The Role of Cities in the Socio-Ecological Transition of Europe (ROCSET)

Working Paper no 93

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Abstract

Taking into account the potentially different starting and framework conditions of cities in different regions of the European Union, we present a new approach for sustainability transition analysis with a special focus on the governance of urban common-pool resources. The aim is to identify the conditions which are supportive for innovative institutional arrangements, like self-organised and co-operative forms of governance for urban resource systems like energy, water and green spaces. This report explores these conditions systematically focussing on the overarching research question: What is the transformative role of institutional diversification and innovation in the governance of core urban common pool resources? The role of the resource systems energy, urban green spaces and drinking water is empirically analysed in field studies of 40 European cities, exploring the potential for local self-organisation and socio-ecological transition.

Keywords:

Beyond GDP, Biophysical constraints, Common-pool resources, Energy, Green spaces, Water, Multi-level governance, Urban commons, Socio-ecological transition, Sustainable cities, Sustainable urban transitioning

Jel codes:

Q56; R11; D70

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Abbreviations

CO_2	Carbon dioxide
Coef.	Coefficient
EU 28 + 2	EU 28, Switzerland and Turkey
EU	European Union
WBGU	German Advisory Council on Global Change
GS	Governance system
GDP	Gross domestic product
IAD	Institutional Analysis and Development
I	Interactions
IAP2	International Association for Public Participation
ISCED	International Standard Classification of Education
EU 28	Members of the European Union from July 1st 2013
EU 15	Members of the European Union prior to the eastward enlargement in 2004
EU 13	Newer members of the European Union with the enlargements in 2004, 2007 and 2013
NGO	Non-government organisation
Obs.	Observations
O	Outcomes
NUT3	Regions, belonging to the third level of the Nomenclature of Territorial Units for Statistics
ECO	Related ecosystems
RS	Resource system
RU	Resource units
SES	Socio-ecological system
SET	Socio-ecological transition
Std. Dev.	Standard Deviation
Std. Err.	Standard Error
NACE	Statistical Classification of Economic Activities in the European Community
ROCSET	The Role of Cities in the Socio-Ecological Transition of Europe

TEPSIE	Theoretical, Empirical and Policy Foundations for Social Innovation in Europe
UN	United Nations
U	Users
S	Variables of the social, economic, and political settings

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All remaining errors are our own.

Executive Summary

Confronting the slow progress in realising the past sustainability commitments the question arises, whether becoming mainstream will be enough to stop the ongoing human-inflicted contribution to global warming and loss of biodiversity? The answer to this question is probably negative. Market income growth, measured as GDP per capita, is the most severe risk for the resilience of key global resource systems. New institutional arrangements beyond the simple market-government dichotomy are needed to enhance human prosperity without overstretching earth's capacities to recover themselves. Such a transition towards a regime of strong sustainability presupposes the transition of the economic system towards a higher degree of institutional diversity. For solving social dilemmas at the global level, it is crucial to understand and to change the determinants of human economic behaviour at the local level in its relation to the socio-ecological context first. The third sector is probably the home of new institutional arrangements like cooperatives, multi-stakeholder-constructions, local-regional partnerships and networks and can provide an organisational frame for sustainable development on the local and regional level. This research aims to explore favourable institutional conditions, which allow and support such new institutional arrangements systematically with a special focus on the overarching research question: *What is the transformative role of institutional diversification and innovation in the governance of core urban common pool resources?*

A framework is required, which allows two things: (1) to treat social and ecological systems in almost equal depth, (2) to analyse the feedbacks between the resource conditions and the rules determining the harvesting rates of the resource. The "tragedy of the commons" holds true under very restricted theoretical conditions, but many field studies could find local groups of users managing common-pool resources cooperatively. Such resource-governance systems may be run by civil cooperatives in the energy and housing sectors, or by community groups caring for local green spaces, or non-governmental organisation intervening into the management of water or other ecological resource systems, or non-profit organisations managing urban farming initiatives. Here an important distinction between participation—where initiative-taking exclusively lies with public authorities—and self-organisation has to be made, according to the locus of initiative taking. Commons are no ordinary goods, as in the imagination of neoclassical economics. Resilience defines the common wealth in the sense that human life depends on the existence of these ecological systems. In contrast to public goods, common-pool resources are characterised by a high degree of subtractability, which may lead even towards a collapse of the overall ecological system, and it is highly difficult to exclude potential beneficiaries.

The SES framework as presented in Poteete, Janssen, and Ostrom (2010) can be seen as an advancement of the Institutional Analysis and Development (IAD) framework. It focuses on institutions that are guiding social interaction between actors that are negotiating either on markets, by state laws or are self-organising their interactions (Elinor Ostrom 1990). This framework is used for comparisons of the governance of different resource systems in different institutional settings in Europe in this study. We consider the change of norms represented by the set of rules governing local action situations may be considered as the central characteristic of socio-ecological system transitions. Successful norm-adoption could be decisive for approaching higher levels of trust and cooperation, and thus for the success of self-organised and more sustainable governance of common-pool resources in general. We analyse three resource systems: the energy system, the urban water system and urban green spaces. For the analysis of transitions of socio-ecological systems, a sequence of rules, set with increasing complexity and dynamics, and hypotheses regarding them, is modelled. Furthermore, based on the theoretical concept a set of seven more detailed research questions has been developed.

For the research, a mix of quantitative and qualitative methods appeared to be appropriate to address the theory. A two-phase selection process produced a country selection with 14 countries (12 EU and 2 non-EU). Within these 40 cities were selected according to preset criteria. The sample covers a broad representation of over- and underperforming cities in the respective countries as well as shrinking to growing cities. After the selection, the actual field research was conducted by local researchers in the domestic language and later translated into English. To achieve a thorough insight into the resource systems energy, green spaces, and water, a quantitative inquiry was conducted as well as qualitative expert interviews with four different local actors from distinct sectors (government, business and civil society). This mix provides a glance on normative shifts, which are leading to institutional changes in the sphere of common-pool resource governance.

The answer to our research question considers the diversity of the different resource systems. Our empirical inquiry and our conducted interviews show that there are individual traits and differences in the several countries and cities as well as convergences. However, a central role for changing institutional arrangements lies in degrees of local autonomy, coherent legal frameworks, and activities of civil society.

The energy system is affected by the degree of local autonomy and the influence of other governmental levels, like regional, national, or European governments. In the process of a socio-ecological transition, the spatial attributes of the resource systems are changing as well. This means that another dimension of complexity lies in the spatial recoupling of energy production and consumption. For this step a shift in regional or national decision-making, towards local decision-making autonomy is necessary, since local energy production has to be installed, maintained, and handled by the local users. Therefore, a central point to support socio-ecological transitions towards sustainability in the energy sector lies in the empowerment of the local level, directly influenced by the resource system. In the progress of norm adaption, several actors from different cities have stated that the most productive way to achieve this lies in legal frameworks that make certain sustainability standards mandatory but allow the local level their individual implementation. These frames and rules have to enable people and politics alike, rather than imply punitive measures. High levels of national administrative centralisation interfere with the possibilities of such an approach and need to be considered in coherent legislations. In addition, several actors stated that the sole legislative power for sustainability issues should lie with the European Commission and thus relieve the national levels, especially concerning emissions and legal standards. This also affects national decision-making in energy questions like in Germany or France. In the end, the overall framework has to be open for participation and self-organising capabilities. If institutionalised participatory processes are anchored in common political proceedings, the possibility to take control over sustainability issues in close vicinity is tangible.

The green spaces sector is the most vivid example of an active civil society and attempts to introduce alternative institutional arrangements. The approach to self-organise local urban green spaces for a manifold use in recreational aspects, to increase biodiversity, or producing food, is growing in several European cities. A reason is the close relationship this movement shares with a broader politically motivated movement about urban social problems. Issues addressed by this (heterogeneous) movement are perceived especially urgent by a younger generation. The dynamics of social conflicts and conflicts evolving around political rights in taking part in decision processes that relate to urban spaces are considerable driving forces. However, this does not come without significant potential for conflicts. In general, the questions, “how do we want to live?”, and “in what kind of city do we want to live?” are deeply connected and one major factor for civil activism. For the question about the role that new institutional arrangements can play, the insights are fruitful. The example of green spaces indicates that one chance lies in an emancipatory aspect of civil society to create an urban space compatible with diverse aspects of social and ecological sustainability. This view is tempting, since our assumption has

been from the beginning that any socio-ecological transition is a movement that concerns society as a whole.

The urban water system is an individual and interesting case that shows distinct differences to the other two resource systems. This can be traced to the diverse features that influence the face of the urban water system. It is sensitive to complex biological, technological, ecological, and economic aspects and it is an indivisible natural monopoly; all of which make a participatory or self-organised approach difficult. To be organised, for example in a cooperative form, requires substantial understanding of the resource system—expert knowledge. Empirically we find this in the fact that we could not find any cooperative forms dealing with urban drinking water. However, the common approach lies in city owned public utility providers that are socialised and assemble the necessary experts' knowledge. Nonetheless, a critical awareness of the importance of the resource system is present and evolving. Civil society can participate in decisions on the resource system to an extent that does not need in-depth knowledge of the system. For example was the citizens' response to initiatives to privatise the European water suppliers overwhelming. In addition, self-organisation does exist when it comes to the preservation of natural water basins like lakes or rivers. Concerning infrastructure another factor becomes visible. Water systems are organised in long timespans: concession rights easily last 70 years. While this factor also hinders the possibility to participate or to self-organise in the resource system, it provides a planning horizon with adequate room for long-term strategies for sustainable developments. Where complex in-depth participation is nearly impossible, the integration of citizenry must remain on a more superficial level and concern the local handling of the water suppliers.

To conclude our research at this point: new institutional arrangements do play a significant role for socio-ecological transitions. However, their part in different resource systems has to be evaluated separately. The individual features of a resource system have different results on the reach of these new forms. An in-depth evaluation of the distinct traits of these systems has to consider the several unique dimensions that are entangled with the structural aspects of the resources as well as with the degree, civil society is and can be informed about.

1. Cities: Places of a new human prosperity

1.1 Sustainability needs transition

Since the 1992 Earth Summit of Rio de Janeiro, the concept of sustainable development became more and more mainstream in global political thinking. The United Nations are currently preparing for a "Post-2015-Agenda", breaking down the overall idea into a set of measurable sustainable development goals for the period up to 2030—succeeding the current Goals of the Millennium Declaration of 2000 (UN 2014) and the Kyoto Protocol on reducing the world wide greenhouse gas emissions as well, which are both in urgent need for a binding follow up.

Confronting the slow progress in realising the past sustainability commitments the question arises, whether becoming mainstream will be enough to stop the ongoing human-inflicted contribution to global warming and loss of biodiversity? The answer to this question is probably negative. However, in the community of concerned scientists a major paradigm shift is underway: It is a shift from the early "Limits of growth" debates of the 1970s, which were referring mostly to assumed trends of human overpopulation, towards a debate recognising the implications of core planetary boundaries (Johann Rockström et al. 2009). Their trespassing would cause an irreversible loss of human control capacities on the endangered global resource systems. If this trespassing is caused by humans it is a realistic that the geologic area of the Holocene already passed into a new are to be labelled as the Anthropocene (Jan Zalasiewicz et al. 2012). Considering the current geologic area as Anthropocene, implies to admit the outstanding human responsibility for a resilient future of the earth system.

Since the early 1990s, the economic sciences debated on mainly two alternatives for optimal policies for the stabilisation of the climate processes: pricing the greenhouse gas emission via carbon taxes, or—alternatively—constraining the eligible quantities of greenhouse gas emissions. The latter option presupposes that the markets would find the appropriate prices for the emission certificates, derived from such greenhouse gas emission control rates (William D. Nordhaus 1994). Both policy strategies are intended to internalise the "greatest externality ever" (Hans-Werner Sinn 2007) by giving greenhouse gas emissions a price in order to reduce the demand for it and to cover the social costs of such global overuse of the atmosphere. Despite some successes (Mikael S. Andersen 2010) only a part of the EU countries introduced carbon taxes while the EU as a whole opted for an Emission Trading System which is currently under reform after delivering some disappointing results in the first two phases (European Commission 2013). Nevertheless, the problem appears more profound than simply to choose between two different ways of internalising the externalities of global market activities by international agreements or optimising emission trading schemes.

What if the United Nations takes the already agreed 2°C goals seriously as limit for acceptable global warming in the 21st century? For meeting this target the world would have to reduce its CO2 emissions by at least 41 % up to 72 % in the four decades between 2010 and 2050 (IPCC 2014). Keeping in line with this goal would imply an annual reduction of CO2 emissions of at least 1.1 % per year in world average until 2050. But, hoping this reduction could be led by a significant reduction of carbon energy intensity alone is misleading, as the experience shows: The carbon intensity of economic growth, measured as CO2 emissions per $1 GDP decreased only by 1.2 percent per year for an average for the two decades from 1990 to 2010 (UN 2014). Thus, by this strategy alone, the average country would have had a maximum eligible growth corridor of 0.1 % per year (1.2 % annual reduction of carbon intensity minus 1.1 percent of annual CO2 reduction). Given this low average speed of carbon intensity reduction would be representative for all countries—and lasts until 2050—there would be no room for GDP growth on the global scale.

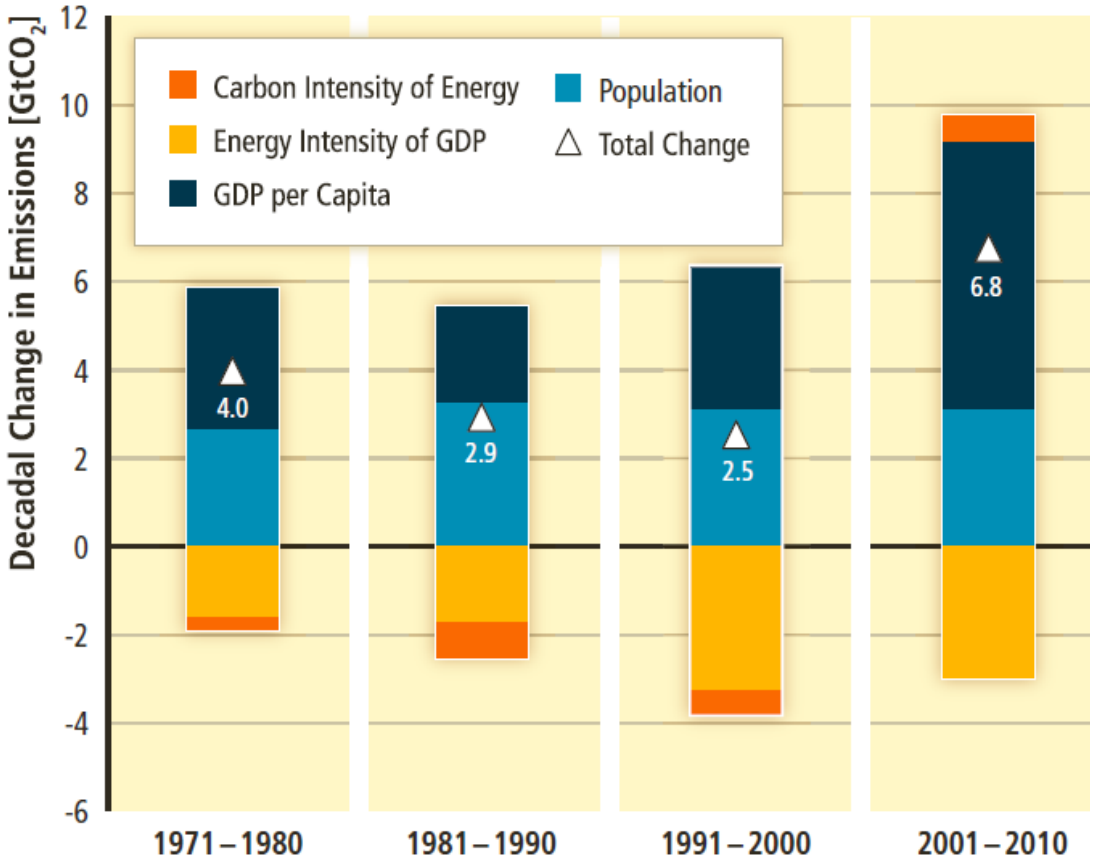

Figure 1: Decomposition of the Change in Total Global CO2 Emissions from Fossil Fuel Combustion

Source: IPCC (2014, 9)

Nevertheless, as Figure 1 reveals, the real development is even worse: the decreasing energy intensity of income per capita alone could have contributed significantly to the reduction of CO2 emissions over the last four decades—if neither world population nor world GDP would have grown during the same time. Obviously, this was not the case: growing world population induced a decadal CO2 emission increase of around three Giga tons CO2 since the 1980s. Moreover, the CO2 emission growth induced by GDP growth per capita even accelerated, particularly in the first decade of the 21st century. In this time period the high growth rates of world GDP coincide with an accelerated growth of world CO2 emissions up to a maximum of additional 6.8 Gt, and with a sudden increase of carbon intensity of energy after three decades of decrease. There is obviously no turnaround in direction of shrinking global CO2 emission in sight, despite the 1997 Kyoto protocol and a sequence of high-ranking international climate conferences since the early 1990s.

A decoupling strategy, aimed at decreasing the energy intensity of GDP is widely considered as the most helpful factor for a transition towards a climate neutral regime. However, this kind of strategy delivers far from enough reductions of greenhouse gases. The slowest factor for climate relief is probably population growth, because this variable entails long time lags and could hardly be influenced by demographic policies, at least in the time period available to stop global warming. Therefore, climate policies could focus on per capita income growth and the growth of carbon intensity of energy. However, the latter, carbon intensity, is probably a variable dependent on the former, the growth rates of GDP per capita. In the decade with lowest growth rates of

GDP (the 1980s), the most significant decline of carbon intensity was observed. In contrast, the extraordinary high GDP per capita growth rates of the 2000s coincided with the strongest increase of carbon intensity in the same decade.

This is bad news for the hope that high GDP growth rates of the emerging markets in Asia and elsewhere would automatically induce a kind of ecological leapfrogging by the high investment rates of these countries. Despite the significant investments in renewable energy technologies, the share of investments in conventional fossil fuel consuming technologies appeared to be even higher there. Thus, the global GDP growth rate remains without doubt the critical variable for reducing emissions of CO2 and other greenhouse gases to a level consistent with the internationally agreed 2°C ceiling of global warming in the 21st century. The same is probably true as well for the overall planetary boundaries, like biodiversity loss, caused by human economic activities (Rockström et al. 2009). To conclude: market income growth, measured as GDP per capita, is the most severe risk for the resilience of key global resource systems.

So the central question arises: are the problems of global warming and of violating the overall planetary boundaries unsolvable social dilemmas in economic reality? Not at all, if the economic sciences would shift their focus from internalising the externalities towards the search for a more comprehensive economic approach regarding the governance of commons and the resilience of resource systems. Thus, new institutional arrangements beyond the simple market-government dichotomy are needed to enhance human prosperity without overstretching earth's capacities to recover themselves. Such a transition towards a regime of strong sustainability presupposes the transition of the economic system towards a higher degree of institutional diversity. This would enable experiments with new forms of economic governance, which could be independent of the ever-growing consumption of natural resources.

So there are strong reasons to look at such processes of institutional diversification and change, taking the multi-level character of governance of the global commons into account at the same time: "[…] while many of the effects of climate change are global, the causes of climate change are the actions undertaken by the individuals, families, firms, and actors at a much smaller scale. [...] To solve climate change in the long run, the day-to-day activities of individuals, families, firms, communities, and governments at multiple levels – particularly those in the more developed world – will need to change substantially" (Elinor Ostrom 2009, 4). For research strategies regarding such social dilemmas, this entails a significant shift of perspective towards the behaviour of individuals and groups managing critical resource systems on a local scale. For climate neutral—as well as ecologic resilience regarding—policies the option to choose a bottom-up approach would skip any excuse for persistent inaction: "[...] continuing to wait may defeat the possibilities of significant adaptions and mitigations in time to prevent tragic disasters. [...] without numerous innovative technological and institutional efforts at multiple scales, we may not even begin to learn which combined sets of actions are the most effective in reducing the long-term threat of massive climate change" (Ostrom 2009, 4). Thus, for solving social dilemmas at the global level, it is crucial to understand and to change the determinants of human economic behaviour at the local level in its relation to the socio-ecological context first.

1.2 New seeds of sustainable prosperity

At the very heart of our understanding whether our marked-based economies have to grow, notwithstanding the resilience of ecological resource systems, is the concept of capital. It entails a bunch of important questions, viz.: is it sensible to assume a general ability to substitute natural capital by human-made capital or is such substitutability constrained by planetary boundaries as sketched above? Is economic capital by definition forced to grow—as it is expressed with the concept of capital accumulation? Moreover, what is actually assumed as growing when economists are talking about capital accumulation?

The latter question was already put by Gabriel Tarde in his “Psychologie économique” of 1902:

> “In my view, there are two elements to be distinguished in the notion of capital: first, essential, necessary capital: that is, all of the ruling inventions, the primary sources of all current wealth; second, auxiliary, more or less useful capital: the products which, born from these inventions, help, through the means of these new services, to create other products. These two elements are different in more or less the same way as, in a plant seed, the germ is different from those little supplies of nutrients which envelope it and which we call cotyledons. Cotyledons are not indispensable; there are plants that reproduce without them. They are very useful. The difficulty is not in noticing them, when the seed is opened, for they are relatively large. The tiny germ is hidden by them.” (Tarde 1902, 229, as translated in Bruno Latour and Vincent A. Lépinay 2009, 49–50).

Tarde defines *necessary capital* as the capability to innovate processes as well as products—already before Joseph A. Schumpeter published his “Theory of Economic Development” in 1911. Like a *germ,* it is source of all current wealth. In contrast to that, Tarde compares *auxiliary capital* with cotyledons: these are useful suppliers of nutrients for seeds, but they are not necessary to reproduce these seeds. Because cotyledons are relatively large compared to germs, the germs are often hidden by them. These metaphor ends up in a comparison between economists and botanists: “The economists who saw capital as solely in the saving and accumulation of earlier products are like botanists who would view a seed as being entirely made up of cotyledons.” (Tarde 1902, 229, as translated in Latour and Lépinay 2009, 50)

As in the days of Tarde, most of the economists today are still focussing on the “more of the same” concept of capital as wealth enhancing approach, still mixing up saving and accumulation of earlier products with real generation of wealth. In contrast to that, a modern concept of capital should start with Tarde’s idea of emphasising the capability to innovate and to learn as its core characteristics and to discard income growth as its key property. This could free the mind of economists and enable them to search for new institutional arrangements.

