory democracy and sustainable development: integrated urban environmental management in Porto Alegre, Brazil. *Environment and Urbanization*, **14**(2), 181-207.
82. Mette, A., (2011). Bridging the Gap between Science and Society. In Tett, P., Sandberf, A., Mette, A. (eds.) *Sustainable Coastal Zone Systems*. Dunedin Academic Press, Edinburgh, UK, 103-135.
83. Milstein, T. (2009). Environmental Communication Theories. In Littlejohn, S.W., Foss, A. (eds.) *Encyclopedia of Communication Theories*. Part 1. University of New Mexico, Sage, 344-347.
84. Modernizing Government (1999). *Modernizing Government*. Controller of Her Majesty's Stationery Office. UK. Retrieved: http://polsis.mk.gov.lv/planDescript.do (10.08.2010).
85. Montrie, C., Fiege, M. (2013). The Republic of Nature: An Environmental History of the United States. James Morton Turner. The Promise of Wilderness: American Environmental Politics since 1964. *The American Historical Review*, **118**(4), 4, 1141-1144.
86. Nagendra, H., Ostrom, E. (2014). Applying the social-ecological system framework to the diagnosis of urban lake commons in Bangalore, India. *Ecology and Society*, **19**(2), 67.
87. Norton, T. (2007). The Structuration of Public Participation: Organizing Environmental Control. *Environmental Communication*, **1**(2), 146-170.
88. OECD (1992). Recommendation of the Council on Integrated Coastal Zone

Management. OECD/LEGAL/0268. Retrieved: https://legalinstruments.oecd.org/api/print?ids=42& lang=en (09.09.2022).
89. OECD (2001). *Extended producer responsibility: a guidance manual for governments*. Paris: OECD, 2001. Retrieved: http://books.google.com/books?id=SQrlNXggi0kC&printsec=frontcover&hl=lv&source=gbs_similarbooks_s&cad=1#v=onepage&q=&f=false (01.05.2010).
90. OECD (2012). *OECD Environmental Outlook 2050*. OECD Publ., Paris.
91. OECD (2017). *Tackling Environmental Problems with the Help of Behavioural Insights*. OECD Publ., Paris. doi.org/10.1787/9789264273887-en (05.01.2020).
92. OECD (2019). *Regions in industrial transition. Policies for people and places*. OECD Publ., Paris, p. 156.
93. OECD (2021a). *Government at glance*. OECD Public Governance Policy Papers. OECD Publ., Paris, doi:10.1787/1c258f55-en.
94. OECD (2021b). *Adapting to a changing climate in the management of coastal zones*. OECD Publ., Paris, p. 28. Retrieved: https://www.oecd-ilibrary.org/docserver/b21083c5-en.pdf?expires=1663753703&id=id&accname=guest&checksum=968B335F4E61850C6848E811259DD152 (12.05.2022)
95. Ostrom, E. (2009). A General Framework for Analysing Sustainability of Social-Ecological Systems. *Science*, **325**, 419-422.
96. Ourcoast (2010). Integrated coastal zone management: Participation practice in Europe. Retrieved: http://ec.europa.eu/ourcoast/download.cfm?fileID=1629 (31.05.2011).
97. Palmer, J.A. (1998). Environmental Education in the 21 st Century: Theory, Practice, Progress and Promise. London: Routlage, 1998, p. 284.
98. Pelonen, A., Tuula, T., Waltari, S. (2008). Assessing policy coordination capacity: higher education, science, and technology policies in Finland. In *Education in Finland*. National Institute of Educational Resources and Research, 2008. Retrieved: http://192.192.169.112/filedownload/%E8%8A%AC%E8%98%AD%E6%95%99%E8%82%B2/Assessing%20policy%20coordination%20capacity (01.05.2009).
99. Petrosillo, I., Aretano, R., Zurlini, G. (2015). Socioecological systems. In Fath, B. (ed.) *Encyclopedia of Ecology*. 2nd edit., Elsevier, Oxford, 4, 419-425.
100. PP (2010). Public participation. Retrieved: http://www.uow.edu.au/~sharonb/STS300/ participation/levels/ expectations.html (28.07.2010.)
101. Pūķis, M. (2010). Self-governance: Experience, ideas and prospects of Latvian self-governments. [*Pašu valdība: Latvijas pašvaldību pieredze, idejas un nākotnes redzējums*]. Latvian Self Governments Association, Jelgava Publisher, 2010, p. 512.
102. REC (1998). Environmental policy planning in Latvian municipalities. [*Vides pārvaldības rīcības plānošana Latvijas pašvaldībās*]. Project report. REC Latvia, 1998 (unpublished document).
103. REC (1999). Assessment of municipal environmental protection structures operayion and opportunities to improve efficiency. [Latvijas pašvaldību vides aizsardzības struktūru darbības novērtējums un efektivitātes paaugstināšanas iespējas]. Project report. VARAM, REC Latvia, 1999 (unpublished document).
104. Recommendation on ICZM (2002). Recommendation of the European Parliament and of the Council of 30 May 2002 concerning the implementation of Integrated

Coastal Zone Management in Europe, Official Journal L 148, 06/06/2002 P. 0024-0027.
105. Selin, H., VanDeveer, SD. (2015). *EU Environmental Policy Making and Implementation: Changing Processes and Mixed Outcomes.* Conference Proceedings. European Union Studies Association (EUSA). 14th Biennial Conference, March 4-7, 2015. Retrieved: http://aei.pitt.edu/id/eprint/79664 (04.06.2016) (12.05.2017).
106. Sterner, T. (2003). *Policy Instruments for environmental and natural resources management*. Washington: Resources for the Future, 2003, p. 504.
107. Schlüter, M., Haider, L. J. Lade, S. J. Lindkvist, E. *et al*. (2019). Capturing emergent phenomena in social-ecological systems: an analytical framework. *Ecology and Society,* **24**(3): 11.
108. Schumacher, J., Schernewski, G., Bielecka, M. *et al*. (2018). Methodologies to support coastal management – A stakeholder preference and planning tool and its application. *Marine Policy*, **94**, 150-157.
109. Scoones, I., Leach, M., Smith, A. et al. (2007). Dynamic Systems and the Challenge of Sustainability, STEPS Working Paper 1, Brighton: STEPS Centre. Retrieved from https://www.ids.ac.uk/download.php?file=files/dynamics.pdf (9.03.2023).
110. Stoker, G. (2019). Governance as theory: five propositions. Reprint from *Int. Social Science Journal*, 1998, **50**, 17-28.
111. Støttrup, JG., Dinenses, GE., Holder, J., Gillgren, C., Schernewski, G. (2017). Re-visiting ICM theory and practice: lessons learned from the Baltic Sea Region. *Ocean and Coastal Management*, 139, 64-76.
112. Støttrup, JG., Dinesen, GE., Schumacher, J. *et al*. (2019). The systems approach framework for collaborative, science-based management of complex systems. *J Coast Conserv*, 23, 881-898.
113. Šteinberga, I., Kudreņickis, I., Ernšteins, R. (2017). Approbation of System Dynamics Modelling for Analysis of Coastal Territories' Development Models and Scenarios: Case of Tourism Development Scenario. [*Sistēmdinamiskās modelēšanas metodes aprobācija piekrastes territorijas attīstības modeļu un scenāriju analīzē: tūrisma attīstības scenārija piemērs*]. Thesis. 75th Scientific Conference of University of Latvia. Geography. Geology. Environmental Science. Riga: University of Latvia, 2017, 357-361.
114. TEU (2012). The consolidated version of the Treaty on the European Union. OJ of the EU C326/13, 26.12.2012.
115. Tews, K., Busch, P. O., Jörgens, H. (2003). The diffusion of new environmental policy instruments. *European Journal of Political Research*, **42**, 569-600.
116. Ulme, J., Graudina-Bombiza, S., Ernsteins, R. (2017). Beach marine litter monitoring: citizen science data series for coastal monitoring development and governance in Latvia. Vienna GREEN Conference Proceedings, **17**(33), 91-102.
117. UNCED (1992). *Earth Summit '92*. The United Nations Conference on Environment and Development, Rio de Janeiro 1992, The Regency Press Corporation, UK.
118. Thematic Strategy on the Urban Environment (2006). *Communication from the Commission to the Council and the European Parliament on Thematic Strategy on the Urban Environment* {SEC(2006) 16 } /* COM/2005/0718 final */ Retrieved: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52005DC0718.