What is needed is an economic system that would be able to cope with growth rates of market income, which are safeguarding the resilience of local ecologic resource systems as well as the global ecological system within their planetary boundaries. It is obvious that there exist neither ready-made blueprints nor panaceas for such a sustainable economic system. If anything, market income growth appears to be deeply entrenched into the contemporary market based economies. Thomas Piketty (2014) observes a strong long-term tendency for the rate of return on capital to be even greater than the rate of overall economic growth. This is feasible only at cost of labour income and results in a concentration of wealth—as well of economic and political power—in the hands of a few. Otherwise, modern welfare states are heavily depending on taxing value added and market incomes for financing their comprehensive tasks in stabilising the economy and for compensating the majority of the electorate for the most severe consequences of unequal distribution of wealth and income. Finally yet importantly are modern labour markets dependent on economic growth for keeping employment rates stable or even to increase them. Thus, this profound entrenchment of the pursuit for economic growth in the institutional setting of current market economies is not easily to be resolved. However, there appears to be no other way to keep human development inside the crash barriers of the planetary boundaries.

Therefore, we face the task to find new institutional arrangements ensuring human well-being and the resilience of ecological resource-systems at the same time. Thus, the question arises, where to find such new institutional arrangements - which would follow a strategy generating prosperity without growth (Peter A. Victor 2008; Tim Jackson 2009) or “Green Agrowth” (Jeroen van den Bergh and Giorgios Kallis 2012; Jeroen van den Bergh 2015)? It is extremely likely that neither the profit-driven business sector nor the tax revenue dependent government sector would emerge as home of such growth-ignoring new institutions, even if it were possible to shift

governance revenues towards a more tax independent financing by profits of state and private enterprises. If this is true, it makes sense to direct the focus of inquiry towards a third sector of not-for-profit economic activities born in the civil society (Adalbert Evers and Jean-Louis Laville 2004; Frank Moulaert and Oana Ailenei 2005; Stephen P. Osborne 2008). This third sector is probably the home of new institutional arrangements like cooperatives, multi-stakeholder-constructions, local-regional partnerships, and networks. It can provide an organisational frame for sustainable development on the local and regional level. These arrangements could also be considered as laboratories for new forms of a more sustainable way to produce and consume and to coordinate these activities beyond the traditional market-government dichotomy. The perspective taken in this research tries to develop a third option *beyond* this dichotomy and thus, open up the discursive closure that only allows for the two poles of resource governance in society.

Unfortunately, this third sector is not well defined. At least there exists no comparable international statistics for the exact scope of this sector—simply because not being in the central focus of interest of public policy and economic sciences, yet. Furthermore, because the third sector is somehow a residual of the formal market and government driven economies, it resembles rather heterogeneous forms of economic activities, like the cooperative movement, the social and solidarity economy (Moulaert and Ailenei 2005; Jenna Allard, Carl Davidson, and Julie Matthaei 2008; Emily Kawano, Thomas N. Masterson, and Jonathan Teller-Elsberg 2009; Bénédicte Fortenau et al. 2010; RIPESS 2013; UNRISD 2013). There are also some overlaps with definitions of the charity and voluntary sectors as used in the UK or US, and with the more radical concept of a community economy (J. K. Gibson-Graham 1996). Thus, to avoid premature reduction and to capture as many aspects as possible we define third sector as the sector of not-for-profit enterprises or the civil society sector, located beyond the business and government sector.

This civil society sector embraces a multitude of initiatives, institutional arrangements, and experiments with the microeconomics of a growth-independent economy. To name a few: an exhibition in the Architekturzentrum Wien in 2012 showed impressively the long history of hands-on urbanism like community gardening and urban agriculture. These initiatives served not only as reactions to crisis situations, avoiding famine, and solving supply bottlenecks in urban areas, but as well as experimental laboratories for an alternative economy on urban green spaces (Elke Krasny 2012). Another important civil society movement is formed by the renewable energy source cooperatives, which try to intervene in transition of the European energy systems towards a low or even zero carbon regime. They organise on local, national, and on European level as well (REScoop.EU 2013). The European civil society campaign for a “Right to Water” collected 1,884,790 signatures in the EU countries for the first successful European Citizen Initiative urging that water supply and management of water resources should not be subject to internal market rules and that water services are excluded form liberalisation (Louisa Parks 2014). Another movement which regained momentum as opposition to the neoliberal way of urbanism is the “Right to the city” (Henri Lefebvre 1990, 1996; Mark Purcell 2003; Purcell 2003; David Harvey 2008, 2012). Finally all of these movements could agree with the insistence that the key resource systems as green spaces, energy, climate, and water should be regarded as commons (Ostrom 1990; The Ecologist 1994; Ostrom 2009; David Bollier and Silke Helfrich 2012; Silke Helfrich 2012), and not as traded goods.

1.3 The European cities of tomorrow: an urban commons focus

In the late 1990s the European Union started a process to formulate an own European urban agenda. In the meantime, this process reached the stage of “Cities of Tomorrow reflection process”, embracing ten main urban challenges in four categories: smart growth, green growth, inclusive growth, and transversal challenges. Summarising the European Commission (2014a): *smart growth* deals with an envisaged transition towards a knowledge society and the develop-

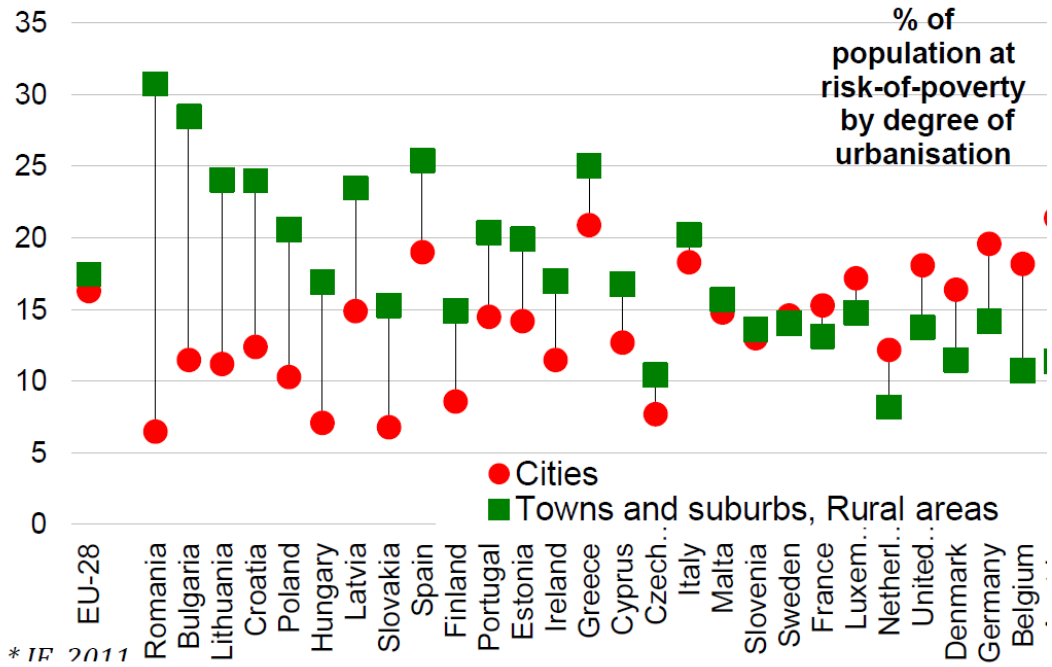

Figure 2: At-risk-of-poverty rate by degree of urbanisation, 2012

Source: European Commission (2014a, 2)

ment of an economic and financial city resilience; *inclusive growth* aims to counter "social/spatial segregation/polarisation", integrating newcomers like migrants, and the reaction to demographic challenges. *Transversal challenges* focus on the cities' attractiveness and the territorial coherence and cohesion; and *green growth challenges* are about achieving greater energy and resource efficiency, sustainable management of natural resources like water, waste, air, soil, and land. In addition, it reflects the acceleration of the transition towards a sustainable city, "given the inherent inertia of infrastructure provision", like housing, transport, water, and energy systems (European Commission 2014a).

The following report presents research results on such "green growth challenges," particularly on the management of natural resources like water, soil and land, as well on the transition of the water and energy system towards a regime of strong sustainability. That is not because of an obviously misleading assumption that social inclusion would not interfere with sustainable management of natural resources and infrastructure provision. However, it is because the focus of this inquiry is laid on the potential of new institutional arrangements for the socio-ecological transition of urban common-pool resources like green spaces, water, and energy.

"*Cities are where the opportunities and threats to sustainable development come together*" (European Commission 2014b, 1). This quote nicely summarises why the focus of this research is laid on the role of cities in the European socio-ecological transition towards strong sustainability, in short the European sustainability transition. Cities are defined according to European conventions as urban centres of 50,000 inhabitants or more, while towns and suburbs have the majority of their population in an urban cluster of 5,000 up to 49,999 inhabitants, while rural areas are defined as the residual of these two categories. According to this classification more than 200 million people are living in a total of 811 European cities, around 159 million in towns and suburbs, and a remainder of 154 million in rural area (European Commission 2014a, 11).

Figure 2 reveals an interesting aspect of European urbanisation processes. While the EU-28 average shows only insignificant differences between the at-risk-of-poverty rate in cities on the

one side and towns, suburbs, and rural areas on the other side, there are huge differences between the more and less advanced EU countries. In more advanced EU countries like Sweden, France, Luxemburg, The Netherlands, United Kingdom, Denmark, Germany, Belgium, and Austria the poor are more likely living in the cities than in more dispersed or rural areas. The picture in the remaining EU countries—most extreme in EU low income countries like Bulgaria and Rumania—is the direct opposite: the risk of poverty here is significantly higher in rural areas, towns and suburbs than in cities. This could be seen as a relevant hint at the role of urbanisation processes on the one hand and at the role of the agricultural sector on the other hand as important elements of the specific national welfare regimes.

What is at stake here is the role of common-pool resources in the urban sustainability transition. We selected two natural resource systems and one hybrid resource system for our inquiry into the role of the third sector in this transition, understood here as transition of socio-ecological systems (Ralf Schüle 2007; Michael McGinnis and Elinor Ostrom 2010; Oran R. Young 2012). In this kind of transitions, social heterogeneity and inequality come in again. If only a few participants benefit, it is probably difficult to come to an agreement on the contribution of such key resources to the overall provision of the population. This is particular true, if no possibility exists to agree on an equal distribution of costs and benefits. Heterogeneity in the access to and dependence on common-pool resources expresses differences in the distribution of power resources. Small sub-groups of users could try to capture bigger parts of the resources and to block the access for other members of the community (Poteete, Janssen, and Ostrom 2010, 231). Mancur Olson (2000) developed for such kind of *rent-seeking behaviour* the term of *stationary bandits.* Such stationary bandits might be very powerful in influencing the direction and speed of socio-ecological transitions and even in the position to block them totally. Therefore, the focus on social inequality and heterogeneity has to play an essential role for any relevant transition research.

The access to clean drinking water plays a key role in any human settlement decisions, especially regarding urbanisation processes (William A. Blomquist, Edella Schlager, and Tanya Heikkila 2004; Audun Sandberg 2008; Edella Schlager and William A. Blomquist 2008; Gabriel Weber and Ignasi Puig-Ventosa 2013; European Environment Agency 2014; Parks 2014). Water basins are very early topics for the research on the boundaries and sustainability of common-pool resources as well as on institutional change and institutional failure regarding their governance (Ostrom 1990). Only in some research on common-pool resources water is considered as urban commons yet (Geeta Lakshmi 2011). Despite this, at least since the European Citizen Initiative, water could also be considered an urban common-pool resource (Elinor Ostrom, Roger B. Parks, and Gordon P. Whitaker (1978); European Environment Agency 2014; Parks 2014). The rights on water are frequently closely connected with the property rights on land and soil. Private property rights on land entail repeatedly the right to benefit from the water sources on this land as well. On the other hand, there are rapid and complex urbanisation processes in the most cases reliant on the public infrastructures for water provision, in this sense they are really services of general economic interest.

Green spaces appear to be a paradox in urban areas, as the degree of urbanisation is regularly measured in terms of density, i. e. the population living on a defined area. In this sense, places appear to be more urbanised if they possess less green spaces. However, this is only part of the story: one of the first demands of the emerging civil society in Europe was to open up the formerly closed feudal parks for the public and the idea of urban allotment gardens arose out of serious food supply problems during the rapid urbanisation processes and war times in Europe and the US. Nowadays we find a worldwide movement for urban agriculture, in more and less advanced countries all the like (Krasny 2012; Stephan Barthel, John Parker, and Henrik Ernstson 2013).

Considering the urban energy systems, we assume that the de-carbonisation of the energy system has significant spatial implications. Such kind of energy transition in urban areas, decentral-

ising the production of renewable energy as well, could re-unite the local production and consumption of electric power. The technological shift from fossil fuels to renewable energies provides a new opportunity for such a spatial re-coupling of energy transformation and energy consumption. If the share of renewable energy harvesting in overall energy provision increases, and if the chosen path of renewable energy technology development is in favour of miniaturised and decentralised energy generation, the ratio of energy transformation to its total final consumption inside the city limits should increase. As a result, the boundaries of the energy system on the one hand and the governance systems on the other hand could be more equivalent on the local level and enhance the involvement of urban and regional actors in the governance of the energy system.

Furthermore, such a spatial re-coupling of energy transformation and energy consumption on the local level could be a chance to increase the role of non-profit activities in the third sector. If new actors would appear in this civil society sector, this could be seen as a Great Transformation underway (Karl Polanyi 1944; WBGU 2011).

Therefore, we hypothesise: favourable institutional conditions, such as decision-making autonomy and social equality, which allow and support new institutional arrangements, make such self-organised and co-operative forms of management of common pool resources in the urban resource systems more likely. This report explores these conditions systematically in the context of socio-ecological transitions with a special focus on the overarching research question: what is the transformative role of institutional diversification and innovation in the governance of core urban common pool resources? This research question also implies the aim to find out how the governance of common pool resources in cities could be improved to better contribute to a transition to sustainable development.

2. Patterns of Change: A General Model of Socio-Ecological Transition

2.1 An institutional focus for transition analysis

In this chapter a new approach for sustainability transition analysis will be developed. In the entire report, the term 'transition' will be used in the sense of 'sustainability transition', if not specified otherwise. Sustainability transition is the pursued process of an accelerated changeover towards strong sustainability and therefore goes beyond incremental sustainable development. The term analysis stresses the intention to avoid an approach, which would be normative and managerial beforehand. The aim is to develop an approach enabling to analyse and understand the normative dynamics in times of transition in which direction whatever. This aim is based on several assumptions. First, it makes sense to distinguish between the concepts of transition and transformation: transitions may happen on a well-defined institutional basis, while transformations entail changes of the institutional basis itself. Therefore, sustainability transitions may entail shifts from one regime to another—without reflecting the underlying institutional setting. For example, the term "green economy" frequently refers to a green market economy without questioning the superiority of market instruments for such greening of the economy. This might be a shortsighted view if these market instruments would not abandon striving for economic growth and respect the planetary boundaries of the Anthropocene instead. Secondly, a broader approach to sustainability transitions is needed to bring the possible institutional change itself into the focus of inquiry and the resource systems which are key for such socio-ecological transitions towards strong sustainability as well. The transitions of the individual resource systems will have spillover effects; we therefore as well argue for 'the socio-ecological transition', since the change of a single part affects the entire system. Thus, a framework is required, which allows two things: (1) to treat social and ecological systems in almost equal depth, (2) to analyse the feedbacks between the resource conditions and the rules determining the harvesting rates of the resource. Aiming to identify the institutional changes required for improving the conditions of a more sustainable way to produce and consume directs the analytical focus inevitably on the determinants of these harvesting rules. These rules are the key interfaces between societal and ecological system. Thus, it is crucial to compare the ecological impact of the rule sets available and to analyse the factors determining the evolution of these rule sets of human resource governance at once.

For the development of such a framework that is capable to assess the transformative potential of diverse institutional settings concerning their sustainability characteristics, an outstanding starting point exists: this is the *tragedy of the commons*—telling a widespread story about the overgrazing of pastures jointly belonging to the inhabitants of a village. It raises the question whether human communities are able to manage such territories jointly in a way that there would be enough fodder for their cattle in the future as well. Here we have as a metaphor the key problem of global sustainability: How to organise our economic activities in a way compliant with the future needs of the human community, i. e. respecting the planetary boundaries and the resilience of ecological systems surrounding us. To solve such social dilemmas by choosing the appropriate institutional settings is obviously crucial for the sustainable governance of such common-pool resources, like pastures, lakes, groundwater basins, fisheries, forests and other ecological resource systems. Therefore, we proceed in sketching the consequences of introducing the concept of common-pool resources in a typology of goods: this step implies the diversification of the institutional settings available for the sustainable governance of resources. If institutional settings diversify, they could be re-selected in a way, which improves the sustainability of resource governance significantly. This leads us to the question what innovative role could be

assigned to self-organised forms of resource governance by civil sector actors on the local level.

2.1.1 Self-organised governance of common-pool resources

In standard textbooks for a long time it was taken for granted what Garret Hardin proclaimed in his seminal publication of 1968: “Freedom in a commons brings ruin to all” (Garrett Hardin 1968, 1244). Thus, selling these commons as private property or keeping them in public property, but allocate the right to use them, appeared to him as the only reasonable solution to avoid such ruin. That is what Harding labelled—with reference to William Forster Lloyd 1833—as “tragedy of the commons”: The inter-temporal problem of securing for the future the fodder of the cattle on common rural ground was transferred by both of them to the feeding of humans in face of an expected overpopulation. In the meantime, modern game theory has well explored that this class of social dilemmas builds on further assumptions, viz. (1) complete and common information, (2) independent and simultaneous decisions, (3) no communication, and (4) no central authority. “When these assumptions are made for a game that is not repeated, or is finitely repeated, the theoretical prediction derived from non-cooperative game theory is unambiguous - zero cooperation” (Ostrom 2009, 6).

In contrast to this, many field studies have found that “local groups of resource users […] have managed to create viable institutional arrangements for coping with common-pool resource problems” (Elinor Ostrom 2005, 221). Thus, it is very promising to explore such self-organised resource governance systems at the local level. A special focus on the characteristics of these institutional arrangements could help to understand better their role in safeguarding the resilience of the ecological resource system under scrutiny. In a next step, one could try to apply these hopefully new insights to scale up to superior governance levels.

Institutions are defined in this study as „the prescriptions that humans use to organize all forms of repetitive and structured interactions [...] at all scales” (Ostrom 2005, 3). From this point of view institutions are the “underlying rules of the game” (Douglass C. North 1990, 4–5). Regarding self-organisation, it makes sense to refer to the following description as starting point: “Self-organized resource-governance systems […] may be special districts, private associations, or parts of a local government. These are nested in several levels of general purpose governments that also provide civil, equity, as well as criminal courts” (Ostrom 2005, 283). Such resource-governance systems may be run by civil cooperatives in the energy and housing sectors, or by community groups caring for local green spaces, or non-governmental organisation intervening into the management of water or other ecological resource systems, or non-profit organisations managing urban farming initiatives.

Here an important distinction between participation and self-organisation has to be made, according to the locus of initiative-taking. In the case of participation, initiative-taking exclusively lies with public authorities, whereas in the case of self-organisation it rests with “members of civic society or business, indifferent to public policy objectives” (Beitske Boostra and Luuk Boelens 2011, 109). In contrast to Boostra and Boelens (2011), independence of public policy objectives is taken here as the better wording (compared to indifference): independence of civil society actors could be supportive, indifferent, or conflictive regarding public policy objectives and be an important source for the revision of such objectives.

Participation can precede self-organisation, yet it is not a prerequisite for it, but self-organisation can emerge independently of existing participation options. According to another definition, self-organisation “comprises all forms of self-organized measures that do not necessarily have to emerge out of a participatory development process but that can be initiated from the beginning by citizens” (Michael T. Wright, Hella von Unger, and Martina Block 2010, 45, own translation). Similarly, it designates “initiatives that originate in civil society from autonomous community-based networks of citizens, who are part of the urban system but independent of government

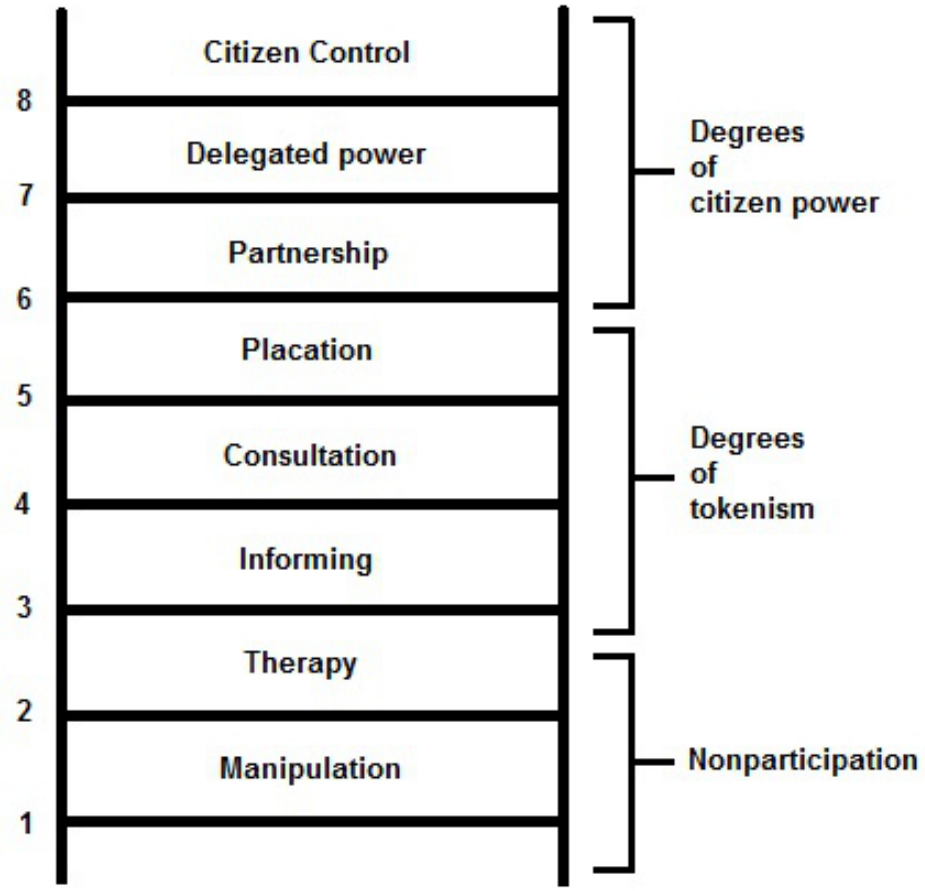

Figure 3: Eight Rungs on a Ladder of Citizen Participation
Source: Sherry R. Arnstein (1969, 217)

procedures" (Boostra and Boelens 2011, 113). Whereas participation "refers to goals set by government bodies on which citizens can exert influence through procedures set by these government regimes themselves […], self-organisation stands for the actual motives, networks, communities, processes and objectives of citizens themselves, at least initially independent of government policies and detached from participatory planning procedures" (Boostra and Boelens 2011, 109). Therefore, in contrast to participation, self-organisation can also emerge without intervention of the local government and even despite of it—for example out of missing citizen participation—or it can deliberately be started by citizens as protest movement against political or administrative action. Self-organisation does not necessarily have to follow the "rules of the game", viz. be organised via established formal institutions, but activities can happen in a more spontaneous, self-managed way.