119. Vanags, E., Vilka, I. (2003). Local Government Reform in the Baltic Countries. In Kersting, N., Vetter, A. (eds.). *Reforming Local Government in Europe: Closing the gap between Democracy and Efficiency*. Opladen: Leske+Budrich, 2003, p. 349.
120. Vanags, E., Vilka, I. (2005). Action and development of self-governments [*Pašvaldību darbība un attīstība*]. Riga: University of Latvia Academic Press, 2005, p. 384.
121. Virapongse, A., Brooks, S., Covelli Metcalf, E. *et al*. (2016). A social-ecological systems approach for environmental management. *J Environmental Management*, **176**, 83-91.
122. Vodden, K.M. (2009). New places, ancient places. Collaborative governance and sustainable development in Canada's coastal Regions. Dissertation. Simon Fraser University, 2009, p. 584. Retrieved: www.academia.edu (06.09.2022).
123. Vos, M. (2009). Communication quality and added value: a measurement instrument for municipalities. *J Communication Management*, **13** (4), 362-377.
124. Vos, M., Westerhoudt, E. (2008). Trends in government communication in The Netherlands. *J Communication Management*, **12** (1), 18-29.
125. Waagsaether, K., Ziervogel, G. (2012). Bridging the Communication Gap: An Exploration of the Climate Science–Water Management Interface. In W. Leal Filho (ed.) *Climate Change and the Sustainable Use of Water Resources, Climate Change Management*, 485-499.
126. Waisbord, S. (2001). *Family Tree of Theories, Methodologies & Strategies in Development Communication*. Retrieved: http://www.communicationfor socialchange.org/pdf/familytree.pdf (02.04.2009).
127. Wamsler, C. (2017). Stakeholder Involvement in Strategic Adaptation Planning: Transdisciplinarity and co-production at stake? *Environmental Science and Policy*, **75**, 148-157.
128. White, ID., Mottershead D.N., Harrison S.J. (1994). *Environmental systems: An Introductory text*. Book 2nd edit. Chapmann &Hall, London, UK. p. 616.
129. Yin, RK. (2009). *Case study research: Design and Methods*. 4th edit., Sage, 2009, p. 219.
130. Zaļoksnis, J. (2009). Environmental education and education for sustainable development in policy and universities. [*Vides izglītība un izglītība ilgstpējīgai attīstībai politikā un augstskolās*]. In Environmental education in universities [*Vides izglītība augstskolā*]. Kļaviņš, M., Zaļoksnis, J. (eds.) Riga: LU Academic Press, 107-126.

National development planning and other official documents

1. 1st Assessment of the Baltic Sea's coastal attendance, created loads on the environment and infrastructure *(2020).* [*1. ziņojums. Baltijas jūras piekrastes apmeklētība, tās radītās slodzes uz vidi un infrastruktūras vispārīgs izvērtējums, 2020*]. Ministry of Environmental Protection and Regional Development, 2020, p. 104. Retrieved: https://drive.google.com/file/d/1R0WNiPu8jvShAxy2lXgbUJqZxGohVcl5/view (30.06.2020).
2. Coastal Spatial Development Guidelines for 2011-2017 (2011). [*Piekrastes telpiskās attīstības pamatnostādnes 2011.-2017.gadam*, 2011]. http://polsis.mk.gov.lv/documents/3634.

3. Environmental Communication and Education Strategy and Action Programme (2001). [*Vides saziņas un izglītības stratēģija un rīcības programma, 2001*]. Ministry of Environment. 2001, p. 34. Retrieved: http://www.vidm.gov.lv/files/text/Vides_izglitibas_parskats.doc (30.03.2009).
4. Environmental Policy Guidelines 2009-2015 (2009). [*Vides politikas pamatnostādnes 2009.-2015.gadam, 2009*] http://polsis.mk.gov.lv/documents/3095.
5. Environmental Policy Guidelines 2014-2015 (2014). [*Vides politikas pamatnostādnes 2014.–2020.gadam,* 2014)]. http://polsis.mk.gov.lv/documents/4711.
6. Environmental Policy Guidelines for 2021-2027 (2022). [*Vides politikas pamatnostādnes 2021.–2027.gadam,* 2022]. http://polsis.mk.gov.lv/documents/7479.
7. Government Communication Guidelines for 2008-2013 (2008). [*Valdības komunikācijas politikas pamatnostādnes 2008.–2013.gadam*, 2008)]. http://polsis.mk.gov.lv/documents/2665.
8. Informative report On the changes in the socio-economic situation of municipalities and results of administrative territorial reform (2023). [*Ministru kabineta 2022. gada Informatīvs ziņojums par izmaiņām pašvaldību sociālekonomiskajā situācijā un administratīvi teritoriālās reformas rezultātiem]* https://tapportals.mk.gov.lv/legal_acts/b031b910-4211-49f3-9d84-f70d3e7d04b6
9. Informative report On Coastal Planning Implementation in 2016-2019 (2020). [*Informatīvais ziņojums Par piekrastes plānojuma īstenošanu 2016.-2019.gadā*, 2020]. https://www.varam.gov.lv/sites/varam/files/data_content/varamzin_270120_piekr_plan_novert.docx.
10. Informative report On State long term Thematic Plan for Coastal Public Infrastructure development timplementation in 2016-2019 (2020). [*Informatīvais ziņojums Par Valsts ilgtermiņa tematisko plānojumu Baltijas jūras piekrastes publiskās infrastruktūras attīstībai īstenošanas 2016.-2019.gadā starpposma novērtējumu*, 2020]. http://polsis.mk.gov.lv/documents/6691.
11. Informative report On Floods Danger Warning System Efficiency Improvement (2019). [*Informatīvais ziņojums Par plūdu draudu brīdinājuma sistēmas efektivitātes uzlabošanas nepieciešamību, 2019*]. https://tap.mk.gov.lv/lv/mk/tap/?pid=40458507.
12. National Environmental Policy Plan 2004-2008 (2004). [*Nacionālais vides politikas plāns 2004.-2008.gadam,* 2004]. https://likumi.lv/ta/id/84021-par-nacionalo-vides-politikas-planu-2004-2008gadam.
13. *National Development Plan for 2014-2020* (2014). https://www.pkc.gov.lv/images/NAP2020%20dokumenti/NDP2020_English_Final.pdf
14. National Long-Term Thematic Plan for Development of the Baltic Sea Coastal Public Infrastructure (2016). [*Valsts ilgtermiņa tematiskais plānojums Baltijas jūras piekrastes publiskās infrastruktūras attīstībai,* 2016]. http://polsis.mk.gov.lv/documents/5763
15. National Plan for Adaptation to Climate Change until 2030 (2019). [*Latvijas pielāgošanās klimata pārmaiņām plāns laika posmam līdz 2030.gadam*, 2019]. https://www.vestnesis.lv/op/2019/148.1.