Another perspective might be introduced by the seminal Ladder of Citizen Participation of Arnstein (1969), as presented Figure 3. It is interesting how Sherry Arnstein divided the degrees of citizen participation into three major categories. *Nonparticipation*, characterised by manipulation and therapy, where the citizens appear as objects of public administrations, *tokenism*, where the citizens are simply persuaded as if they would participate for real, and *citizen power,* where all citizens have a real voice in collective decision-making, independent of their socio-economic power resources. "At the topmost rungs, (7) *Delegated Power* and (8) *Citizen Control,* have-not citizens obtain the majority of decision-making seats, or full managerial power" (Sherry R. Arnstein 1969, 217). In 1969, as Sherry Arnstein published her article, as "have-not citizens" she

Table 1: IAP2/TEPSIE Spectrum of Public Participation

	Inform	Consult	Involve	Collaborate	Empower
Public participation goal	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions	To obtain public feedback on analysis, alternatives and/or decisions	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public

Source: Anna Davies and Julie Simon (2013, 5), following International Association for Public Participation

had in mind people without significant assets that should be empowered to get a voice in community governance, which they did not have before. In current times, and as well as in this research, it might be an issue, whether delegated power and citizen control are really a sequence of increasing citizen power, or equal valid alternatives of it. This assumption would transform the Arnstein ladder into a "Y of citizen control". The Arnstein Ladder appears in the literature on public participation in many variations, extended or abridged, like the one by IAP2 and the TEPSIE project (Table 1). Maybe the newer spectra of public participation are not judgemental as the seminal Arnstein Ladder, but they miss her reasonable distinction between citizen control and delegated power.

2.1.2 Goods and commons – the difference

Commons are no ordinary goods, as in the imagination of neoclassical economics:

> "Define a good as an object or service of which the consumer would choose to have more. Then the collection of goods he chooses when he has more money to spend […] must represent more goods than that he chooses when he has less money to spend […]. [...] Hence we derive both parts of the law of demand from the definition of goods. The hypothesis from which we have deduced it is that goods are goods" (Harry Johnson 1958, 149).

From this neoclassical perspective the resilience of ecological systems, like global climate, groundwater basins, lakes, fisheries, forests, etc. is no good in the sense that people would buy more if they could afford to do so. Resilience defines the common wealth in the sense that human life depends on the mere existence and functioning of these ecological systems, and not of its growth. Humans have to understand how they could maintain the resilience of crucial ecosystems and to avoid their collapse. Thus, there is no choice to have simply more of the same.

Commons are neither public goods nor "collective consumption goods […] which all enjoy in common […] that each individual's consumption of such a good leads to no subtraction from any other individual's consumption of that good" (Paul A. Samuelson 1954, 387). In contrast to public goods, such common-pool resources are characterised by a high degree of subtractability, which may lead even towards a collapse of the overall ecological system. In contrast to private goods, it is highly difficult to exclude potential beneficiaries from using common-pool resources.

Unfolding the conventional binary terminology of goods ("private vs. public") towards a four-type scheme relies on the assumption that the institutional setting for the governance of commons is more diverse as the conventionally supposed delineation between the boundaries of market and

Table 2: Four types of goods

		Subtractability of Use	
		High	**Low**
Difficulty of Excluding Potential Beneficiaries	**High**	*Common-pool resources*: groundwater basins, lakes, irrigation systems, fisheries, forests, etc.	*Public goods*: peace and security of a community, national defense, knowledge, fire protection, weather forecasts, etc.
	Low	*Private goods*: food, clothing, automobiles, etc.	*Toll goods*: theaters, private clubs, daycare centers

Source: Elinor Ostrom (2005, 24)

government sector. Put in another way: *is there a case for self-organised governance of common-pool resources beyond market and government structures?*

2.2 General model of socio-ecological transition

2.2.1 An institutional perspective on socio-ecological transitions

The term socio-ecological transition concerns the shift of socio-ecological systems from one state to another. This implies that transitions are always directed *towards* something like a new equilibrium, a new regime, or a certain benchmark like 'strong sustainability'. The term transition expresses a certain degree of urgency as well. Goal-directedness and urgency appear to predestine transitions as a subject of management, i. e. transition management, solving technical problems of resource efficiency and so on. However, this could be a misleading idea, if transitions entail the transformation of the overall system, including the emergence of new groups of actors. In his seminal book on *The Great Transformation* Karl Polanyi hints at "those critical phases of history, when a civilization has broken down or is passing through a transformation, when as a rule new classes are formed, sometimes within the briefest space of time, out of the ruins of older classes, or even out of extraneous elements like foreign adventurers or outcasts" (Polanyi 1944, 155). Under such circumstances, it might be difficult to find some transition managers, accepted and trusted by these new actors. It appears to be more likely that such new social groups emerge as change agents of a Great Transformation (WBGU 2011).

Transition management is one of the most important concepts and frameworks to analyse and research transitions towards sustainability. Its prominence in transitional research is undoubtable. The approach of transition *management* is the governance of transitions, to provide guidance in a "radical transformation towards a sustainable society" (John Grin, Jan Rotmans, and Johan Schot 2010, 1). Since this "radical" rupture can issue uncertainty and uncontrollable problems, the transformation is met with governance knowledge. "Transition management […] is the attempt to influence the societal system into a more sustainable direction, ultimately resolving the persistent problem(s) involved" (Grin, Rotmans, and Schot 2010, 108). The goal is to provide an analytical framework, elaborated by "competent practitioners and researchers together" (Jan Rotmans, Derk Loorbach, and René Kemp 2007, 5) to initiate transitional changes in societal structures, cultures, and practices through means of technological and social innovations (Grin, Rotmans, and Schot 2010, 109–13).

Yet, there are certain critiques that transition management has to face and that we indirectly seek as a demarcation to our own demands to a theoretical framework. Criticising transition management needs to account for several levels that refer to its perspective, its approach, and its implications. To begin with the latter, the term '*management*' already implies a narrow and straight logic to grapple with transitions towards sustainability. *Management* suggests a view of transition as something that is *manage*-able, which means it is steerable. At the same moment it finds itself in the common (modern) believe that management is a universal knowledge and logic of steering, organising, and controlling. Against management itself, a more and more noticeable opposition is forming since the late 1980s and early 1990s, with *Critical Management Studies* being one of the more prominent representatives (cf. Yannick Kalff 2015 forthcoming). Not only sociologist feel a slight unease that a rather technocratic, instrumental form of knowledge dominates the control and organisation of nearly all societal domains (Mats Alvesson and Hugh Willmott 1992, 1996; Martin Parker 2002; Martin Parker, Valérie Fournier, and Patrick Reedy 2007). In short, the critique of management reflects the unilateral focus on instrumental knowledge and its applicability on any given situation. Thus, it is a neutral tool in a modern fashioned way of means-to-ends relations. Ambiguity and ambivalence are neglected and the ability to dominate nature, control human beings, and their organisations, is taken for granted (Parker 2002, 3–5; Elisabeth Shove and Gordon Walker 2007, 765). The critique in the cited work does not oppose management fundamentally but in a too narrow form: that is the most common interpretation just stated (Alvesson and Willmott 1996, 29–36). Its roots in modern traditions of accountability, predictability, and controllability seem to be reminiscent of the dominance of humanity over nature that contradicts the 'postmodern' ambiguity and ambivalence of the world. At this point transition management exceeds classic management definitions and is aware of its position in highly uncertain contexts with the need "for a new breed of managers schooled in the arts of transition" (Shove and Walker 2007, 766–67).

This directly leads to a critique of transition management's approach, which is in the term of trained and informed personnel an exclusive and elitist undertaking with a 'classic' managerial caste—as well as these competent and capable experts (Rotmans, Loorbach, and Kemp 2007, 5). While this can be a politically motivated critique, it also points out that complex transition over long time spans produce effects and outcomes that only different actors from different settings can assess or influence. This is also influenced by a general unease concerning the role of individual agency in transition processes (Felix Rauschmayer, Tom Bauler, and Niko Schäpke 2015, 214). The influence in processes is not clearly approached to integrate them into the picture, which at least suggests that they are underrepresented—or at worst are not capable at all to have agency. A rather scientific critique reflects the case study approach of unique technological innovations. Their trajectories usually represent 'success stories'. What becomes a case and what is left out of the picture is deeply entangled with its underlying story in socio-ecological transition (Shove and Walker 2007, 767).

The third critique reflects the inherent perspective and with it the heuristics, which are applied to the research subject. Transition management takes a common interest in transitional motives for granted. In a sense, transitions are considered conflict free without any contested or debated visions or ideas—especially contradicting movements are left out of the picture. Rauschmayer, Bauler, and Schäpke (2015, 214) reflect this aspect as a general "naivety to issues of power" that emerges from the three distinct levels and their institutional actors. For example, technological lock-ins or path dependencies are always tied to specific interests and power positions that are sincere in maintaining the status quo. Above that a one-dimensional interpretation of innovation, which is synonym to progress, blurs the perspective of Transition Management. A lot of discontent with this connotation of innovation refers to the underlying model of change in transition management, the multilevel perspective (MLP) that leaves other models of change out of the picture, especially those with a more conflict driven approach. Although there is a distinct attempt to map self-organisation (Derk Loorbach 2007, 56), it remains an evolutionary perspective that is partly blind for political and discursive means of change, e. g. by conflict. This con-

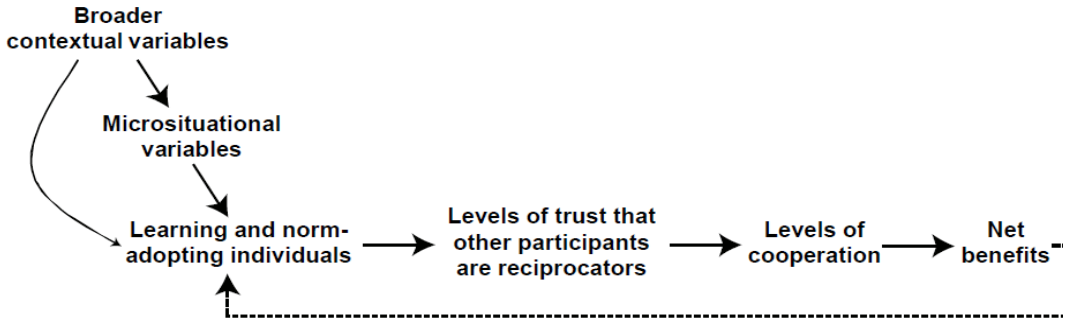

Figure 4: Micro-situational and broader context variables of social dilemmas affect the levels of trust and cooperation

Source: Amy R. Poteete, Marco A. Janssen, and Elinor Ostrom (2010, 227); Ostrom (2009)

tradicts the "radical" of this transformation, since it is rather a mode of incremental change. Either way, the conceptualisation of system change by transitions is deeply connected to actors and specific forms of knowledge that are necessary to have insight into the system, the transition, and the targets. While transition management can lend decisive insights into transitional processes, the other two forms of knowledge are underrepresented (Rauschmayer, Bauler, and Schäpke 2015).

In short: several aspects make transition management a limited approach for urban socio-ecological transitions. Above all, transition management cannot inquire the involvement of an active civil society, the engagement in productive conflict, in discourse, and participation, since it is not considered a constituting force. Especially in these fields, a simple instrumental means-to-ends rationality of management leaves out the dynamics of *movements.*

Thus, we develop here an extended socio-ecological system (SES) approach to the ongoing sustainability debate on sustainability transition theory, by focussing on the rules-in-use, which structure the interactions of the resource and the governance system. This appears to be the most appropriate way to capture the dynamic factors driving such transitions.

The SES framework as presented in Poteete, Janssen, and Ostrom (2010) can be seen as an advancement of the Institutional Analysis and Development (IAD) framework. According to Elinor Ostrom and Charlotte Hess (2007, 41) the IAD framework "[…] is a diagnostic tool that can be used to investigate any broad subject where humans repeatedly interact within rules and norms that guide their choice of strategies and behaviors". It focuses on institutions that are guiding social interaction between actors that are negotiating either on markets, by state laws or are self-organising their interactions (Ostrom 1990). On a bottom level, our interest is focussed on the functioning of institutional settings in certain governance paradigms. For the self-organising capabilities of local entities, the special functional settings of diverse institutional frames are assessed, since diversification of the institutional framework fosters a wider possibility to solve any shortcomings of the other two paradigms—markets and states—by addressing the diversity of the social structure and its scenarios.

A primary way analyses these "action arenas" (Ostrom 2005, 55–56), where the social exchange takes place and is guided by three mayor sets of variables: institutions and rules, characteristics of the community, and attributes of the physical environment (Ostrom 2005, 15). The benefit of using the IAD framework as a starting point lies in its strength as "a comparative method of institutional analysis" (Ostrom and Hess 2007, 42). Because this study aims at identifying the institutional relations, which are crucial for a socio-ecological transition at the city level, the IAD framework seems to be appropriate to frame the research approach. Mainly in focusing and analysing an action arena, the sets of rules, community attributes and the several distinct

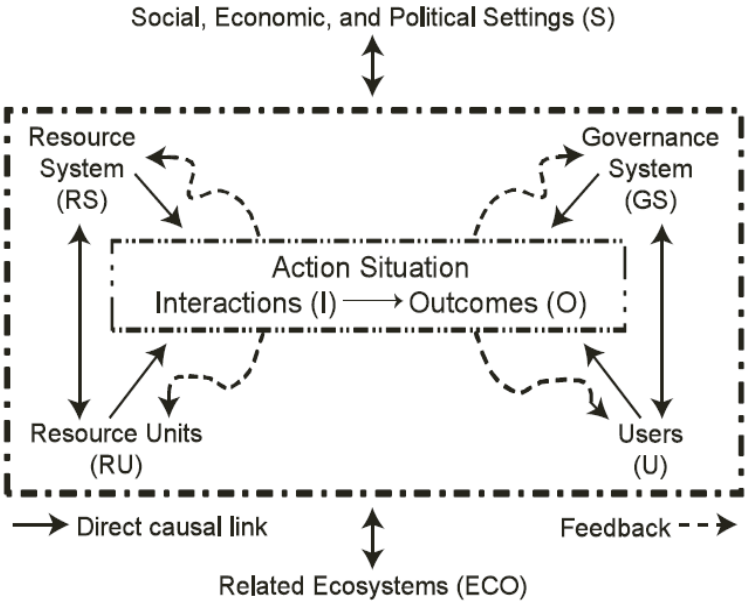

Figure 5: Action situations embedded in broader socio-ecological systems
Source: Elinor Ostrom (2007, 15182)

rule sets that determine positions, access to and restrictions from these arenas, become assessable for a comparative analysis (Ostrom 2005). This could be used for comparisons of the governance of different resource systems in different institutional settings in Europe like in this study here.

To capture the institutional dynamics of socio-ecological transition, we assume that these kinds of transitions are driven by learning and norm-adopting individuals (Figure 4). These are capable of (1) developing critical levels of trust that other individuals involved in the governance of the resource systems are reciprocators, (2) developing levels of cooperation, which are necessary to solve social dilemmas like the “tragedy of the commons”, and (3) realising the net benefits of this cooperation. From this perspective, it is crucial for a general theory of socio-ecological transition to understand the variables inducing this kind of collective learning and norm-adoption. It makes sense to distinguish between socio-ecological and micro-situational context variables and relate them to sets of rules governing the action situation under consideration.

2.2.2 The socio-ecological context variables

The broader context could be conceptually modelled as socio-ecological system (SES), consisting of the variables describing the resource system (RS), the resource units (RU), the governance system (GS) and the users (U), which influence the interactions (I) and outcomes (O) of the action situation. External to this system are variables of the social, economic, and political settings (S) as well as of the related ecosystems (ECO).

Poteete, Janssen, and Ostrom (2010, 237–38) identified a total of 53 variables describing the overall socio-ecological system. Therefore, they consider twelve variables as particularly relevant for the capabilities of the users to self-organise the governance of the resource system under consideration. “Rather, it is the overall combination of these variables in particular settings that affects how participants judge the benefits and costs of new operational rules, and how trust and reciprocity have developed in a setting” (Poteete, Janssen, and Ostrom 2010, 238). The framework distinguishes two spheres: the social system, and the resource system. The perspective focuses on reciprocal interactions between the two systems, where the ecological

Table 3: Variables that affect the likelihood of self-organisation

Resources	Governance
System RS3 - Size of the resource system RS5 - Productivity of the system RS5a - Indicators of the productivity of the system RS7 - Predictability of system dynamics	System GS6a - Local collective choice autonomy
Units RU1 - Resource unit mobility	Users U1 - Number of users U2 - Socio-economic attributes of users U5 - Leadership / entrepreneurship U6 - Norms / social capital U7 - Knowledge of SES / mental models U8 - Importance of resource

Source: Variables extracted from Amy R. Poteete, Marco A. Janssen, and Elinor Ostrom (2010, 237)

system is perceived as anthropocentric (Claudia R. Binder et al. 2013). What is important at this point is an explicit link between this systemic approach and a normative perspective. Although it is foremost an analysis-oriented concept, the description of rules, their emergence, and practical implications describes the role of norms in linking the two systems. These linkages especially occur in the topics of information, boundaries, and decisions, since there a direct alignment takes place between social and ecological system—vice versa.

2.2.3 Micro-situational context variables solving social dilemmas

While the identification of broader context variables of socio-ecological research draws on a wealth of field research described in the works of Elinor Ostrom and her colleagues, the micro-situational context variables are derived from repeated social dilemma experiments in the laboratory (Norman Frohlich and Joe A. Oppenheimer 2001; Eva Ebenhöh and Claudia Pahl-Wostl 2008). These experiments show on the one hand the very rigid assumptions leading to situations like the tragedy of the commons, where—at its best—only a few users would cooperate. “A social dilemma situation in which an individual has no information about who else is involved and makes an anonymous decision relieves many individual participants of the need to follow

Table 4: Variables influencing trust and the solution of social dilemmas

Positive	Positive, or neutral, or negative impact	Negative
S1 - High marginal per capita return of cooperation	S7- Size of group	S10 - Heterogeneity in benefits and costs
S2 - Security that contributions will be returned if not sufficient	S8 - Information about the average contribution is made available	
S3 - The reputations of participants are known	S9 - Sanctioning capabilities	
S4 - Longer time horizon		
S5 - Capability to choose to enter or exit from a group		
S6 - Communication is feasible with the full set of participants		

Source: Amy R. Poteete, Marco A. Janssen, and Elinor Ostrom (2010, 229–30)

norms or value outcomes of others. […] Overharvesting tends to occur when resource users do not know who is involved, do not have a foundation of trust and reciprocity, cannot communicate, have no established rules, and lack effective monitoring and sanctioning mechanisms" (Poteete, Janssen, and Ostrom 2010, 228). However, trust and cooperation could also produce exclusive elitism and not necessarily advance socio-ecological transitions. This process constitutes an overemphasised notion of 'community' and constructs a demarcation line and with it an 'outside' of the community. Socio-ecological sustainability would be downsized and exclusively available to a closed group. This notion of 'flat' communitarism—in the sense of a closed or 'gated' community—needs to be evaded, and the scope of transition and sustainability necessarily needs to include a perspective that appeals to the relational construction of identity and is driven by a more overarching form of social integration.

Elinor Ostrom's approach proves to be scalable in its reach, although empirically it has only been applied to local or regional resource systems. The process of negotiating rules of usage, scope and boundaries can be extended to a broader level (Binder et al. 2013). In existing research, it was possible to identify a set of micro-situational variables in experiments by relaxing such restrictive conditions that lead by definition towards non-cooperative behaviour. These influence trust and positive outcomes in multiple social dilemmas (Table 4). They will be explained in the next section and extended by other variable, we deem influential.

2.2.4 Institutional elements of action situations

The action situation is a key concept of the IAD and the SES framework as well. It can be used to describe a variety of diverse institutional settings such as markets, families, hierarchies, legislatures, corporations, neighbourhood associations, common-property regimes and so on. Formal games as well could be described, analysed and compared as action situations regulated by seven normative elements concerning "participants, positions, actions, outcomes, information, control, and cost/benefit" (Ostrom 2005, 188). Each of these elements is governed by a special set of rules, which as an ensemble govern the overall action situation (Figure 6).

Assuming that these sets of rules define the governance regime of a socio-ecological system and defining transitions "as shifts from one regime to another regime" (Frank W. Geels 2011, 26), implies that any transition could involve a change of at least some of the rules governing the action situation of a socio-ecological system (SES). Rules—in contrast to norms—are sanctionable. This means, that breaking of rules results in a kind of regulating response of a specific body that is capable and eligible to sanction. However, the violation of a norm does not imply institutional corrections. The process of norm adoption precedes the changing of rules, as it is a broader foundation of any rule and sanctioning mechanism. This change of rules might be induced externally by superior governance levels, or internally by learning and norm-adopting individuals who are involved in the local action situation. The internal way of learning and norm-adoption is crucial for a profound transition to strong sustainability, because it influences behavioural patterns in the action situation already before legal changes. Thus, this kind of learning is more informal and more directly involved in everyday activities as legislation by superior levels of governance alone.

The socio-ecological context variables are determining the capabilities of the users to self-organise the governance of the resource system, and the micro-situational context variables are influencing the feasible levels of trust and of cooperative solutions in multiple social dilemmas. They are probably responsible for the diversification and change of the norms, ruling the action situation under consideration. Thus, they could be of crucial importance for the direction and success of socio-ecological transition.

Summarising, we argue that the change of norms represented by this set of rules governing local action situations may be considered as the central characteristic of socio-ecological system transitions. Successful norm-adoption could be decisive for approaching higher levels of trust

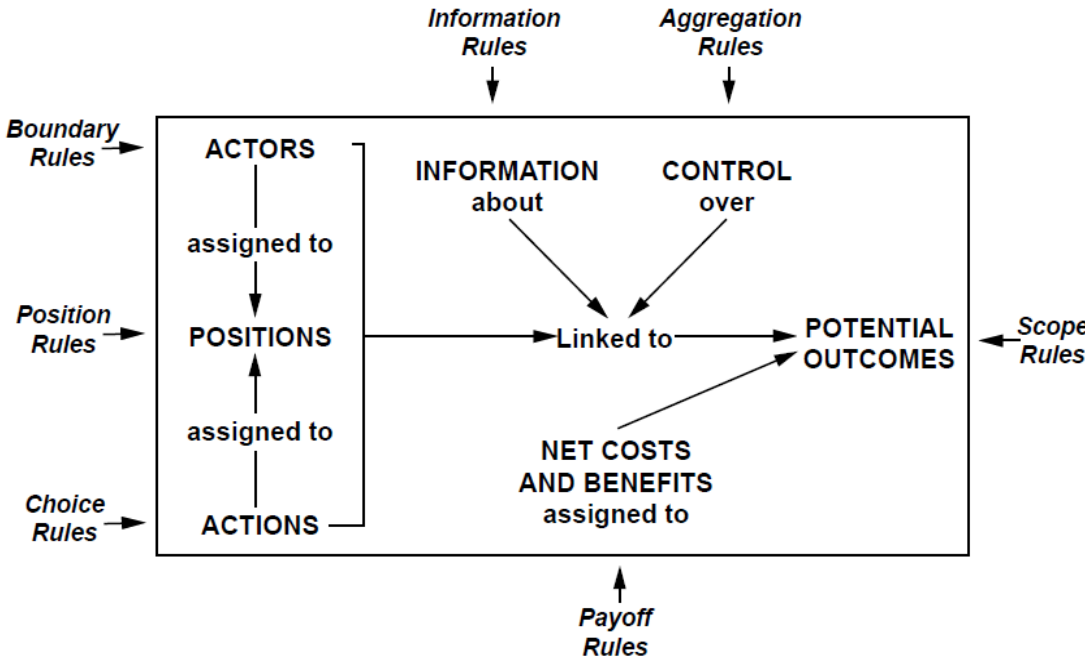

Figure 6: Rules as exogenous variables directly affecting the elements of an action situation
Source: Elinor Ostrom (2005, 189)

and cooperation, and thus for the success of self-organised and more sustainable governance of common-pool resources in general.

2.2.5 Norms ruling socio-ecological systems

In our research, we focus on the interactions of the three different dimensions of resource system governance. Rules, socio-ecological and micro-situational context variables as an ensemble are assumed to determine the transition paths from one governance regime to another. For such an examination, the sets of rules regulating the action situation of a SES seem to be the appropriate starting point. They link the resource system and its units on the one hand and the governance system and its units, the users, on the other hand. Norms are considered here as the transition channels for the negative or positive feedback loops between SES and action situation. This is why they could be stabilised or destabilised by these feedback loops, the latter case urging a transition from one governance regime to another. Table 5 presents the influence of the seven different set of rules in interaction with (1) the socio-ecological context variables relevant for facilitating self-organisation of resource governance (2) the micro-situational context variables enhancing trust and cooperation in local action arenas of SES governance, and (3) the potential signs of their impact on trust and cooperation. Hereafter, we discuss the connections of these sets of rules with both kinds of the context variables.

(1) Scope rules could be considered as a set of rules interacting with both kinds of context variables concerning “a known outcome variable that must, must not, or may be affected as a result of actions taken within the situation" (Ostrom 2005, 209). Such scope rules depend strongly on the practical and shared knowledge about the SES considered (U7), which is necessary to predict the dynamics of the resource system (RS7) and, thus, responsible for the time horizon of the decision-making about the SES (S4). A longer time horizon (S4) might be the result of trust building and positive outcomes in many common pool experiments. However, it might as well

improve the willingness to commit in long-term investment positively: “Participants can reason with themselves that showing a willingness to contribute early may lead others to contribute and the longer the time horizon involved, the better the return on individual investment” (Poteete, Janssen, and Ostrom 2010, 229).

(2) Information rules "affect the level of information available to participants" (Ostrom 2005, 206). Thus, an important assumption in our research is: the higher the information levels of all participants about the resource system, for example the local energy system, the higher the probability that trust and cooperation in the governance of the resource systems could emerge. As indicators for this hypothesis may serve the degrees to which civil society and private households are involved in the monitoring of the resource system (GS8) and the extent to which communication is feasible with the full set of participants of the resource system (S6).

(3) Payoff rules are a third set of rules relevant for the institutional setting of SES assigning “external rewards or sanctions to particular actions that have been taken or to particular readings on outcome state variables" (Ostrom 2005, 207). They determine whether a motivation for transitional activities regarding the governance of the common-pool resource under consideration may exist or not. The significance of the payoff rules depends on different kinds of variables:

1. The factor facilitating a positive experience with the self-organisation of SES governance is a high marginal per capita return of cooperation (S1): participants learn that their contribution makes a difference. This is obviously the most important payoff rule: the net benefit should be high enough to convince the potential actors to act. The basic socio-ecological context variables for allowing such high returns are the technology used for harvesting the common-pool resource (U9) in interaction with the productivity of the resource system (RS5). For example, the energy transition towards the exclusive use of renewable energy will change the technologies used for energy harvesting and storage significantly. At the same time, productivity of energy use could be enhanced significantly—due to the decentralisation of the resource system governance allowing tighter feedbacks between users and providers. In contrast to that, grassroots activities on urban green spaces are per se local with high returns on cooperation because the results are very soon visible. On the other side, the water system in dense urban agglomeration does need high and long-term investments in fixed capital—probably being hard to handle by self-organised interventions of civil society.
2. The information made available about the average contributions (S8) of all resource users appear to have an ambiguous impact on trust building in common pool resource governance: “information about past overuse may lead some individuals to pull back and harvest less out of fear of losing all future opportunities, while others might increase harvesting” (Poteete, Janssen, and Ostrom 2010, 230). The information about resource contributions and use of others might be easier to receive in smaller resource systems (RS3), which are probably characterised by slower resource unit mobility (RU1), as land use compared to water use in an urban area. The availability of reliable information on resource use by other participants would decrease information costs and risks of individuals calculating the probable net payoff of their own contribution to the resource maintenance. Thus, this kind of information is relevant for the payoff rules as well.

Table 5: Interactions between micro-situational and socio-ecological context variables with rules governing transitional action situations

Rules evolving	Socio-ecologic context variables (SECV)	Micro-situational context variables (MICV)	Trust impact
1 Scope	U7/RS7: Knowledge of SES, practical & shared/Predictability of systems dynamics	S4 Longer time horizon	Positive
2 Information	U6/GS8: Norms, social capital & civil society/Monitoring	S6 Communication is feasible with the full set of participants	Positive
3 Payoff (feasible)	U9/RS5: Technology used/Resource system productivity	S1 High returns of cooperation	Positive
3 Payoff (net)	RU1/RS3: Resource unit mobility/Size of resource system	S8 Information about the average contribution is made available	Unclear
4 Position	U5/U3/U4: Leadership, entrepreneurship/History of use/Location	S3 Known reputations of participants	Positive
4 Position	U6/GS8: Norms, social capital & civil society/Sanctioning	S9 Sanctioning capabilities	Unclear
5 Boundary (entry rules)	GS6a/U1: Local collective choice autonomy/Number of users	S7 Size of group	Unclear
5 Boundary (exit rules)	GS6a/U2: Local collective choice autonomy/Bargaining & conflict resolution, Voice & exit	S5 Capability to enter or exit from a group	Positive
6 Participation (aggregation rules)	GS6a/RS3: Local collective choice autonomy/Size of resource system	S2 Security of returned contributions, if not sufficient	Positive
7 Choice (creation and distribution of power)	U2/U8: Socioeconomic attributes of users/Importance of resource	S10 Heterogeneity of participants	Negative

Source: Own concept, based on Ostrom (2005) and Amy R. Poteete, Marco A. Janssen, and Elinor Ostrom (2010)

(4) Position rules are connecting participants and authorised actions in the action situation under consideration (Ostrom 2005, 193–94). It could be assumed, that this authorisation to act will strongly depend on the known reputations of the participants (S3) gained by them in the location under consideration (U3), by using the common-pool resource (U4) and resulting in a

kind of leadership of some of them which is appreciated by all other participants (U5). Thus, the variables determining the known reputation of participants might be of special importance for trust-building : “[…] knowing enough about fellow participants’ past history of being a contributor is likely to increase cooperation levels when the reputation is positive” (Poteete, Janssen, and Ostrom 2010, 229). Here is a special link to a second knowledge issue: “Prior experience with other forms of local organisation and development of local leadership (U5) greatly enhances the repertoire of rules and strategies known to local participants as potentially useful to achieve various forms of regulations” (Poteete, Janssen, and Ostrom 2010, 240). Thus, we can assume that leadership and entrepreneurship could build on prior experience with the management of socio-ecological systems and may motivate less experienced users to collaborate in long-term endeavours. Such linkages between participants and authorised actions could lead to the evolution of corresponding position rules.

(5) Boundary rules are relevant for a theory of socio-ecological transition with a focus on the aspect of institutional change. They "define (1) who is eligible to enter a position, (2) the process that determines which eligible participants may enter (or must enter) positions, and (3) how an individual may leave (or must leave) a position" (Ostrom 2005, 194). Core micro-situational context variables, like the capability to enter or exit from a group governing a resource system (S5), as well as the size of group allowed (S7) and the eligible heterogeneity of the participants (S10) are defined by these boundary rules. On the micro-situational level, the capability to access and leave the action situation will probably have a positive impact on trust-building, while the size of the group may have diverse impacts and a high degree of heterogeneity a negative one.

(6) Aggregation rules determine "whether a decision of a single participant or multiple participants is needed prior to an action at a node in a decision process" (Ostrom 2005, 202). Thus, they define the degree of participation feasible in the user-groups of the socio-ecological system considered. In this sense, they could also be termed as ***participation rules.*** It is plausible to expect a higher degree of participation in more decentralised SES with significant *local collective-choice autonomy (GS6a)*. Here, the inclusion of all participants is an important precondition for successful decision-making processes. According to Poteete, Janssen, and Ostrom (2010, 241) this kind of autonomy “tends to lower the costs of organizing. A group that has little autonomy may find that those who disagree with locally developed rules seek contacts with higher-level officials to undo the efforts of users to achieve their own new rules. With the legal autonomy to make their own rules, users face substantially lower costs in defending their own rules against other authorities.” This appears to be particularly true for defining the size of the resource (RS3) as well as for the security of returned contributions (S2), for setting the rules to enter or exit a group (S5) and the size of the group as such (S7).

(7) Finally, **choice rules** define "what a participant occupying a position must, must not, or may do at a particular point in a decision process in light of conditions that have, or have not, been met at that point in the process" (Ostrom 2005, 200). In some sense choice rules and scope rules are the residuals of all other sets of rules and could substitute each other: “If a rule is not a position, boundary, information, pay-off, or aggregation rule, then it is either a choice rule (if the AIM is an action) or a scope rule (if the AIM is an outcome)” (Ostrom 2005, 209). Choice rules indicate the creation and distribution of power in action situations:

> “By widening or narrowing the range of actions assigned to participants, choice rules affect the basic rights, duties, liberties, and exposure of members and the relative distribution of these all. Choice rules may allocate to positions high levels of control over many different state variables; in other words, authorize powerful positions. Choice rules empower, but the power created can be distributed in relative equal manner or grossly unequal manner. Choice rules thus affect the total power created in action situations and the distribution of this power.” (Ostrom 2005, 201)

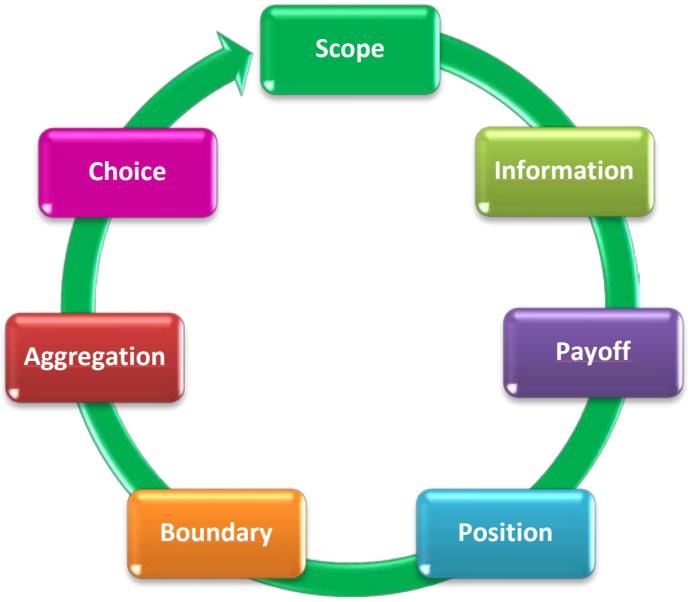

Figure 7: Socio-ecological systems transition model as a sequence of norm set adoption

Thus, choice rules are crucial indicators for the degree of citizen empowerment towards the self-organised use of resource systems. We can imagine urban farms on local green spaces organised as cooperatives where every associate has an equal voice on important decisions what to plant, how to cherish, how to distribute the harvest. This could be an example of full citizen control in the sense of Arnstein's Ladder. On the other edge of the scale we have the urban water systems, where one-time investments in the fixed infrastructure determines the way of water provision, say for the next seventy years. It is hard to imagine that such decisions could be an issue for direct citizen control. More likely, it could be an issue for delegated power to the local government, if this would be in the position to own the local water utilities or to hold the decisive share in it at least. Depending on the technologies available—and there are profound innovations under way now—and on the legal market design—for example by feed-in tariffs—there are many options how to organise the decision rules in the energy sector now. Here we expect to observe the highest diversity in choice rules due to the diversity of national rules governing the energy sectors and the technological infrastructure already in use.

2.2.6 Sustainability transitions as a sequence of norm changes and interactions with the socio-ecological resource system

Concluding this section, we propose to analyse transitions of socio-ecological systems, as a sequence of rule sets with increasing complexity and dynamics (Figure 7). As developed in our socio-ecological systems transition model, we assume that, if self-organised and cooperative use of common pool resources emerge, this is due to a complex set of variables and norms. They help us to formulate the following definitions and research assumptions as basis for the specific research questions following subsequently.

1. **Scope rules** affect the very basic issues and time horizon of known outcome variables of the sustainability strategy under consideration.

   A commonly agreed understanding of the sustainability transition concept, including an agreement on the priorities of such transitions on the local level and strategies, enhances the possibility to grasp topics and fields the sustainability transition encloses. This

tacit knowledge facilitates the initiation of transition processes of the socio-ecological systems towards stronger sustainability since strategies and approaches refer to the same scope and allow consensual solutions.

2. **Information rules** affect the level of information available to each participant of the considered SES. Thus, they provide the basic precondition for citizens' participation and the possible starting point for developing higher levels of trust and cooperation.

   Considering the information rules applied in the local context, the degree of citizen participation in the governance of local resource systems like energy, water, and green spaces might be the higher if better information is available for the citizens.

3. **Pay-off rules** assign awards or sanctions to actions regarding the outcomes, thus defining possible returns and the motivation to implement specific sustainability measures for a multitude of actors.

   Another crucial precondition for the initiation of socio-ecological transition processes is the emergence of attractive opportunities to invest in new institutional arrangements, promising a sufficient per capita return for the cooperation of local actors. Investments as well as returns need not necessarily be monetary, but could rather be of other quality, like for instance resources, social acknowledgement or replenishment rates of resource units.

4. **Position rules** determine the actors who are authorised and capable to act, considering reputation gained and the possibilities to sanction by potential actors.

   We assume that the existence of a certain degree of leadership, i.e. reputation gained by innovativeness, practical experience, and trustworthiness in the urban action arena, is supportive for local self-organisation of common-pool resources. If these individuals gained a reputation as reciprocators this is particularly helpful for a cooperative approach towards the governance of local socio-ecological systems.

5. **Boundary rules** define criteria and processes for including and excluding actors in socio-ecological systems, the degree of overlap between resource and governance systems, as well as the size and heterogeneity of the actor group.

   If such eminent people—established as reciprocators and specialists for the local resource system—exist, this facilitates a kind of norm-adoption in favour of new institutional arrangements, and their acceptance by the local citizenship. In the case that the concerned stakeholders accept such trusted evolution of norms and their sanctioning, this transforms these new norms into rules. The shift of boundary, position, or choice rules thus follows lessons learned in the local action arenas.

6. **Aggregation rules** determine the degree of communication and participation of actors involved in the decision-making on the SES at the considered location. They depend very much on the level of local decision-making autonomy.

   If norm-adoption shifted the boundary rules in favour of local action arenas, this could pave the way for a more autonomous decision-making on the local level, leading to a harmonisation of ecological and social boundaries. This implies an enhancement of the local decision-making autonomy.

7. **Choice rules** characterise the extent of power distribution and citizen empowerment in self-organising the governance of local resource systems.

   Finally, unambiguous choice or decision-making rules are the most complex indicators of citizen involvement in the governance of local resource systems, either via delegation of power or full-fledged citizen control. We assume that a specific set of choice rules empowers local actors, and is especially productive, if this power is distributed equally between the actors, to allow a thorough form of self-organisation.

Figure 8: Research questions derived from the SES transition model

Rather than reading the set of rules in Figure 7 as a cascade, it expresses a process of learning and norm-changes as a helix structure. Rules are altered in a complex and interconnected way. The cycle will repeat itself limitless and regularly reinforce itself.

2.2.7 Research questions

To this point we have derived seven related assumptions from Ostrom's rule set to guide our research interest that imply a certain mode of influence on critical aspects of the socio-ecological transition process towards sustainability. As a result, these assumptions are compared to a detailed description of the case studies of the resource field. Therefore, it is mandatory to understand the research assumptions as a preliminary interpretation of the field, not as testable hypotheses. These assumptions lead to research questions, indicating an exploratory approach to the field. The strength of the framework lies in its openness to produce explorative insights in the field, to be assessed by other scientific means later. In detail the seven research questions, derived from the seven rules and assumptions, are as follows:

1. Is the urban governance of ecological resource systems observed in the European cities framed by a common understanding of sustainability transition?
2. Which kinds of citizen participation and user self-organisation can be observed in local urban resource systems like energy, water, and green spaces?
3. Who are the actors and what are the factors motivating them to pursue a socio-ecological transition in these urban resource systems?
4. What are the lessons learned and the reputations gained from leadership in local resource management?
5. Could we observe transitional socio-ecological norm-adoption towards trust and cooperation in the urban context?
6. Does local decision-making autonomy matter in socio-ecological transitions in relation to superior governance levels?

7. To what extent do citizens have an equal voice in the governance of urban resource systems in terms of delegated power and citizen control?

Based on the preceding theoretical concept, Figure 8 specifies the connection between the foundational assumptions on the effects of rules and the main direction of the respective research questions. Departing from this view on the socio-ecological structure of the field, its institutional settings, and the interactions between its elements, the research rather follows an abductive understanding than a deductive or inductive approach: this means, the research goal lies in confronting preset assumptions on the field with empirical evidences to create a picture of the empirical reality. These assumptions narrow down the research perspective and allow focusing on the elements that are having the greatest influence.

2.3 Research strategy and research design

A mix of quantitative and qualitative methods appears to be appropriate for the research strategy chosen here. This mix could provide at least a glance on normative shifts, which are leading to institutional changes in the sphere of common-pool resource governance. As explained above, it makes sense to focus on the questions, whether, how, and in which directions shared strategies, norms, and rules change over time, because norm-adopting behaviour is expected to be the main driver of transformative change. A comparative research design enables the identification of specific institutional settings, external to the urban action area. These might influence the results of success or failure of self-organisation and cooperation processes regarding the governance of the local socio-ecological resource systems. Thus, the research design presented in the next chapter considers the following variables:

- In demographic and economic terms: size and growth rates of the country where the city is located regarding population and total GDP
- In geographic and cultural terms regarding their location in Northern, Southern, Eastern and Western Europe
- Regarding the national government structure as defining the degree of administrative decentralisation and the degrees of local decision-making autonomy
- Regarding the welfare regime of the nation, where the city is located as determinant for the type and degree of heterogeneity of local user groups relevant for the governance of urban common-pool resources.

3. Selecting forty cities

This chapter outlines the research design and reflects the empirical data sampling and inquiring process. In brief, the structure follows three sections. 1) The methodological approach describes the analytical framework and research methods used, as well as the material generated in the field phase. 2) Following this, the chapter discusses the first instance of the strategic sampling procedure on the national and regional level. Further, on the bottom level, the second instance of selecting actors that were to fill out questionnaires and were engaged in face-to-face interviews is described. 3) Methodological reflections complete this chapter assessing challenges and pitfalls on handling poor data-availability in the city selection process as well as providing a critical assessment of the applied sampling strategy and research methods for data inquiry.

3.1 Methodological approach

This study will rely on triangulation (Alan Bryman and Emma Bell 2011, 397–98), combining methods by using both quantitative and qualitative data collection. Triangulation allows for a better understanding and sharper display of research results by—metaphorically coming from navigation—getting a fix on the research object from several positions (Uwe Flick 2011, 179–95). Triangulating the results provides excellent insight into the material from different angles. Individual shortcomings of each research methodology and method are complemented by the focus of the other methods. This cannot simply be realized by 'adding' the one to the other, thus, the several distinct features, pros and cons have to be reflected and adjusted (Bryman and Bell 2011, 619–22). For the quantitative data analysis, the study relies mainly on primary data of a survey, inquired in the field phase, supplemented with secondary data. The qualitative data analysis bases on primary data in the form of expert interviews. The used research methods have to be deducted from the methodology of the study to fit the research interest and the research questions accordingly. Therefore, this section begins with an outline of the "Institutional Analysis and Development Framework" as the foundation of an applicable methodology.

3.1.1 The Institutional Analysis and Development (IAD) Framework

Based on the Institutional Analysis and Development (IAD) framework—developed by Elinor Ostrom and continuously sharpened by her and other researchers over the past years—the research undertakes a structural analysis and focuses on institutional settings. Ostrom and others draw upon a linguistic approach towards a syntax, constituting rules (Ostrom 2005, 139–52); an elaborated "Grammar of Institutions" (Ostrom 2005, 137). It allows to asses institutional diversity beyond market or governmental organisation. The basic outlines for the theoretical approach of this study as well as additions and further enhancements of the IAD framework are discussed in chapter 2.

The approach towards socio-ecological transitions in urban contexts used in this research is extended by several aspects that surpass the theoretical approach laid out by Ostrom and others (Thomas Sauer 2014a, 2014b). First, it is an attempt to apply the works of Ostrom and others who demonstrated its explanatory power for rural resource systems to urban contexts. By focusing on self-organisation capabilities, we believe to have a more directed approach to resource governance in the action arenas of local resource systems—cities—towards a sustainable and resilient treatment at our hands. Self-organising capabilities can under circumstances prove themselves to be important transition drivers and integrate into recent discussions and socio-political movements that claim a "right to city" (Harvey 2008); forces that cannot be neglected.