16. MEPRD, 2002. National Report to the UN Conference on Sustainable Development in Johannesburg (2002). MEPRD, 2002. (Institutional archive).
17. River Basin Districts Management Plans and Flood Risk Management Plans 2016-2021 (2015). [*Upju baseinu apgabalu apsaimniekošanas plāni un plūdu riska pārvaldības plāni 2016.-2021.gadam, 2015*]. https://www.meteo.lv/lapas/vide/udens/udens-apsaimniekosana-/upju-baseinu-apgabalu-apsaimniekosanas-plani-/upju-baseinu-apgabalu-apsaimniekosanas-plani-un-pludu-riska-parvaldiba?id=1107&nid=424
18. State Long-Term Thematic Plan for Development of Public Infrastructure on the Baltic Sea Coast *(2016).* [*Valsts ilgtermiņa tematiskais plānojums Baltijas jūras piekrastes publiskās infrastruktūras attīstībai,* 2016]. http://polsis.mk.gov.lv/documents/5763.
19. *Sustainable Development Strategy of Latvia until 2030*. Latvia2030. https://pkc.gov.lv/sites/default/files/inline-files/LIAS_2030_en_0.pdf
20. The Aarhus Convention II National Implementation Report (2008). [*Orhusas konvencijas II nacionālais ieviešanas ziņojums, 2008*]. http://www.varam.gov.lv/files/text/Darb_jomas// ece.mp.pp.2005.18.add. 14.e.pdf

ANNEX

The list of author's scientific publications and research projects

Scientific papers (chronologically descending)

1. Ernsteins, R., **Lagzdina, E.,** Kudrenickis, I., Kaulins, J. (2022). Municipal coastal governance process developments in Latvia: Non-statutory instruments towards collaborative governance system. *WIT Transactions on Ecology and the Environment*, **260,** 391-402

2. Ernsteins, R., **Lagzdina, E.,** Kudrenickis, I, Lontone-Ievina, A. (2020). Municipal coastal governance system developments in Latvia: governance segments, sectors and instruments. Proceedings. 21st Int. Scientific Conference on Economic Science for Rural Development (ESRD). May 12-15, 2020, Jelgava, Latvia. *Economic Science for Rural Development*, **54,** 87-98.

3. Ernsteins R., **Lagzdina, E**., Lontone-Ievina A. (2019). Municipal coastal governance process research and development: coastal socio-ecological system and its governance understanding. Proceedings. 20th Int. Scientific Conference on Economic Science for Rural Development (ESRD), May 9-10, 2019, Jelgava, Latvia. *Economic Science for Rural Development*, **52**, 29-36.

4. **Lagzdina, E.,** Kudrenickis, I., Ernšteins, R., Lontone, A. (2018). Municipal coastal governance towards rural community resilience development: Scenarios and tools. *WIT Transactions on Ecology and the Environment* **226** (1), 297-309.

5. **Lagzdina, E.,** Kudrenickis, I., Ernsteins, R., Kaulins, J. (2017). Coastal sustainable development studies in Latvia: integrated local social-ecological systems governance. *Journal of Social Sciences. Regional Formation and Development Studies*, **1**(21), 83-96. doi: 10.15181/rfds.v21i1.1411

6. Ernsteins, R., **Lagzdina, E**., Lontone-Ievina A., Stals A. (2017). Municipal environmental communication governance development: complementary disciplinary and integrative approaches and practice. Proceedings. *Int. Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management (SGEM)*, June 29-July 5, 2017, Albena, Bulgaria, **17**(54), 359-370.

7. Ernsteins, R., Lontone – Ievina A., **Lagzdina E**., Osniece K., Kaulins J. (2017). Integrated coastal management practice case studies: deficiency of collaboration communication and socio-ecological system approaches. Proceedings. Int. Scientific Conference on Economic Science for Rural Development (ESRD), April 27-28, 2017, Jelgava, Latvia. *Economic Science for Rural Development*, **45**, 63-70.

8. Lontone, A., Ernsteins, E, **Lagzdina, E.,** Graudina, S, Kudrenickis, I, Kaulins, J, Osniece, K., Lapinskis, J. (2017). Local coastal governance: science-policy interface and municipal monitoring. Proceedings. *13th Int. MEDCOAST Congress on Coastal and Marine Sciences, Engineering, Management and Conservation (MEDCOAST 2017)*, October 31-November 4, 2017, Mallieha, Malta, **1**, 105-116.