The amount of 40 selected cities as well as the treatment for these cities could be referred to as a case study. Nonetheless, the foundation of analysis is not the individual city but—more aggregated—the constitution of transition processes in three distinct resource systems: energy, water, and green spaces, with a regional clustering of Europe (cf. Table 6). The research design evaluates the role of cities in socio-ecological transition, where cities are the spatial delimiting factor and the transitions are the phenomena. Taking into account that each city is highly individual, the research reconstructs a contrasting picture of the three transition processes in energy, water, and green spaces. Case study designs provide single outcomes that are not generalizable. This is no flaw but a trait: "In social case work we do not gather data in order to compare, classify, and analyze with a view to formulating general principles. We gather the data case by case in order to make a separate, differential diagnosis, with little or no regard for comparison, classification, and scientific generalization. The diagnosis is made with a view to putting treatment into operation in this particular case." (Pauline Young 1939, 235–36 in John Gerring 2007, 190) The research design here provides the *insights* into the transition processes of single resource systems and above that for "differential diagnosis" of certain individual and contextualised aspects. Although e. g. Poteete, Janssen, and Ostrom (2010) base their work on detailed case studies of single local entities, this research will not make use of such an approach. Moreover, the basal research interest will be a regional understanding and comparison of sustainability in socio-ecological transitions. Reasons for this are found in a practical aspect. 40 case studies are difficult to handle; above this the material necessary for in depth case studies is complex and manifold and thus, the inquiry, too, is complex and time consuming (e. g. ethnographic research, interviews, document analysis, etc.; although not all sources have to be served for a coherent study, cf. Robert K. Yin 2003, 86, figure 4.1). In terms of content, institutional *diversity* is of more importance for the research than detailed individual case studies to point out the individual case structures. Yet, as John Gerring puts it: "The product of a good case study is *insight*" (Gerring 2007, 7) and the insights this research targets are the special features of socio-ecological transitions of different resource systems. The entity of the city is not the first point of interest but the details of the transitions across several cases. This includes contradicting and sometimes ambiguous results and furthermore a per se problematic definition of 'cases' as entities of research. A "[c]ase connotes a spatially delimited phenomenon (a unit) observed at a single point in time or over some period of time." (Gerring 2007, 19) This, however, does not add much to a robust definition and opens up for interpretation.

3.1.2 Experts and expert knowledge

The empirical data was mainly collected through expert interviews and questionnaires. Key actors in the chosen cities were selected as experts (Alexander Bogner, Beate Littig, and Wolfgang Menz 2009). Their central positions in city politics and administration, in the business sector, and in civil society grant insights into the dense socio-political field of ecological transitions and its challenges (for a detailed list of actors, cf. Table 15). Thus, they have the possibility and the aims to influence local sustainability transitions to a certain degree; and above all to have a certain degree of knowledge and experience of or with the field as well as motivation to get involved in transition processes. The interviewees are at the heart of these discussions and interactions and they are involved in the topics on a daily basis. Therefore, their knowledge and experience is *expert knowledge.* This knowledge can open up and clarify the (pre)conditions of socio-ecological transition dynamics and the possibilities for self-organising capabilities. Generally, the status of an expert in expert interviews refers to a special insight into practices, dynamics, etc. the researcher is interested in. Socio-ecological transition as topic for political decisions, administrative work, civil society commitment, etc. can best be narrated by persons that actively hold adequate positions and work with these topics (Beate Littig 2011). The method of expert interviews relies on the special status of the expert's knowledge: to gain insight in the field the researcher needs the expert to explain to him what the important aspects are, to point out the relations and the history. Different actors mean different versions of the local narrations (at best). All experts' narrations have to be taken for granted by the researcher. A critical con-

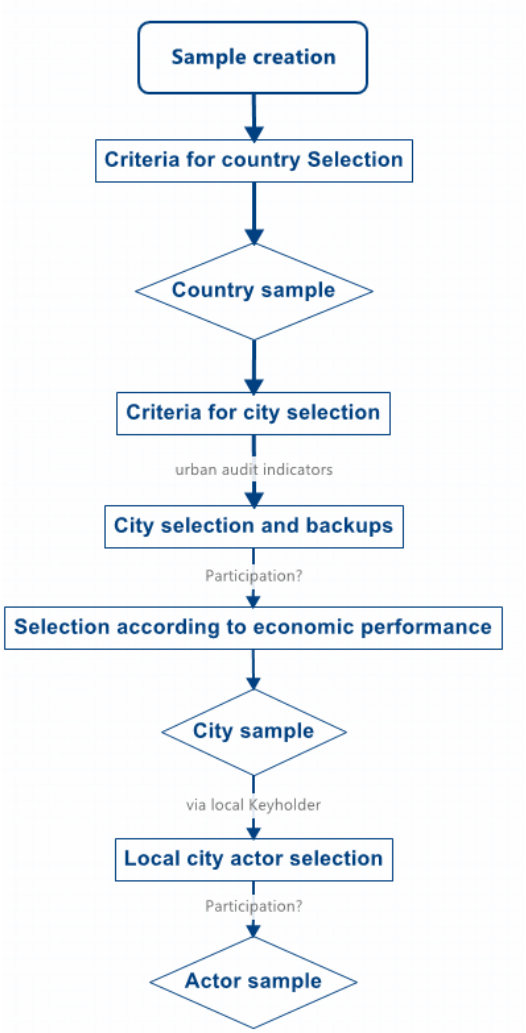

Figure 9: Sample creation process
Source: own presentation

testation can only occur in contrast to other experts' narrations. In contrast to an in-depth analysis, the statements of the interviewees are used to illuminate a local arena, which is unknown to the researcher, while in-depth analysis tries to reconstruct subconscious patterns of the interviewee. Therefore, inquiring in-depth structures of the individual statements aims at completely different results. Moreover, it would be a violation of ethical conduct in social research resulting from a misinformation of the interviewees on how their statements are used (Clifford G. Christians 2005, 144–45). In short, expert interviews are a suitable method for a research that 'does not know' what is going on, and needs explanation of local practices, constellations and dynamics for assessing the local socio-ecological transition towards sustainability in the city.

3.2 Criteria for the country and city selection

This section illustrates the process of the country and city sampling. A random sample on city basis is not applicable because the goals of the study are an equal representation of the European population. Random selections of a number as small as 40 cities can over- or underrepresent certain areas, regions, or countries. Thus, the selection process bases on a theoretical sampling that reflects populace and economic growth to generate a sample that describes the

Table 6: Country selection per European region

Region	Country
Eastern Europe	Poland, Czech Republic, Romania
Northern Europe	Denmark, Sweden, United Kingdom
Southern Europe	Greece, Italy, Spain, Turkey (Istanbul)
Western Europe	Austria, Germany, Switzerland, France

Source: UN classification in major area and region in the world (UN 2010)

socio-structural texture of the EU. General selection criteria for the cities (and regions) were defined, following a qualitative sampling strategy with prescribed selection criteria (Jennifer Mason 2002; Jane Ritchie, Jane Lewis, and Gillian Elam 2003). The sampling process is thus not randomized nor is it comparable to a theoretical sampling that emerges from the research process (e. g. in grounded theory).

The sample was generated in two steps. In a first approach, forty cities in fourteen countries were selected. For the second selection step, field researchers on site identified the specific actors for enquiry. Special 'key holders,' selected beforehand, supported them locally. These key holders were contact persons of the local administration, recognised by ICLEI who had special overview of the city's relations and relevant characters.

3.2.1 Country Selection

In preparation of the city selection process and in order to facilitate the coordination of the field research, several countries that are representative of all European regions and of the institutional diversity governing urban development in Europe were identified. An average of two to three cities per country resembles in about 14 countries for selection. This allows contrasting at least two cities per country according to criteria that are discussed further in detail.

The following subsections present the refined features for a strategic sampling used in this research and try to distinguish countries according to their GDP and population shares on all of Europe as well as welfare state regimes and administrative features. Weighting according to a regional representation was the foremost criteria to select a country sample.

Regional representation

In a first step, 14 countries were chosen in order to represent first all main regions of Europe (according to the UN classification in major areas and regions in the world (cf. Table 6); second a significant share of European population (cf. Table 7); and third a complete range of development levels in terms of income per capita. Two non-EU countries have been included: Switzerland was selected due to its unique experience with local autonomy and self-administration and because of its environmental policy program "2000-Watt-Society strategy" [1] (Lukas Gutzwiller 2006). The UN classification (2010) also refers to the *geographical* region of Europe thus including Switzerland although it is not part of the European Union. Turkey was selected although considered as 'Western Asia,' according to UN (2010). Nonetheless, in the case of the city of Istanbul it is debateable that it—geographically— still is part of the European continent. Furthermore, because of the extraordinary dynamism of the Istanbul urban area and Turkey's long-term involvement with EU as a major accession candidate, a selection can be justified.[2] These Non-EU cities bring additional and contrasting insights into the understanding of socio-ecological transition at the urban level in the future EU as well.

[1] Cf. 2000-Watt Gesellschaft (n. a.)

[2] The latter point was valid before the Gezi Park protests in 2013. In the aftermath of the governmental dealings with the protests, EU negotiations and talks with Turkey about joining the EU have come to a halt.

Table 7: Population, GDP per Capita and number of selected cities per country in 2013

Country	Population in 1 000	Share EU 28	Share 28+2	GDP/Capita PPS (Idx)	Cities
EU 28 + 2	589.397,0		100,0 %		
EU 28	505.730,5	100,0 %	85,8 %	100	
Germany	80.523,7	15,9 %	13,7 %	122	5
Turkey	75.627,4		12,8 %	53	1
France	65.633,2	13,0 %	11,1 %	107	4
UK	63.888,0	12,6 %	10,8 %	109	4
Italy	59.685,2	11,8 %	10,1 %	99	4
Spain	46.704,3	9,2 %	7,9 %	94	4
Poland	38.533,3	7,6 %	6,5 %	67	3
Romania	20.057,5	4,0 %	3,4 %	55	3
Greece	11.062,5	2,2 %	1,9 %	73	2
Czech Republic	10.516,1	2,1 %	1,8 %	82	2
Sweden	9.555,9	1,9 %	1,6 %	127	2
Austria	8.451,9	1,7 %	1,4 %	128	2
Switzerland	8.039,1		1,4 %	163	2
Denmark	5.602,6	1,1 %	1,0 %	124	2
Total Sample		83,1 %	85,5 %		40

Source: Eurostat (2013a), Eurostat (2014) sorted by population (abs.)

Table 7 shows that the country selection achieved a fair representation in terms of population (around 85 % of the overall population) and income level. Therefore, the aspect of representing a selection by 40 cities in 14 countries is realised. In this form of strategic sampling the explanatory power of the results can be assured to a certain degree, that outmatches a mere random sampling on country and/or city level.

Welfare regimes

It can be argued that several different details and aspects of government, state, and social welfare institutions influence the involvement of actors on a city level with sustainability issues. These can reach from affecting the rights and means to organise grass-root or bottom-up initiatives to the sphere of influence cities, regional governments, or national governments have on certain issues and legislative frames. Also governmental organisation—on all levels—is affected by differing administrative structures and bureaucratic procedures as well as by the political agenda shaping for instance welfare, environmental, and economic policies.

Drawing on our regional pre-selection, these countries could be characterized as diverse institutional taxonomies according to national welfare regimes, the degree of administrative decentralisation or styles of local government. According to Anthony S. Kasozi (2004, 1) “the taxonomy […] draws on existing accepted definitions providing categorizing criteria to address these definitional ambiguities” and further “the taxonomy should enable easier differentiation of institutions from related aspects” (Kasozi 2004, 14). The argumentation for a differentiated institutional approach is very much taken from *neo-institutionalism* and it accounts on varying backgrounds and the processes of isomorphism in institutional settings (Paul J. DiMaggio and Walter W. Powell 1983). It can be extended by cultural aspects on differing institutional settings, origins and materialisations (Stewart R. Clegg 1990).

Table 8: Characteristics of welfare regimes

	Liberal	Social democratic	Conservative
Dominant mode of solidarity	Individual	Universal	Kinship Corporatism
Dominant locus of solidarity	Market	State	Family
Degree of decommodification	Minimal	Maximum	High (for male breadwinner)
Modal examples	USA	Sweden	Germany
Assignment of country sample	Czech Republic, Poland, Romania, Turkey, United Kingdom	Denmark, Sweden	Austria, France, Germany, Greece, Italy, Spain, Switzerland

Source: Adapted from Esping-Andersen (1999), additional sources: Arin (2002), Kolberg and Esping-Andersen (1992)

The concept of (national) welfare regimes was developed by Gøsta Esping-Andersen (1990) to characterise three distinct kinds of welfare state capitalisms by considering their degrees of de-commodification and the dominant locus of solidarity. The concept of de-commodification reflects the granting of social rights: "If social rights are given the legal and practical status of property rights, if they are inviolable, and if they are granted on the basis of citizenship rather than performance, they will entail a de-commodification of the status of individuals *vis-à-vis* the market" (Esping-Andersen 1990, 21). This means that de-commodification allows for a life and to survive afar from market logic, e. g. by granting welfare services and alike. Table 8 lists the three distinct types Esping-Anderson elaborated: liberal, social democratic and conservative. These reductions show the relations between family, market and state and the dominant mode of solidarity of the welfare state. These result in varying degrees of de-commodification.

Eastern European and Mediterranean countries are not initially represented in Esping-Anderson's typology of welfare regimes. However, later he described the specific situation in countries like Italy, Spain, and Greece with their dominant locus of solidarity in "familialism" (Esping-Andersen 1999, p. 45)—but not as addition to his initial typology. Similarly, Wil Arts and John Gelissen (2002) discuss the addition of a fourth category "Mediterranean countries" (Italy and Spain) to Esping-Andersen's three categories, extending his ideal-types in response to several critiques. Arts and Gelissen (2002, 142–46) sum up the discussion of several authors arguing that Mediterranean states represent an additional prototype that cannot be subsumed as a subcategory under the existing three worlds. Thus, there appears to be an essential need for additions to the three ideal types and several authors urge to fill the gap against Esping-Anderson's objection.

Gøsta Esping-Andersen (1996) rejected the idea of a "new" post-communist type of welfare state in Central Eastern Europe, instead he suggested that the differences between these countries and his proposed three welfare types were only of a transitional nature. Eastern European states were subsumed under the existing labels, mainly under the liberal label. Yet, H. J. Menno Fenger (2007) identifies six different types of welfare regimes as result of a hierarchical cluster analysis. His categorisation complements Esping-Andersen's 'three worlds'. Czech Republic and Poland correspond to a post-communist European type of welfare regime, and Romania is considered as a developing welfare regime (Fenger 2007, 27–28; Zsuzsa Ferge 2008). Two intermediate forms complement the existing three distinct types. Esping-Andersen's adherence on three types of regimes neglects experienced transitions towards post-communist societies. These countries have doubtlessly undergone profound structural changes as well as systemic and institutional transformations. Broader it denies an existing diversity in Eastern Europe welfare state developments (Dorothee Bohle and Béla Greskovits 2007; Jolanta Aidukaite 2011; Dragos Adascalitei 2012). Yet, this 'inflation' of welfare regimes would obviously not comply with Esping-Andersen's criteria of "explanatory parsimony" that should better be traded in for individual case comparisons (Gøsta Esping-Andersen 1999, 90). Additionally, he rejected the further

Table 9: Typologies of state structure

Type of state	Modal examples
Unitary states	Greece
Decentralized unitary states	Denmark, Sweden
Regionalized unitary states	France, Italy, Spain, United Kingdom
Federal states	Austria, Germany, Switzerland

Source: ESPON (2005, 285)

adding of an "Antipodean Fourth World" (Esping-Andersen 1999, 89–92), including the Mediterranean, relying on familialism, and East Asia, relying on a unique form of capitalistic economy and an "either unique or hybrid" mix of "conservative and liberal elements" of welfare state (Esping-Andersen 1999, 91).[3] The reason therefore lies in the lack of a yet "distinct logic per se" (Esping-Andersen 1999, 92); these forms are only variations of Esping-Andersons existing three distinctions. In regard of de-commodification, if taken as central analytical concept for Esping-Andersen's welfare regimes, indeed it can be argued for a model that represents his initial three logics. Nonetheless several distinct influences on welfare state regimes can be pointed out that come from cultural or religious trajectories (Wim van Oorschot, Michael Opielka, and Birgit Pfau-Effinger 2008). Thus, keeping eyes peeled for cultural, structural, and institutional differences of East and South European countries yields insights that also have to be reflected in the sampling.

Table 8 refers to Esping-Andersen's initial categorisation and depicts his initial typology. It is extended by an assignment of the sampled countries to the three pillars. Switzerland and Turkey have also been categorized based on works by Tülay Arin (2002) as well as Jon E. Kolberg and Gøsta Esping-Andersen (1992).

Degrees of administrative decentralisation

The governmental structure of a state highly influences policy implications and decision taking. Generally, the aspect of centralisation and de-centralisation touches the judicial aspects of governments and nations. Especially in constitutional questions and the representation of the people, differences are assessable and with them differences in legal and constitutional frameworks that influence possibilities of direct action on several levels of governance. According to ESPON (2005), four typologies of state structure were defined as in Table 9. The new EU member states Czech Republic, Poland, Romania were not included because of the early stage of the analysis. Ivan Tosics 2011) provides a typology of territorial government systems in EU countries. It describes and analyses the formal vertical/multi-level government structures in the EU-27 countries in terms of unitary and federal structure, including the new member states. Here the unitary states are classified into five sub-categories including the new member states (cf. Table 10). Markus Boeckenfoerde, Philipp Dann, and Verena Wiesner (2007) distinguish between unitary and federal states and define a unitary state as "a state or country which is generally governed as one single unit" (Boeckenfoerde, Dann, and Wiesner 2007, 6).

[3] A more detailed elaboration on the East Asia welfare state with special focus on Japan can be found in Gøsta Esping-Andersen (1997).

Table 10: Draft typology of territorial governmental systems in the EU27+2 countries

Government structure	EU-15 and EFTA countries	New Member States
1. Classical unitary countries	Greece Ireland Luxembourg	
2. Centralises unitary countries with strong, but non-integrated local authority level	Portugal	Bulgaria Malta Czech Republic Hungary Romania Slovakia Cyprus
3. Centralized unitary countries with strong, integrated local authority level	Denmark Finland The Netherlands Sweden Norway	Estonia Latvia Lithuania Slovenia
4. Centralised unitary countries with strong local and regional level	France United Kingdom	Poland
5. Regionalised countries	Italy Spain	
6. Federal States	Austria Belgium Germany Switzerland	

Source: adapted from Iván Tosics and Joe Ravetz (2010, 81)

Especially when contrasting centralised versus de-centralised states, the differences in autonomy become obvious. While the main selection criteria for the sample was the regional weighted distribution and an orientation on the share of GDP per capita and population, the degree of decentralisation is a further detail for governmental and administrative influences on local level environmental policies. For example, Greece is considered a unitary state, although it can be argued that especially administrative reforms decentralised the state, government, and administration. These reforms were initiated due to financial and economic crisis that especially struck Greece in 2009 and 2010, but still are not established entirely (Dimitrios S. Goulas and Georgia N. Kontogeorga 2013; Eleni Sofianou et al. 2014).

Napoleonic systems of local government

Jeffrey M. Sellers and Anders Lidström identify four categories of local government systems according to local capacities and the type of supra-local supervision (cf. Table 11). In their taxonomy systems of local governments which rely on administrative centralisation but are "politically decentralized" are labelled as "Napoleonic" (Sellers and Lidström 2007, 615). A common characteristic is that "many countries under the influence of the Napoleonic tradition have territorial offices of administrative supervision over local government that corresponds fully or partly to the French prefect" (Sellers and Lidström 2007, 619). They conclude that "[t]raditional institutional distinctions between federal and unitary states, or even many general analyses of centralization and decentralization at higher echelons of states, fail to capture this crucial local dimension of the state" (Sellers and Lidström 2007, 626). Under "this crucial local dimension" the authors see local governments as a precondition for the possibility (and lasting success) of Scandinavian welfare policies. Overall, they assess that there is a trend for focusing on local level governance and especially capable forms of local level organising. Yet, the field lacks a concrete and extended classification of different types. Although the authors only refer to social democratic wel-

Table 11: Local government systems

Type of system	Modal examples
Northern European	Denmark, Sweden
Middle European	Austria, Germany, Switzerland
Napoleonic	France, Italy, Greece, Spain
British	UK

Source: Anders Lidström (2003), as cited in Sellers and Lidström (2007, 614)

fare regimes, Sellers and Lidström argue for a "close relation between decentralization to local government and the character of the welfare state itself." (Sellers and Lidström 2007, 610) For this research, the correlation between degree of decentralisation and welfare state is an important aspect.

Other concepts

Of course, other typologies and comparisons of government structures, welfare regimes, and economies exist.[4] Their understanding of institutions comes very close to this research's definition. Hall and Soskice are following North (1990, 3) and: "[…] define institutions as a set of rules, formal or informal, that actors generally follow, whether for normative, cognitive, or material reasons, and organizations as durable entities with formally recognized members, whose rules also contribute to the institutions of the political economy" (Peter A. Hall and David Soskice 2001, 9). Bruno Amable uses a definition of 'institution' which comes even closer to the one used by Ostrom (2005): "Institutions will be defined as set of rules that structure social interactions in particular ways." (Bruno Amable 2003, 36)

These approaches are focusing as well on different institutional settings for a capitalistic system of economy. They include more or less comparable aspects and try to argue for historical and institutional path dependencies in the development of national governance differences. Overall, they all rely on comparative positions, as it is the goal of this research endeavour. There can be crossing lines as well as distant vanishing points that these frames, as well as the one proposed here, share. Therefore, this literature on "varieties of capitalism" could deliver valuable background to our institutional comparison on local common-pool resource governance, but would distract our attention too far from our focus on socio-ecological systems—at least for the moment.

The use of the chosen typologies clearly shows that the country selection is representative of European countries in regards to the criteria of local government, welfare, and decentralisation. Thus, the country selection provides a representative sample of the EU in terms of population, regional and income distribution as well as institutional classifications.

3.2.2 City Selection

Prior to going to field, a city selection was done. It followed several criteria to achieve a selection as objective as possible. This meant the sample should be representable accordingly by key figures that displayed economic performance and success respectively decline. In addition, a specific sample had to be set that allowed for 'back-up cities', if a chosen municipality denied its cooperation or showed no interest in the research endeavour, to grant 40 cities as well as structural adequacy.

In order to support the city selection process, a list of indicators from the Urban Audit database in Eurostat has been taken into account to evaluate data availability (cf. Table 12). This pre-

[4] Basically their notion of institutions also shares common roots with works on neo institutionalism (cf. Paul J. DiMaggio and Walter W. Powell (1983).

selection was extracted from cities included in the Urban Audit database hosted by Eurostat, as it is the most comprehensive database on European cities available at this day. Indeed, it is of crucial importance that a certain amount of data is available for cities included in the final selection. In this spirit, and before proceeding to the pre-selection, a filter was applied excluding cities that have been judged to have poor data availability. In order to assess the availability of data for the cities selected in the case studies series, a set of 26 indicators of Urban Audit were considered. It provided the research team with an overview of data availability. With the insight it was decided to define poor data availability based only on the assessment of data available under 12 environmental indicators (indicator code starting with EN). Concretely, for each country, the availability of environmental data was assessed and defined as poor when demonstrating a significant lack in availability of recent data (2007–2012) compared to other cities of the same country. As a result, from 275 cities represented in Urban Audit, 89 cities have been arbitrarily excluded from the sample for showing poor data availability. At last, 186 cities remained for pre-selection.

This secondary quantitative data analysis delivers additional data to the quantitative data gathered by the field researchers. To define the number of cities for each country, the following strategy was applied: first, the population size of the countries was compared. In order to achieve significant and comparable results, it is reasonable to aim at a proportional distribution of the number of cities for each country. That means a country with a bigger population is represented by a bigger number of cities than a country with a smaller population. Nevertheless, for each country at least two cities were selected. Exceptional case is Turkey where only one city was chosen. It was handled this way according to the argumentation that lead to including Turkey in the country sample: Istanbul—it can be argued—is geographically situated at least partly on continental Europe. Table 7 shows the population size and the number of cities in the individual countries selected.

Table 12: Urban Audit indicators included in evaluation of data availability

	Variables			
Demographics	DE1001V: Total Resident Population			
Economy	EC2031V: Gross Domestic Product per inhabitant in PPS of NUTS 3 region			
Social Indicators	SA1001V: Number of Dwellings	EC3055V: Total Number of Households with less than 60 % of the national median disposable annual household income	TE2031V: Number of residents (aged 15-64) with ISCED level 5 or 6 as the highest level of education	IT1005V: Percentage of households with Internet access at home
Employment	EC1001V: Total Economically Active Population	EC1010V: Residents unemployed	EC1012V: Female Residents unemployed	EC2012V: Employment (jobs) in public administration, health, education, other (NACE Rev. 1: L-P)
Pollution/Air Quality	EN2002V: Summer Smog: Number of days ozone (O3) concentrations exceed 120 microgram/m3	EN2003V: Number of hours per year that nitrogen dioxide NO2 concentrations exceed 200 microgram/m3	EN2005V: Number of days particulate matter PM10 concentrations exceed 50 microgram/m3	
Water	EN3003V: Total consumption of water	EN3011V: Percentage of the urban waste water load (in population equivalents) treated according to the applicable standard		
Waste	EN4001V: Annual amount of solid waste (domestic and commercial)	EN4004V: Annual amount of solid waste (domestic and commercial) that is recycled		
Land use	EN5012V: Green space area	EN5016V: Land used for agricultural purposes	EN5024V: Land used for commercial activities (industry, trade, offices)	EN5004V: Land area in housing/ residential use
Transport	TT1010V: Percentage of journeys to work by public transport (rail, metro, bus, tram)	TT1007V: Percentage of journeys to work by bicycle	TT1008V: Percentage of journeys to work by foot	TT1012V: Percentage of journeys to work by car or motor cycle

Source: Eurostat (2004)

Figure 10: Map of 40 selected cities

Source: Share Map (2015)

Further, it was important to contact key actors in cities that could provide information and confirm a possible participation of the city; a phase carrying a high level of uncertainty depending on the willingness of the local actors. Therefore, in order to ensure a final number of 40 city cases, a larger pre-selection of 80 cities was made, which was reduced to 40 after establishing positive contacts to the cities.

Table 13: Cities selected

Country	City	Avg. annual GDP growth	Performance avg. pop growth/avg. GDP growth	Regarded time span
Austria	Innsbruck	3.84	C/C	1996–2007
	Linz	3.86	B/C	1996–2007
Czech Republic	Jilhava	4.93	B/C	1996–2007
	Praha	7.31	A/A	1996–2007
Denmark	Aalborg	5.32	C/C	2005–2007
	Copenhagen	1.81	A/B	2005–2007
France	Nice	4.62	B/A	1996–2007
	Paris	3.94	B/C	1996–2007
	Rennes	4.51	A/A	1996–2007
	Strasbourg	3.08	B/B	1996–2007
Germany	Dortmund	3.85	S/C	1996–2007
	Freiburg	2.55	A/B	1996–2007
	Kiel	2.60	A/B	1996–2007
	Potsdam	3.96	A/C	1996–2007
	Saarbrücken	4.05	S/A	1996–2007
Greece	Larisa	3.92	A/B	1996–2007
	Thessaloniki	2.62	S/B	1996–2007
Italy	Milano	2.59	S/B	1996–2007
	Napoli	3.13	S/C	1996–2007
	Roma	3.03	S/C	1996–2007
	Trieste	4.33	S/A	1996–2007
Poland	Krakow	7.80	S/A	2001–2007
	Lodz	6.56	S/C	2001–2007
	Lublin	4.76	S/B	2001–2007
Romania	Giurgiu	5.63	S/B	2001–2007
	Sibiu	12.74	S/A	2001–2007
	Timisoara	13.67	S/A	2001–2007
Spain	Barcelona	5.44	B/C	1996–2007
	Bilbao	6.81	B/A	1996–2007
	Madrid	5.66	B/C	1996–2007
	Valencia	5.78	B/C	1996–2007
Sweden	Goteborg	4.62	A/C	1996–2007
	Umea	4.20	A/C	1996–2007
Switzerland	Lugano	1.08	A/–	1990–2008
	St. Gallen	-0.08	S/–	1990–2008
Turkey	Istanbul	N/A	A/–	
United Kingdom	Birmingham	4.46	S/C	1996–2007
	Glasgow	5.45	S/A	1996–2007
	Leeds	4.54	B/C	1996–2007
	London	5.45	A/A	1996–2007

A: Overperformer, B: Underperformer, C: Close to average. S: Shrinking City (where population growth is considered); values for Switzerland reflect average population growth

Source: Urban Audit Database

of possible city developments within the country is desired. To fulfil this condition, the pre-selection of case studies per country was performed according to the following procedure: The first city was the one with the highest GDP growth rate in the country (GDP data is at NUT3 level). The second was the city with the lowest GDP growth compared to the national average. The third—if available—city was the one closest to the national average, making sure average cities are represented. 4) This sequence was repeated until the necessary number of cities was reached. In the special case of Switzerland, there is no GDP data available at NUT3/city level at this day. Consequently, GDP was substituted in the selection procedure by population data, still reflecting a trend of city development. Refer to Table 13 for an overview over the selected (and finally successfully enlisted) 40 cities for the research project. This procedure rules out subjective patterns in the selection of the cities, basing it on comparable and assessable parameters. The sample depicts manifold directions in which European cities (and among them three that could be classified as 'mega cities': London, Paris, Istanbul) are developing and in addition shows the structural diversity of successful and less successful developments. Although these traits do have diverse structural, institutional, or other reasons, according to key figures it allows assessing individual and contrasting statements for environmental policies and influences on them.

3.2.3 Identifying and interviewing seventeen key local actors

After country and city selection, the third sampling level gathered actor's level. Identifying and approaching actors for the interviews had to follow predefined selection criteria to assess a comparable sample over all cities.

The final research was conducted 'on site' by 15 external field researchers who were fluent in English and native speakers of the language of the country to be field researched. The goal was to perform adequate research in every country of the first level of research, thus questionnaire and interview guide had to be translated into the domestic language. Interviews were conducted in domestic language**.**

Organizing interviews

The process of data inquiry from quantitative questionnaires and qualitative interviews was organised and supported by ICLEI and included the identification and selection of relevant local actors. The researchers were provided with a field handbook, describing the main goals of the research and the selection criteria for the local actors. In June 2013, before the field phase commenced, an initial briefing meeting was held in Berlin with the field researchers due to the complex nature of both, quantitative and qualitative data gathering (Sue Arthur and James Nazroo 2003, 133–36). The field researchers were given clear guidance and templates to assist them in carrying out the interviews and in collecting the data. The event was also an opportunity to listen to and exchange on any potential concerns or difficulties that researchers felt could arise. After the field phase was finished, a de-briefing meeting took place, again in Berlin in December 2013. This meeting provided an opportunity for the field researchers to give feedback to the project consortium the knowledge and information they had gathered while visiting the cities and conducting the desk research.

While organizing the interviews, the interviewers worked autonomously and coordinated with the key holder within the local government. The key holders were involved at an early stage to discuss the research aims and objectives, and to explain in detail what was required in terms of identifying people for the interviews and questionnaires.

Regular reporting and continuous communication with the ICLEI team were considered of outmost importance, especially when problems emerged locally. Although a vast number of data had to be gathered, there were no grave problems that stalled the process. The conducted inquiries were done in face-to-face situations to ensure a quick response and to assist the respondents while filling in the questionnaires to ensure they understood the questions. The quite

Table 14: Realised results for data inquiry

Type	Planned	Realised	Challenges
Qualitative interviews	160	155 (96.88 %)	Lacking cooperation and political issues
Quantitative inquiries	480	453 (94.4 %)	Standard issues with non-response, complex questionnaire and time issues

Source: own presentation

complex questionnaires for the three different resource systems (energy, water, and green spaces) took about one hour to be completed. These questionnaires covered topics from personal information, state of resource system, challenges, lessons learnt, etc. Before entering the field phase, it was pretested and refined accordingly. In some cases due to the limited time of the actor and the complex nature of the questionnaire, it was only handed over and then sent back to the interviewer. This was an alternative procedure but opened possibilities for non-response. Especially interviewing the actor *and* having the questionnaire filled, was time consuming and collided with the actors' schedules. All in all the field researchers realised a very good return rate with both the questionnaires and the qualitative expert interviews (cf. Table 14

Selection of the actors

Before arranging the face-to-face interviews, every field researcher was required to identify relevant local actors in each city they were responsible. In total, the field researcher had to prepare a tentative list of 13 potential interviewees that follows the guidelines which were set up preceding the field phase and communicated in the previous briefing that prepared for the outlines and needs of the strategic sampling process (Mason 2002, 123–27). ICLEI approved this lists, advised and organised the field phase, and the researcher deployments. To help in the identification of the local actors, the key holder in each city was available to advice and to support. They provided orientation in the cities and established contacts if necessary. Once the tentative actors list had been approved, the field research commenced.

The interviewed individuals were important key actors in the local arena for environmental and sustainability issues. The selection of actors was done according to the thematic focuses in the research, i. e. energy, water, and green spaces. For this purpose, actors active in the field, with expertise and knowledge were potential interviewees and were recruited from representatives from local politics, local government and administration, but also from the business sector as well as from leaders of civil society or from bottom-up initiatives and NGOs in relation with socio-environmental issues. A list of positions of actors in each city is displayed in Table 15. Distributing the different types of questionnaires was realised on a simple segregation: while actor 1 only was interviewed, actor 2 always filled in a questionnaire on energy; actors 3 and 4 filled in questionnaires according to the city's dominant focus (water or green spaces). Qualitative expert interviews implicitly followed the same selection criteria although the field handbook or the initial briefings did not implicate this. This leaves the research with a certain constraint: the energy sector does not include interviews from civil society actors (actor 4) and only very few business actors (actor 3). This leads to difficulties in the qualitative analysis and interpretation of self-organisation capabilities. Since only political and administrative actors were interviewed on energy—and almost none from business or civil society—the results remain a bit one-dimensional. Vice-versa this also applies to water system and green spaces, where almost no political and administrative actors have been interviewed but predominantly actors from business and civil society.

The overall character of the sample for questionnaires represents the following features: ca. 75 % are male, the overall age ranging from 23 to 83 years, 48 years on average. More than 75 % completed a second cycle at university (master degree or equivalent). Of these 75 %, 14 % have a doctorate. The majority (60 %) is involved with sustainability as a central part of their job, 28 % as a secondary part. 15 % are involved in their free time. It can be assessed that

Table 15: List of actors

Actor	Profession	Conducted inquiry
1	Politician with a particular interest in sustainability (mayor for smaller cities)	Semi-structured interview only
2	Head of environmental/sustainability department (or other department dealing with environmental issues or sustainability)	Questionnaire on energy; semi-structured interview
3	A representative of the private sector with particular relevance to the issue of sustainability. This could be from the local chamber of commerce of a major business in the city.	Questionnaire chosen from water, or green spaces; semi-structured interview
4	A civil society representative (or leader of bottom-up initiatives, NGO, etc.)	Questionnaire chosen from water, or green spaces; semi-structured interview
5	Director/manager of energy provision company	Questionnaire on energy
6	A civil society representative (or leader of bottom-up initiatives, NGO, etc.)	Questionnaire on energy
7	Representative of the private sector with particular relevance to the issue of energy (local chamber of commerce, energy intensive industry, local private energy producers, etc.)	Questionnaire on energy
8	Director/manager of water provision company (water expert)	Questionnaire on water
9	A civil society representative (or leader of bottom-up initiatives, NGO, etc.)	Questionnaire on water
10	In the case water is provided by a private company a representative of that company, otherwise a representative of a business that has a significant impact on water resources such as industries or large-scale farming	Questionnaire on water
11	director/manager of urban planning department (or department in charge of green spaces)	Questionnaire on green spaces
12	A civil society representative (or leader of bottom-up initiatives, NGO, etc.)	Questionnaire on green spaces
13	A representative of the private sector with particular relevance to the issue of green spaces (forest owners, park manager, local chamber of commerce, etc.)	Questionnaire on green spaces

Source: own presentation

the selected and questioned actors are experts in their field(s). Furthermore, there is a gender bias that might come from higher academic qualification and the overall age of the sample as a mirror of social and societal state.

3.3 Methods and Methodological reflections

This section reflects the used sampling strategy and the used research methods. It tries to point out shortcomings of the research design and to delimit the range of possible research results. Since the research design in itself is very complex, there is an essential need to have a self-reflective approach towards the process and to keep the limitations in mind, when approaching the material for interpretation. Many different aspects produce hard to control effects on the research, the inquiry, and the data. Not all can be assessed at this point but the most important ones will be pointed out.

3.3.1 Quantitative data

The field researcher collected quantitative data with three different questionnaires (cf. Table 15 for an overview of questionnaires and actors). As described earlier, in each city 13 actors in the fields of energy, water, and green spaces, were identified. Each actor apart from actor 1 filled in one questionnaire, depending on the personal area of expertise. In sum, we expected 480 questionnaires, an average of 160 each on energy, water, and green spaces. The questionnaires for energy, water, and green spaces were analysed jointly for the first two sections, which covered questions on socio-demographic data and the experts' understanding of urban sustainability and socio-ecological transition. Sections three to seven focused individually on the specific resource systems and were therefore analysed separately.

Finally, 453 questionnaires were completed (151 energy, 167 green spaces, 135 water). These split to the three sectors as follows: 135 from government, 166 from business and 152 from civil society experts. Of the completed questionnaires in 40 cities within the four regions are 23 % from Eastern Europe, 17 % Northern Europe, 28 % Southern Europe and 33 % Western Europe.

For data analysis the software solution STATA was used (version 13), allowing for all state-of-the-art statistical analysis instruments. Initially a descriptive analysis of the research questions was performed. Differences between the answers of the regional clusters (north, south, east, and west) and the sectors (business, government, and civil society) were analysed alongside the six research questions. Afterwards a regression analysis was performed with identified factors influencing *self-organisation capabilities* to uncover relationships between local preconditions and the emergence of new institutional arrangements.

Mainly, a five-stage scale measured answers, thus measures for ordinal-scaled variables were used for the analysis. The differences between groups of respondents were analysed with the Kruskal-Wallis equality-of-populations rank test. It tests the hypothesis that several samples are from the same population (David Sheskin 2000, 595–609). Three different significance levels were observed and marked (* $\alpha = 0.1$; ** $\alpha = 0.05$; *** $\alpha = 0.01$). The regression was performed as ordered logistic regression, controlling for the cities and the sectors (J. Scott Long and Jeremy Freese 2006, 188–93).

3.3.2 Qualitative data

Interviews were conducted following a semi-structured topic guide. This guide provides an interview structure that makes the interviews easier to compare, and it served as a reminder that no essential questions were forgotten (Arthur and Nazroo 2003, 115–26). The answers depict the object in the view of the specific actor, which exactly means that things might be denoted differently or even contradicting, marking a problematic discourse (e. g. different views of a business representative and the member of an ecologic NGO). The interview situation is effective to foster reflection of the actors so they can give elaborated statements and assessments. This produces reflections and thus insights into the inner structure of socio-ecological transitions. For the interviewees it offered an opportunity to reflect the picture of the local transition.

Initially, 160 interviews were planned—four per city; 155 interviews were realised. The interview length stretched from 18 to 118 minutes with an average duration of 55 minutes. One-hour face-to-face talks are a very good result and promised differentiated and considerable statements of the interviewed. In addition, the time corresponds with a specific time slot that the interviewees were able to allocate in an otherwise tight schedule. Native speakers conducted all interviews in the local language, transcribed, and translated them to English (on the translation process cf. section 3.3.4). The analysis and interpretation process made use of computer-assisted qualitative data analysis software, especially MaxQDA (Version 11). The project was set up as a team project to allow easy cooperation and work division. In a first step, the interview transcripts were proofread for corrections, layout issues, and to gain insight into their content. Secondly the initial

coding process commenced, using Elinor Ostrom's *second tier variable system* (Elinor Ostrom 2007; Poteete, Janssen, and Ostrom 2010; Thomas Sauer 2012) as a starting point. The given code system was refined and differentiated with own codes, generated in an open coding process, yet remaining within Ostrom's system. The third step aggregated the coded passages according to the several research questions. By paraphrasing the retrieved coded segments for each research question, key words and 'headlines' were generated and allowed for thematic comparison (also with the results of the quantitative research). This led to the fifth step through the empirical interpretation and writing of three chapters on the determination the self-organisation capabilities in the three resource systems energy, water, and green spaces.

3.3.3 Additional field research resources

In addition to quantitative questionnaires and qualitative expert interviews, each field researcher had to provide a general city case study report and a personal field report. The first one served as an overview of the situation in the city and was composed as a desk research task profiting from the insights gained through the field research. By assessing documents, webpages and alike the researchers provided a document stating the public self-display and discourse of each city, alongside with a critical inquiry in the topics and discussions that were on local debate. The goal was to identify key issues in each of the resource systems and was supported by the interviewed key actors. Further, it was a possibility to get a neutral overview over local challenges and transition factors in contrast to the assessments made by the interviewees and above all provided context knowledge. A first desk research before the interview phase served the same purpose: finding suitable interviewees as well as gaining context and background knowledge for the interview situations and refinements for potential questions during the interviews.

The latter—the personal field report—served as a possible way to reflect on the field phase, identifying and contacting interviewees and feedback on the field inquiry. Generally, this document provided details on contacting key holder and potential interviewees and feedback for the research team on the questionnaire and the semi-structured topic guide for the interviews. When planning a sample with 40 cities, 160 qualitative interviews and 480 questionnaires, nothing ever runs as planned. So, the personal reports served also as a possible way to examine non-responsive actors and possible local structural problems (e. g. missing actors, etc.), as well as to give a flavour of what was happening in the city, but which might not be reflected in the data.

While the personal reports will not be published (due to confidentially issues), it is planned to make the city case study report available via online download. Its content adds to the empirical work of the research and sustains the interpretation of the material.

3.3.4 Methodological reflections

This study used a qualitative sampling strategy as depicted in section 3.2. A first important aspect related to sampling is the ability to generalise results. Because there has not been conducted a random sample—as it is required for any form of inductive statistics—it cannot be assumed that the findings of this research can be generalised in a statistical correct way. The shape and details of our sample did not allow for an easy accessible and randomly drawn sample (cf. chapter 3.2). This mainly comes from the fact that this research design is aimed at inquiring members of institutions (e. g. politics, governments, parties, NGOs, etc.). They cannot be randomly selected from a city. Nonetheless, there are possible ways to achieve a certain degree of generalizability, rooted mainly in qualitative methodology (Jane Lewis and Jane Ritchie 2003).

Every research design has its assets and drawbacks. The reflections on the used methodology and methods try to evaluate possible strengths of the set as well as potential drawbacks and

shortcomings. First, a mixed methods approach that combines quantitative and qualitative analysis is a good venture point to provide differentiated insights into the research field.

Reflecting qualitative research methods used, there is an aspect with the topic guide that structured the interview. It assesses transition locally and the state of the local resource system, lessons learnt and policy implications as well as transition factors and challenges. The latter two can be considered as perpendicular to the assessments of the local state of the system. This is sustained by the expert interview as a device to encourage actors to engage in self-reflection on the local transition, which likely produces expound problems of the field. In addition, interviewer effects cannot be excluded. Qualitative research is affected broadly by a complex set of uncontrollable influences on the interview situation. The field researcher's context is essential in the interview situation: own qualification, knowledge, or lack of knowledge of the field, appearance, and interaction (verbal, non-verbal) with the interviewee affect the situation. These cannot be controlled by the research team but only by the individual filed researchers themselves. Thus, adequate and dedicated personnel with an understanding of and qualification for qualitative research were hired.

Another aspect was the 'quality' of the chosen experts. Subsection 3.2.3 described a brief structure of the selected sample that allows for an attribution as 'experts'. In general, every chosen actor had to fill a questionnaire. Only the political actors (a1) were not given questionnaires. Concerning the qualitative interview partners, there was a question in the interview guide, which served as an entry to the more elaborate topics: it addressed the own individual involvement in sustainability topics and the individual motivation to grapple with these issues. All interviewees could state their own affiliations with the topic as well as their own involvement by their positions. Hence, the questioned persons are experts on sustainability in their fields and are able to contribute insights of value. This shows that the initial identification process of the field researchers to preselect relevant persons that have expertise and information on the field of sustainability was successful.

On the level of methodology, the procedure of data-interpretation has to be addressed. For the qualitative data, several methodological approaches can be considered. Usually, expert interviews are interpreted with means of content analysis. Another way could have been grounded theory but it was not a goal of the inquiry to generate theory (first of all the grounded theory would have required an open approach to the field and one to multiple returns to the field to retrieve refined information). In addition, the information gained from the experts is used as insight in local proceedings, processes and *their* knowledge of the system, used to explain to the researcher the mechanisms at work in the field. To assess the expert's knowledge means to take it seriously, as an access to social reality. A content analysis focuses the surface of this knowledge not of the underlying structures producing or limiting this knowledge and therefore is most applicable.