9. Lontone A., Ernšteins R., **Lagzdiņa Ē**., Vanaga M., Šteinberga Z. (2017). Flood risk governance and communication development for coastal municipalities:

information and education, participation and practise self-experience. Proceedings. *17th Int. Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management (SGEM),* June 29-July 5, 2017, Albena, Bulgaria, **17**(52), 373-385. doi: 10.5593/sgem2017/52/S20.049

10. **Lagzdiņa, E**. (2011). Participatory local environmental management: institutional mechanisms, communication instruments and empowering medium. *Journal of Management/Vadyba*, **2**(19), 13-21.
11. **Lagzdina, E**. (2010). Environmental communication instruments for environmental policy integration. *Environmental and Climate Technologies*, **5**(1), 56-64.
12. **Lagzdiņa, Ē.** (2010). Vides izglītība Latvijā: pārvaldības instrumentu un mērķa grupu novērtējums [Environmental Education in Latvia: Assessment of management instruments and target groups]. *Economics and management*. Acta Universitatis Latviensis, Riga: University of Latvia Academic Press, 2010, **754**, 349-361.
13. **Lagzdiņa, E**., Ernšteins, R. (2009). Vides politikas plānošana pilsētu pašvaldībās: disciplinārās un integratīvās pieejas komplementaritāte [Municipal environmental policy planning: complementarity of disciplinary and integrative approaches]. Proceedings. 7th Int. Scientific Conference, June 25-27, 2009, Rezekne, Latvia. *Environment, Technology, Resources*, **2,** 134-144.

Papers from the international conferences' proceedings

14. **Lagzdiņa, Ē.,** Ernšteins, R. (2018). Vides pārvaldības attīstība pašvaldībās. Vides komunkācijas nozares un tās integrācijas nepieciešamība [Municipal environmental governance development: environmental communication sector development and integration requirement]. In Medeckis A. (ed.) *Society and Culture*. Liepaja: LiePA, 2018, **20**, 411-421.
15. Kudreņickis, I., **Lagzdiņa, E.,** Ernšteins, R. (2017). Piekrastes integrētās pārvaldības attīstība: Salacgrīvas novada modeļteritorijas novērtējums [Integrated coastal governance development: assessment of Salacgriva pilot case]. In Medeckis A. (ed.) *Society and Culture,* Liepaja: LiePA, 2017, **19**, 251-263.
16. Ernšteins, R., **Lagzdiņa, Ē.,** Štāls, A. (2016). Vides komunikācijas imperatīvs videi draudzīgu pašvaldību attīstībā: komplementāri instrumenti, sektorpieeja, integrācijas nodrošinājums [Environmental Communication imperative for pro-environmental municipal development: complementary instruments, sector approach, integration requirements]. In Medeckis A. (ed.) *Society and Culture,* Liepaja: LiePA, 2016, **18**, 338-354.
17. Ernšteins, R., Kuršinska, S., Štāls, A., Zīlniece I., Rudzīte-Griķe M., **Lagzdiņa Ē.** (2010). Environmental Management Integration into Municipal Development Process: Collaboration Communication Imperative. In Livina A. (ed.) *3rd Int. scientific conference on Solutions on Harmonizing Sustainability and Nature Protection with Socio-Economic Stability,* August 19-20, 2010, Valmiera, Latvia, 2010, 53-63.

18. **Lagzdina, E**., Brizga, J. (2009). Integration and collaboration as drivers for local sustainability: North Kurzeme case. In Grasserbauer M. *et al.* (eds.) *Knowledge-Based Technologies and OR Methodologies for Strategic Decisions of Sustainable Development*, Vilnius: Vilnius Gedeminas Technical University, 2009, 80-84.

Participation in the research projects related to the thesis

1. **BALTCOAST**: A Systems Approach Framework for Coastal Research and Management in the Baltic Sea Region. Financed by the EU Baltic Sea Research and Development Programme. Implemented by the University of Latvia (2016-2018).
2. **SUSTINNO:** Innovations and Sustainable Development: post crisis processes in Latvia. The Latvian State Research Programme. The University of Latvia (2015-2017).
3. **Environmental Communication Instruments for Environmental Policy Integration.** European Economic Area (EEA). The Regional Environmental Center for CEE (2009-2010).

Scientific Papers submitted for defence