Another critical aspect for the research was that all data was gathered locally in the country's language (Katharina Inhetveen 2012). Thus, it was important that the questionnaires and transcripts were translated. Whilst the transferring of the quantitative data might not have posed a severe difficulty, the translations of the transcripts were a more complex task. For quantitative analysis, a problem can be recognised in the fact that questionnaires were translated from English to local language, which could shift sense and understanding that lead to violations of quality criteria for research (objectivity, reliability, and validity). In the process of data interpretation, complex questions tended to have not been treated equally in translation and/or handling and thus could not be handled accordingly in the data analysis. The translation of the expert interviews instead produced less grave problems, as in expert interviews, which should give insight into the fields of the actors only the concrete meaningful and semantical relations are important on the surface. In-depth interviews cannot be treated the same way because the translation process would have destroyed the in-depth meaning. In addition, the transcription process sufficed on a plain level that 'flattened' spoken language (e. g. by erasing all filling words like 'eem' or 'uhm' and erasing repetitions). The translation took only part in a written account as the inter-

view itself took place in the country's language by native speakers, then transcribed in original language and lastly translated.

Despite the described (potential) problems with translating questionnaire and/or interviews, the process was considered more accurate than conducting all research in English. Especially, comprehensibility of both questionnaires and interviews was extended since the capability to understand and answer questions in English cannot be assessed and might have been less detailed. Nonetheless, the research team proofread the initial translations to control any deviations of the original sense.

4. Socio-ecological transitions in the energy system: The local government view

4.1 The role of the resource system energy in sustainability transition

The energy sector is the foremost leverage to bring forward transitions towards sustainability, since a central aspect of climate change relates to CO2 emissions, energy use, and global warming. This chapter describes, analyses, and discusses its role in the socio-ecological transition of European cities. As a main system in urban contexts, the energy system is highly influenceable to reach sustainability goals (Jonathan Rutherford and Olivier Coutard 2014). On a technical level, this is achieved by actively changing the means of energy production to renewable ones, and passively by increasing the efficiency of either the energy production or the energy consumption (e. g. substitute coal with gas, installing housing insulation, etc.). Henrik Lund points out that in a more simplified grouping “three major technological changes: energy savings on the demand side […], efficiency improvements in the energy production […], and replacement of fossil fuels by various sources of renewable energy” (Lund 2007, 912) are undertaken. Thus, this field gives way to several, heterogeneous movements towards a socio-ecological transition in urban fields. Yet, on several occasions the research shows that especially greater energy efficiency can provoke rebound effects (Jeroen van den Bergh and Miklos Antal 2014). Increasing technological efficiency reduces the per unit price and thus the gained advantage is annihilated due to increased (cheaper) consumption (Lorna A. Greening, David L. Greene, and Carmen Difiglio 2000). Others conclude (for Norway) “that efficiency gains have interesting, non-intuitive, and maybe provocative impacts on energy consumption and carbon emissions” (Sverre Grepperud and Ingeborg Rasmussen 2004, 279). On individual consumption scale as well as on economic and industry scale this rebound effect is measurable (Horace Herring and Steve Sorrell 2009) but also results on macro levels are contested (cf. Lee Schipper and Michael Grubb 2000).

On a broader understanding, the issue of energy sustainability deeply connects with the topic of CO2 emissions. Therefore, energy topics touch topics of urban transportation, mobility, heating, and housing—which are CO2 intensive. This makes the energy field a complex system, hard to separate from other systems in urban contexts. To be more concrete on the role of the energy system for either the city as a whole and for the socio-ecological transition towards sustainability, this introductory section tries to evaluate its relations to the city and the other resource systems. The conducted questionnaires showed that the experts assess the energy system as *one of the most important* resource systems in our research sample. The focus on energy topics relates to the perceived urgency of a transition: cities are due to their density of population as well as the income produced by industry and businesses consuming more energy as rural areas. In addition, city lifestyles differ and are more energy intensive (Jukka Heinonen et al. 2013a, 2013b). Considering urban areas for a socio-ecological transition towards sustainability is crucial. This gets even more important, since nearly half of the world’s population lives in urban areas, thus showing the importance of assessing them thoroughly as social, economic, governmental, and ecologic factors for a transition process.

Next to the structural needs of modern society and industry for electricity, there is a historical development observable. Energy production had become highly centralised and decoupled from places of energy consumption. The shift from renewable to fossil resources during the carbon era implied higher energy density and lower energy transport costs, facilitating production of primary energy far off the location of energy users. “Counterfactual estimates of city population sizes indicate that our estimated coal effect explains at least 60 % of the growth in European

city populations from 1750 to 1900" (Alan Fernihough and Kevin H. O'Rourke 2014, 3). The current energy transition towards renewable resources, like wind, water, or solar power, partly reverses this development. Relying on new energy sources comes along with the necessity to link back together spatial production and consumption. Due to electric resistance in long distance grids, energy loss is too high. Relying on CO2 neutral energy production means that this energy has to be gained decentralized, locally. Excluded herefrom is nuclear energy—that in parts of Europe is considered as low-emission technology; but neglecting the difficulties in final disposal of nuclear waste and the fundamentally safety and risk estimation of nuclear power plants. This flaws nuclear energy as bridge technology and especially overcasts its low life-cycle greenhouse emissions, which are nearly as low as with hydro energy (cf. Sims, Ralph E. H., Hans-Holger Rogner, and Ken Gregory 2003; Manfred Lenzen 2008).[5] Nevertheless, the socio-ecological transition basically has to be described as a spatial 'recoupling' of energy production and consumption, like in pre-coal era, when energy sources were windmills, watermills, or the local forestry, located in vicinity of energy consumption. It is an interesting detail that the term 'sustainability' first appeared in the emergence of modern forestry in the 18th century. In his treatise on forestry Hannß C. Carlowitz (1713) discussed the problems of uncontrolled (unsustainable) wood cutting. Thus, he argues that one ought to cut down only as many trees as one could regrow in a certain period. This origin is reflected upon by several interviewed actors, although it is apparent that this is a trait for German-speaking regions only (e. g. Freiburg, a1, 11; Linz, a2, 11; Kiel, a1, 14; St. Gallen, a1, 10). The term gained a broader popularity due to a publication in the 1980s, *Our Common Future*, by (The World Commission on Environment and Development 1987). The focused result however, is not autarchy. It is an increased level of self-subsistence, however also generating trade-offs (Johannes Schmidt et al. 2012). They include volatility of local electricity grids with unsufficient back-up potentials and the general problem of quickly adapting to changing consumption patterns and equally unsecure energy provision.

Central developments that occur beside to spatially recoupled energy production are the constructions of 'smart grids' that aim at a combination of production, consumption, and infrastructure for the distribution. This has to happen especially in respect to provision fluctuations due to an uncertain availability of renewable energy sources.

This first of three empirical chapters presents the relevant findings extracted from the material of quantitative and qualitative analysis. Chapter 3.3 describes the mixed methods approach deployed in this research. It combines qualitative interviews with quantitative statistics. Practically this is realised by a reciprocal reference of data from both domains. It presents an interpretation along the discussed research questions. The structure of the chapter is as follows: Section 4.2 discusses the self-organising capabilities in accordance to the presented theoretical extensions of Ostrom's IAD framework. It focuses on the central argument of the study that self-organisation can be considered as a transition driver and lays out the status of the sustainability transition. Section 4.3 depicts actors, actions, and transition factors that are involved, undertaken, and fostering (in) socio-ecological transitions in the cities. The section concludes with an account of lessons learnt by local actors. Section 4.4 describes the processes of norm adoption and emergent changes in local frameworks to assist in transitions. Local decision autonomy as a foundation for self-organising capabilities is assessed in the light of local city transition processes. The last section discusses the findings and contextualises them.

The insights for this research come from a quantitative inquiry of 480 key actors in the field of urban socio-ecologic transition for the basic survey and 151 for the specialised part on energy: 57 government actors, 54 business actors, and 40 civil society actors. As well as from 69 quali-

[5] Low-emission affinity of nuclear energy is—as well as nuclear energy in general—an issue of dispute. It is imperative that arguments are also considered in their context that generated them, since a quantity of studies is conducted on behalf of nuclear energy corporations and interest groups; cf. for a summary of several studies Nuclear Energy Institute (n. a.).

tative expert interviews, that covered 32 political, 34 administrative, and 3 business actors. It covers the cities Aalborg, Barcelona, Birmingham, Copenhagen, Dortmund, Freiburg, Giurgiu, Glasgow, Gothenburg, Innsbruck, Istanbul, Jihlava, Kiel, Larissa, Leeds, Linz, Lodz, Lublin, Lugano, Madrid, Milan, Naples, Nice, Paris, Potsdam, Prague, Rennes, Rome, Saarbrücken, Sibiu, St. Gallen, Strasbourg, Thessaloniki, Timisoara, Trieste, and Umea.

4.2 Self-organisation capabilities and Sustainability transition

The section of this chapter introduces two main parts of socio-ecological transitions. First, it provides insight in the current state of the transition and describes an understanding of sustainability, the state of the resource system, as well as perceived and experienced challenges. In a second subchapter, the self-organising capabilities are assessed next to the state of participation in political processes, the transition, or other.

4.2.1 Socio-ecological transitions

At the beginning stands an outline of the transition processes towards sustainability. This includes statements about the understanding of sustainability as a concept and descriptions of the ongoing socio-ecological transition in the cities. Additionally experienced and expected challenges as well as influencing factors are inquired.

Initially, in both the questionnaire and the topic guide for the interviews, the experts were asked to give a brief definition of the term ‘sustainability’ to assess **a common understanding**. As a first insight, Table 16 shows a distinct estimate from the experts’ questionnaire responses about the importance of several issues. These issues resemble the set out sustainability goals, defined by the European Union (Council of the European Union 2006; Eurostat 2009, 2011, 2013b). The European sustainability goals partly overlap with the former Lisbon Strategy and now the Europe2020 strategy. They can be divided into three aspects: social, environmental, and economic sets of goals, which resemble with the core definitions undertaken by the United Nations in 1992 that became known as the Agenda 21 or as Rio 1992, in reference to the hosting city Rio de Janeiro. From the experts’ point of view, the topic of public transport is the most important field, followed by clean energy on second and local water resource management and education together on third place. Generally, social aspects for sustainability like migration or demographic changes are considered less important, than resource issues. The interviewees commonly name these “three pillars” as a framing for sustainability definitions. Those pillars are a standard approach, considered as “conservative perspective” (Dortmund, a1, 12), “the three P’s: profit, people, planet” (Aalborg, a3, 13) are solid knowledge of university’s curricula (Prague, a1, 13). Interviewees occasionally referred to an additional fourth pillar. The questionnaires cannot give further insights, since it did not inquire it per se. However, the interviews show significance of governance, institutional or governmental aspects for sustainability (e. g. Milan, a2, 11; Nice, a2, 16; Strasbourg, a3, 14). The broad reference of the three-pillar-model indicates that to a certain degree the definitions of sustainability are common knowledge and suggest a convergence to the EU sustainability goals, although they are not considered equally relevant.

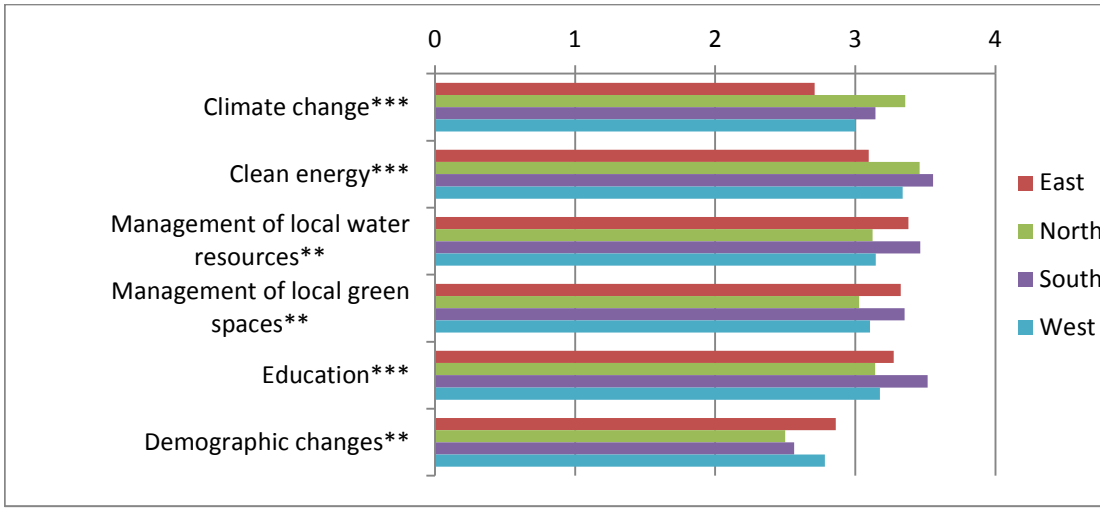

Figure 11: Differences in sustainability perception according to European region (scaled from 0: none to 4: very high)

Regional comparisons of the importance of sustainability issues show significant differences for climate change as well as clean energy for North and South, and education for East and South (cf. Figure 11). In case of clean energy, the differences, also to the other two regions, are moderate although highly significant. Education is an important issue in countries that suffer from weak economies and from not yet solidified social security regimes. Thus, for Southern and Eastern Europe the importance of education is fundamental to gain on already advanced educational standards of other European regions.

Interviews depict a holistic understanding of sustainability processes, bringing to attention that a socio-ecological transition cannot be achieved through one item alone. It is of utmost importance to address all facets of sustainability in all sectors and systems (e. g. Birmingham, a2, 13; Paris, a2, 12–15; Strasbourg, a1, 17). This underlines the high complexity and heterogeneity of the sustainable transitions in cities that makes the process hard to define (e. g. Innsbruck, a2, 21; Linz, a1, 11; Timisoara, a1, 22). In a broader sense sustainability is referred to as an attitude in thinking and a specific set of moralities and values that harmonise with ecology (e. g. Freiburg, a1, 19; Innsbruck, a2, 21; Larissa, a1, 25; Nice, a2, 14; Paris, a1, 12; Prague, a2, 11). In addition to this holistic approach, a temporal dimension becomes important that aligns sustainability to the future for following generations. With it comes the treatment of scarce resources and long-time preservation: a “compromise between history and future” (Prague, a2, 9). Inheriting the planet to *future generations* is a specific motivation (e. g. Barcelona, a1, 20; Copenhagen, a1, 12; Madrid, a2, 18; Umea, a1, 19). This temporal dimension is by definition a crucial part of sustainability although not everywhere mentioned accordingly.

Table 16: Importance of sustainability issues (scaled from 0: none to 4: very high)

Variable	Obs	Mean	Std. Dev.	Median
Public transport	441	3,41	0,746	4
Clean energy	447	3,36	0,786	4
Management of local water resources	442	3,29	0,847	3
Education	439	3,29	0,820	3
Management of local green spaces	441	3,21	0,866	3
Management of local land resources	439	3,18	0,860	3
Climate change	446	3,03	0,971	3
Poverty and social exclusion	436	2,98	0,910	3
Labour markets	437	2,98	0,871	3
Consumption behaviour of the citizens	440	2,92	0,947	3
Private transport	440	2,85	1,016	3
Production patterns of local enterprises	430	2,82	0,923	3
Demographic changes	439	2,69	0,931	3
Migration	421	2,47	1,006	3

In contrast to these quite homogeneous definitions of sustainability, the **estimations of the local socio-ecological transitions** are more heterogeneous. They include problematisations of the transitions, perceived challenges, as well as results. Intersecting is the relevance of action plans and strategies derived from European policies (e. g. Europe2020, Agenda 21, etc.) as well as underlying programmes and networks like the *Covenant of Mayors*[6] (Adrien Labaeye and Thomas Sauer 2013). Timeframes for the transition processes are beginning around 1992, directly influenced by the first Rio conference. In relation to the Europe2020 program, they are estimated to end in the year 2020—at least for achieving the set out goals, not for a completely successful transition (e. g. Barcelona, a1, 22; Kiel, a2, 16; Timisoara, a1, 25). These strategies are directed towards reducing CO2 emissions and pollution levels of the cities and relate to energy and public transport as well as traffic in general (Birmingham, a1, 14; Thessaloniki, a2, 13–17). Individual aspects of the cities can complement this.

Further, the state of the socio-ecological transition is connected with awareness and awareness raising. Efforts to change citizens' consumption patterns go along with information campaigns and use individual behaviour as leverage in fostering transitions from 'bottom-up' (Bilbao, a1, 22; Lugano, a2, 11; St. Gallen, a1, 11). Although the term 'sustainability' frames these efforts, one actor consequently avoided the term. The interviewee argued that if a city pursues goals of economic and social cohesion, the overall result would be "sustainable" (Leeds, a2, 12).

The **state of the local resource systems** is very heterogeneous. The divergences even within cities suggest difficulties in correctly assessing them. In terms of energy efficiency, the cities have unanimously taken steps to increase these levels. This is achieved by a variety of programs or projects, e. g. SMART cities, the changing of street lighting with LEDs or implementing new directives and laws that request energy efficient building. Also legally binding standards are introduced to make administration and municipal buildings energy efficient (e. g. Birmingham, a1, 40; Glasgow, a1, 17–19; Paris, a1, 33). The estimated share of locally produced energy also

[6] The covenant is a voluntary programme that aims at increasing energy efficiency and the use of renewable energies in the participating cities. Also by committing it is sought to exceed the CO2 reduction goals, set by the European Union cf. The Covenant of Mayors (2008).

is very heterogeneous and substantially differs within cities. Two cities aim at implementing a "circular economy" (Freiburg, a1, 18; Rennes, a1, 74) and combine production and continuous use of residuals in other production steps. For example, water treatment facilities produce sewer sludge that biogas digesters use to generate energy (Nice, a1, 38). All in all the share of locally produced renewable energy is low. In several locations, it is not distinguishable because local municipal utilities merged with (inter)national companies (Freiburg, a1, 41). Occasionally, a bio digester not working to capacity buys the needed bio waste from distant communities (Potsdam, a2, 93–98). This shows that the share of renewables in the local energy mix is hard to estimate and coherent information is urgently needed.

Local energy efficiency also was difficult to assess in the interviews. Nonetheless, distinct actions and decisions were taken to increase efficiency according to Europe2020 objectives.[7] Above that, cities provide help in increasing energy efficiency, e. g. by establishing a solar cadastre (Potsdam, a1, 94) or by helping to spot "energy thieves" (Umea, a2, 46). In addition to this, the productivity of the resource system for renewable energies faces the problem that urban areas—other than rural areas—do not have the same preconditions (Potsdam, a1, 92) as well as spatial problems: "putting photovoltaic panels on all roofs might not be the solution" (Nice, a1, 60). The prerequisites for different types of renewable energies are not given everywhere. This is also true for spatial use where solar panels can be more easily downscaled for individual use than a wind power plant or a bio digester.

Cities set **goals** for their socio-ecological transitions, which they derive from distinctive programs and strategies (like Europe2020) and provide the cities with key figures and timeframes. Occasionally, they project to the year 2050, depending on the set of goals. They involve interconnected social, economic, and environmental issues and refer to the three-pillar model of sustainability. A special focus lies on the social dimension: several statements pronounce the necessity for cohesion and adequate mechanisms to treat social problems (e. g. Aalborg, a2, 89; Nice, a1, 66). Another important aspect is education as has been mentioned above (e. g. Linz, a2, 95; cf. Table 16: Importance of sustainability issues). This has to be backed financially and thus social cohesion goals include economic goals for an "integrated economy" in relation to municipal agenda and urban development (Strasbourg, a1, 99; Lublin, a2, 50). Setting goals provides a reference point for planning and a 'translation' of socio-ecological transitions into a language accessible for administrative and political processes as well as for public understanding. Therefore, goals have to be clear to allow better performance and measurement (Copenhagen, a1, 79).

A last aspect for assessing the sustainability transition in the empirical data contains **challenges perceived and expected**; problems that the actors have dealt with or are assuming to encounter. Above that, their relevance for the future of the transition was inquired. The questionnaire asked for anticipated challenges to the availability of affordable energy in the future (cf. Figure 12). Especially peaks in energy demands, an adequate infrastructure, and price volatility pose key threats to the local resource system. The several statements are, again, very heterogeneous and thus are more diverse in the interviews than in the questionnaire. In addition, they reflect individual features of the according cities. The assessments can be summarised in different categories. First, social problems like segregation, energy poverty, and gentrification are concerns that emerge from transition processes especially when cities improve their overall living quality. Cities are expected to realise socio-ecological transition that is affordable for everyone (Aalborg, a3, 15; Madrid, a2, 28). Closely related to this is the problem of high costs for citizens to get entrance to these 'communities,' e. g. for constructing houses or the mandatory consumption of (more expensive) renewable energies (Bilbao, a2, 81–82; Thessaloniki, a2, 77).

[7] These goals are derived form a "strategy for smart, sustainable and inclusive growth" of European Commission (2010): reducing greenhouse gas emissions (like CO2) by 20 % in relation to the levels of 1990. Increasing the share of renewable energies to 20 % and increasing energy efficiency by 20 %.

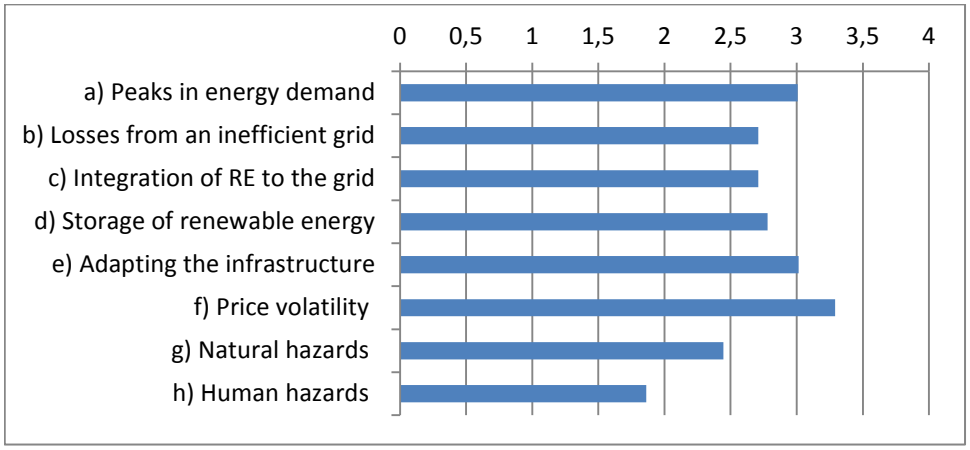

Figure 12: Anticipated challenges to the availability of affordable energy (scaled from 0: very low to 4: very high)

Here lies a problem of so-called *boundary rules* (cf. chapter 2.2.5) that prohibit entry in local resource systems and make sustainability an exclusive, socially closed privilege (Max Weber 1978).

Problems erupting from structural aspects reinforce social problems. Individual histories of cities, their industrial layout, and affiliation with service sector, the dynamics, and structural changes resulting from it, create challenges that influence the cities' social structure as well as political dynamics, financial means, and so forth. This refers especially to structural changes, mainly in urban districts that relied on heavy industries. With their decline social and economic problems went hand in hand and are still felt today (e. g. Bilbao, a2, 28; Glasgow, a2, 19; Rome, a2, 26). A broader problem poses 'the crisis' (financial crisis, economic crisis, crisis of the EU and the Euro) and the continuing austerity politics (Aalborg, a1, 35; Barcelona, a1, 30). The socio-economic backbone of cities interferes with transitions towards sustainability and is an important challenge, especially if transitions towards post-industrial cities are incomplete or were unsuccessful. However, successful industrial transitions provide a certain vantage point for socio-ecological transitions (e. g. Dortmund, a2, 26–28). The interconnectedness between social, economic, and ecologic wellbeing is obvious to this point.

Other problems are legal and juridical challenges. Concerning the approaches to transitions, implementing edicts, legal standards, and laws are common to direct the possible actions of actors in a more sustainable direction. This happens on a variety of levels from the EU to the local level. Nonetheless, juridical intervention often is felt as paternalism that cuts individual freedom. Secondly, a prohibitive culture is accentuated more than a culture of encouragement towards sustainability (Milan, a1, 19; Trieste, a1, 12). Thirdly, the laws are, occasionally contradicting, inconsistent, or ambiguous on the different levels from EU to the local level. They add further complexity that makes "the interpretation of the law […] quite complicated" (Prague, a2, 21).

Urban areas are vastly developing, especially in given condition of socio-economic changes and ruptures of crisis. Sustainable transitions and developments towards new resilient states are often ambiguous and accompanied by risks that a society has to cope with. Planning as an ultimately insecure and risky endeavour yet reflects on a possible open ended development—and suffers from lacking knowledge of resource systems (Barcelona, a2, 28). A transition always involves the risk that something will not develop according to plan and that a plan ultimately *can* fail. One of the challenges perceived is thus firstly to plan somehow (and reduce the risk of failure) and secondly to follow the plan until successful completion. As the definitions of sustainability have shown, they are considered heterogeneous and complex. Therefore, the planning

processes are—and planning inherently is—uncertain and has to reflect social, ecological, and economic dimensions alike (Lugano, a2, 11). Istanbul has a slightly different problem: its development follows no plans. Moreover, developments 'happen' and administration 'plans' afterwards to 'cover' these uncontrollable developments (Istanbul, a2, 13)

Lastly, funding issues of sustainability programs are another challenge that is related to juridical problems (Innsbruck, a2, 27). Financing programs and campaigns are central in socio-ecological transitions, especially in terms of decision autonomy. Thus, the possibilities to acquire funding on EU, national, or local level are important for an ongoing transition towards sustainability—especially in times of 'crisis' and EU austerity politics; and as well for structurally 'weak' cities per se (Leeds, a1, 23–25).

4.2.2 Self-organisation capabilities

Developing self-organising capabilities and citizens' participation are the foremost mechanisms to realise a bottom-up transition towards sustainability. As transition drivers they press urgent matters in local communities that are negotiated in "action arenas" (Poteete, Janssen, and Ostrom 2010). The steps towards successful self-organisation necessarily include the ability for citizens to participate in local decision making processes, in politics, and in public spheres and to engage in public discourse (Jürgen Habermas 1989). This possibility to 'get involved' in public affairs has to be granted and institutionalised. Thus, to assess the self-organising capabilities, first of all the state of citizens' participation has to be evaluated.

Foundations for participation in a local energy transition lie in several local aspects. A central necessity for constructive participation roots in information. On the level of individual citizens, efforts to get informed on processes and developments that are fostered by municipalities exist, e. g. by holding public discussions or informing the citizens in advance (Prague, a1, 39; Kiel, a1, 82). However, occasionally information about decisions serves transparency purposes only. It does not intend to allow citizens to influence the decision process itself (Innsbruck, a2, 83). The other way round, municipalities seek insight into the needs of the local population and initiate surveys for the citizenry, although this is a rather rare phenomenon (Jihlava, a1, 15). In addition, a municipality provided equipment for citizens to measure their own energy efficiency (Rennes, a2, 45). A more substantial necessity is general awareness for ecological problems and a technical understanding of the underlying mechanisms (Nice, a2, 113; Paris, a2, 50). To allow and foster participation in political processes, citizens require a forum to seize voicing options. These can be discussion rounds, surveys or public meeting of city administration (Nice, a2, 67; Rome, a2, 30). An interviewee states that a specific "energy culture" is helpful as it provides awareness and motivates to participate (Barcelona, a2, 58). In general, the interviewed actors from politics and administrations see a distinct importance in participation. Although it is a challenge to involve and motivate the citizens, it is a basic requirement to achieve a socio-ecological transition (Larissa, a2, 20; Madrid, a2, 35; Paris, a1, 38). In addition, the pooling of creativity and innovativeness produces more and more elaborated ideas (Strasbourg, a3, 63). Participation cannot be enforced. The citizens have to be enabled and motivated to get involved—above that, nothing else can bring them to participate than awareness, idealism, and convincement (Linz, a2, 93). The quantitative analysis shows that there are severe differences between the actors taking responsibility and leadership as well as how those inquired perceive the leadership (cf.

Figure 13). Especially the mayors' roles and those of the politicians of the majority are critically assessed by civil society, whilst governmental actors see it as more valuable. The other way round this also can be stated for the role of local civil society groups or NGOs. Another important aspect is the overall assessment that leadership in development of local energy efficiency is higher than the potentials for creating new energy sources. This indicates the perceived complexity in rendering new sources accessible in contrast to increasing efficiency of existing

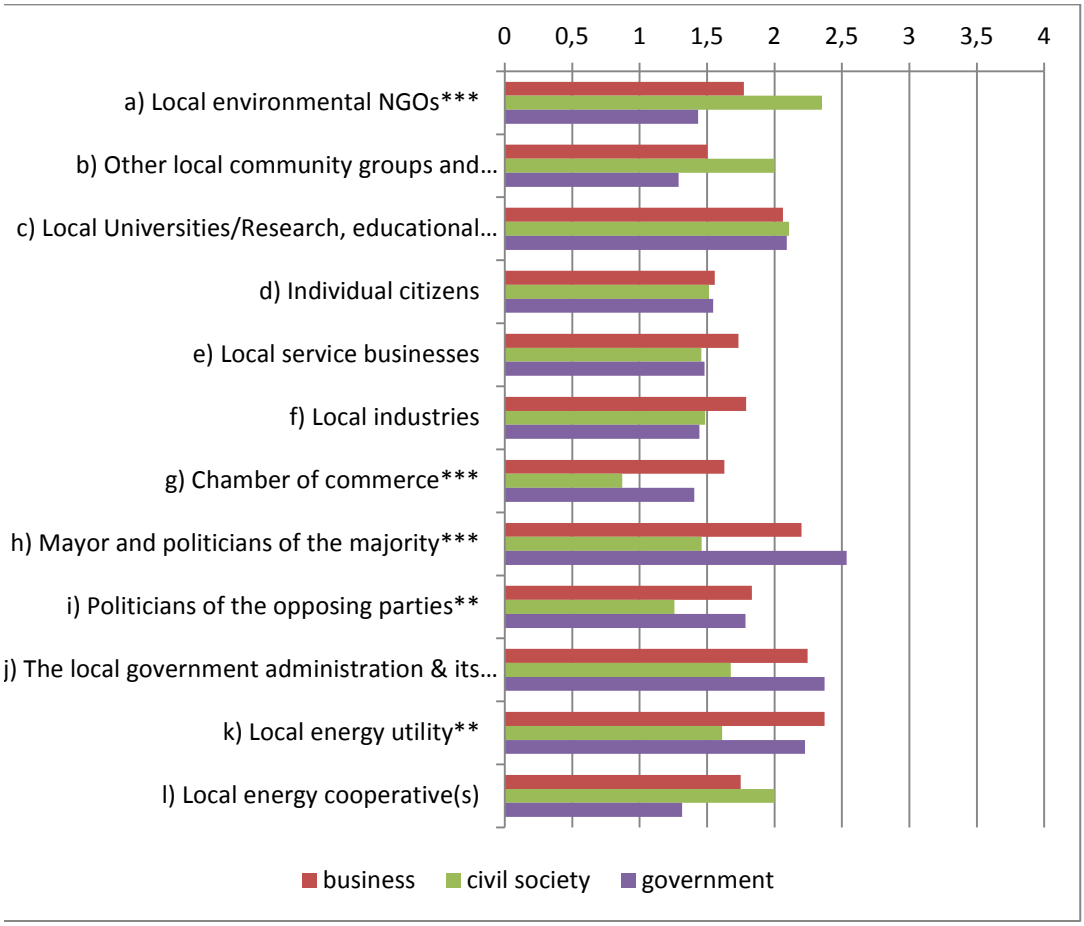

Figure 13: Leadership shown by local actors in developing local renewable energy (scaled from 0: none to 4: very high)

ones. In this point, universities and research are considered to take the leadership, along with the ruling parties and the governmental administrations (cf. Figure 14). Participation of citizenry is low.

One direct approach to participate on local level is to get involved in political proceedings. As above, in some places there are possibilities to get involved into public discussions on decisions, although sometimes they take place only once the decision is taken. Nonetheless, there are positive examples where this possibility exists and can influence administrative procedures (Jihlava, a2, 39–41). Participation is even a juridical precondition for political processes on different levels. For example, consultative neighbourhoods with the capability to assign budgets on local projects for one year exist or social media are used to integrated citizenry. In this case, law obliges to provide structural mechanisms to participate (Timisoara, a1, 85–86). Involving citizens in local campaigns also plays a role in Birmingham. Open planning processes and the delegation of emerging topics to open forums that handle them on citizens level are described (Birmingham, a1, 48 and a2, 62). Although there is a certain understanding for the importance of citizens' participation, there are also cases where genuine participation efforts are obstructed. For example 'round tables' for energy planning are only opened for technical experts or for actors from economy—generally discussions on planning and strategies are kept on a professional level that excludes citizenry (Aalborg, a2, 64; Lugano, a1, 87; Milan, a1, 33). Business representatives and politics further make the important decisions, "since at important decisions money talks" (Innsbruck, a2, 79). On top of this, socio-ecological movements can be 'institutionalised' and absorbed by political/administrative structures (Kiel, a2, 92). A unique case is Swit-

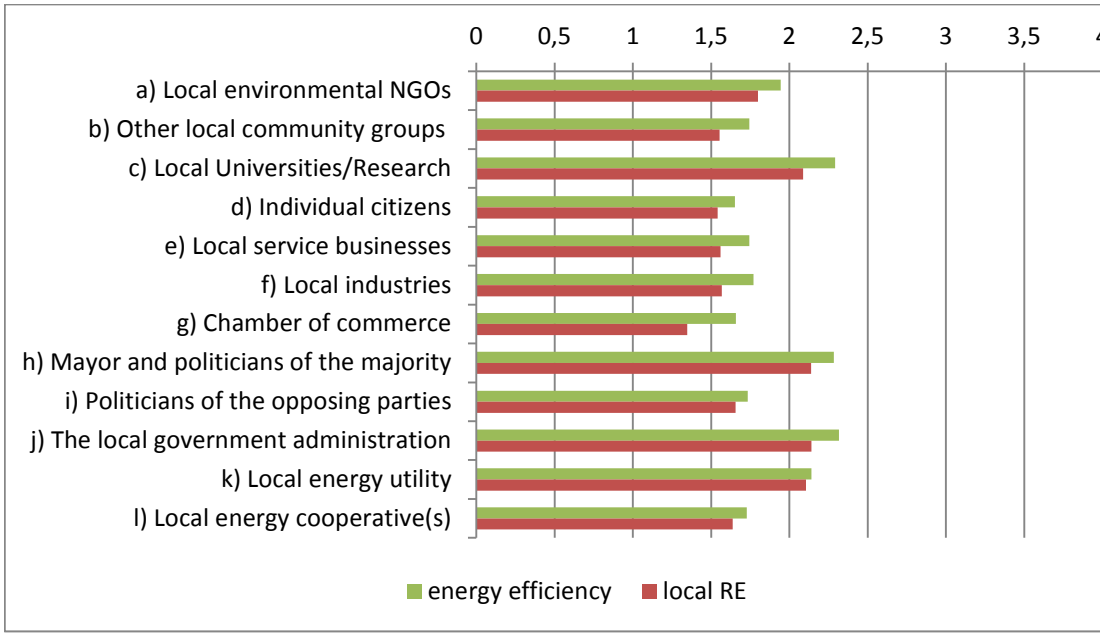

Figure 14: Leadership in improving energy efficiency and developing renewable energy locally (scaled from 0: none to 4: very high)

zerland that has a specific constitutional framework. Direct democracy, the possibility to vote on every political decision, constitutes citizens' participation as rooted in the constitution of the country and is part of the political self-conception (St. Gallen, a1, 50 and a2, 29, 39).

Participating in energy related topics in urban contexts faces several problems, challenges, and hindrances.[8] A first hindering factor is the complexity of energy issues on a technical and infrastructural basis. Further, political processes are bureaucratic, administrative procedures time-consuming and opaque (Gothenburg, a2, 52; Strasbourg, a3, 91). A severe question about responsibility arises as a diffuse participatory movement hardly allows for clear structures, hierarchy, and so forth; addressing and taking responsibility is nearly impossible but mandatory for the interviewed politician (Dortmund, a1, 51). In addition, the process is too complicated since not politics have direct influence on energy issues but the administration and they do not easily "change a winning horse"—assuming that the current system works well (Rome, a2, 66). This leads to the problem of representation by citizens' participation. Since initiatives are usually a small(er) group of people, they are not adequately representing the citizenry (Larissa, a2, 60). The governance of energy policy of a country also determines successful or possible participation: in several cases, energy system policies are set on national level without any local decision autonomy (Barcelona, a1, 55; Lugano, a2, 59).[9] Especially aspects of lacking motivation and awareness for relevant topics add to issues of disputed participation. The majority does not take interest in specific issues (Madrid, a2, 72, 72–74; Umea, a1, 73) or takes interest in other matters like transportation, etc. (Trieste, a1, 49). The preference of citizens for convenient tradition-

[8] It is important to keep in mind that nearly all the following statements on citizens' participation were inquired from political or administrative actors. Thus, they show *their* opinion that follows the *logic of their field*. Therefore, statements have to be assessed carefully: representatives of energy cooperation and alike might have different stories to tell.

[9] Generally, France could be added to this group, since energy policies are in the hand of a single national corporation, the *Électricité de France* (EDF). However, EDF does not have a monopoly on electricity production. It is interesting that in these statements Lugano and St. Gallen differ. At least on a general position on citizens' participation, the statements do not diverge; only on energy policies which is a cantonal responsibility.

al democratic representation undermines participation. Getting involved contradicts their urge to be “caressed” by politics (Glasgow, a2, 66; Leeds, a1, 52–54). A politician puts it straight: “I think participation is overrated” (Kiel, a1, 68). He refers to a project where participation was offered but not seized, even not by environmental NGOs. However, these statements are no adequate assessment of social reality, only one distinct view.

Out of or alongside of citizens’ participation, **self-organisation** can emerge. The relation between participation and self-organisation is not easy to depict; it can be argued that the correlation works in both ways. Participation fosters and sustains self-organisational processes—or it hinders them, since citizens are included in decision-making processes and consider this situation as adequate and discard the possibilities to self-organise. Further details about forms of self-organisation are discussed in chapter 2.1.

The foundations for successful self-organisation lie in several aspects, according to the interviewed and inquired experts. A first corner stone are coherent legal frameworks that structure self-organisation and allow for a degree of reliability and predictability. In a sense, bottom-up projects still need to be controllable for politics. While local or national laws back self-organised projects, constitutional rules determine their influence. Acting in a complex field, a framework provides a ‘playground’ for self-organised socio-ecological transition (Barcelona, a2, 75; Bilbao, a2, 123). A contrasting case is Istanbul, where openly no citizens’ initiatives exist; the citizens’ role only includes informing the city council or the administration about problems (Istanbul, a2, 50, 64). Further, political, or governmental support sustains self-organised movements, e. g. by socialising local energy production and transforming it to “community-based energy association[s]” (Copenhagen, a1, 72; quote: Potsdam, a1, 106). Administration offers needed information about the resource system in form of a solar cadastre (Dortmund, a1, 31 and a3, 58; Kiel, a2, 118; Paris, a1, 50; Potsdam, a1, 94). Providing adequate tools for citizens’ initiatives is also important to cope with the demands of self-organisation. However, administrative and governmental institutions not necessarily fulfil this task (Rome, a2, 80). It can be stated from the quantitative analysis that in no region energy cooperatives are common. On top of this, the overall assessments about cooperation and conflict remain neutral; in terms of conflict, Western Europe seems to be more harmonious (cf. Figure 15). This can be interpreted in different way. Either, there is no conflict, or there is no form of cooperation in the first place that could lead to conflict.

With the solar cadastre, a requirement for adequate local level plans is articulated. It represents knowledge of the local resource system that is obligatory for successful self-organisation. These can be interpreted twofold: as knowledge of the local context and as having a plan—an idea of how to advance (Aalborg, a2, 81–84). The role of local or (inter)national NGOs is also important. Citizens’ movements are guided by NGOs that have existed for some time and can draw on experience and knowledge; or they form NGOs to recur to a form of organising—although these are not always long lasting. An actor describes the frustrating short lifespan of NGOs as cooperation partners for administrations, which relies on longer timeframes (Thessaloniki, a2, 69). A central precondition (and a challenge) is to guarantee and secure sufficient funding of self-organised endeavours (Madrid, a2, 90); without funding, ideas remain ideas—and there are many of them (Timisoara, a2, 128).

A last step extracts the state and shape of self-organisation from the interviews. A socio-ecological transition of the energy system has to be considered as “a decentralised revolution” (Freiburg, a1, 79). The state cannot govern an energy transition on its own but has to distribute the responsibility to local entities and movements. Partly, this includes experts’ opinions on socio-ecological transitions that primarily have to change individual decisions, behaviour, and consumption (e. g. energy saving, energy efficiency, etc.). Taking influence on, changing, shaping, or incentivising behaviour is seen as task of the state, government, or local administration, and politics (Barcelona, a1, 73; Freiburg, a1, 82; Milan, a2, 89; Potsdam, a2, 170; Trieste, a1, 53). This coincides with statements about citizens’ participation considering it individualised behav-

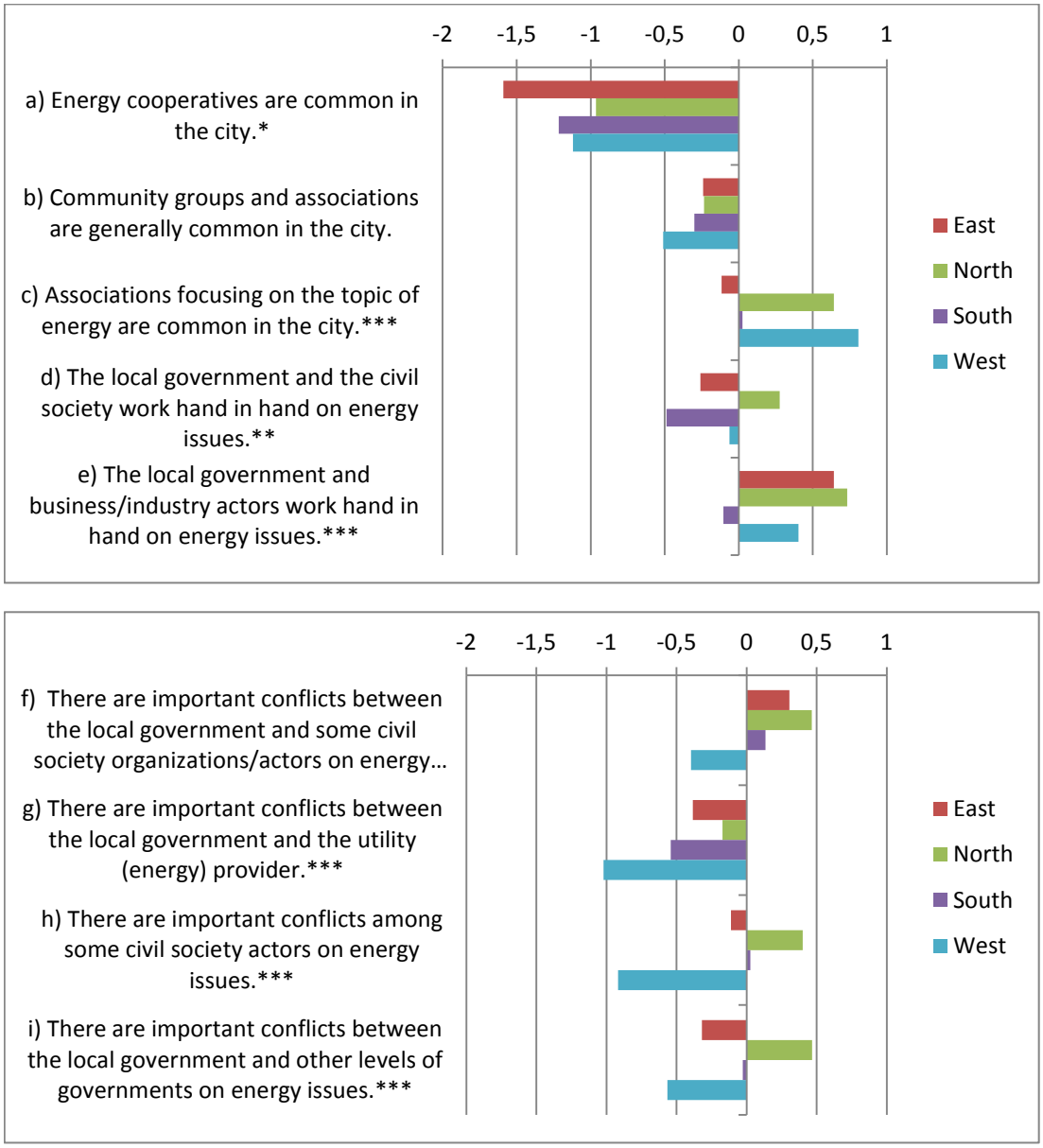

Figure 15: Cooperation and conflicts (scaled from -2: strongly disagree to +2: strongly agree)

ioural changes. The question is, if this perception of participation and self-organisation is reductive, neglects, and inhibits bottom-up organised initiatives. Participation is restricted to a passive role in socio-ecological transition that has no influences on the process, but only on its consumption. Focusing on individual behaviour change complies with activation policies that strengthen citizens' responsibilities. Participation then is a personal affair. If it were about influencing political decision processes, participation would be an intervention on governmental sovereignty.

The state of self-organised energy transitions in the city sample is hard to assess for the interviewed persons. This, on the one hand, has to do with the overall organisation of the resource system (e. g. on national or regional level—Rennes, a1, 139; Larissa, a2, 78); on the other hand it is hard to distinguish organisational forms, especially since the sample did not include civil so-

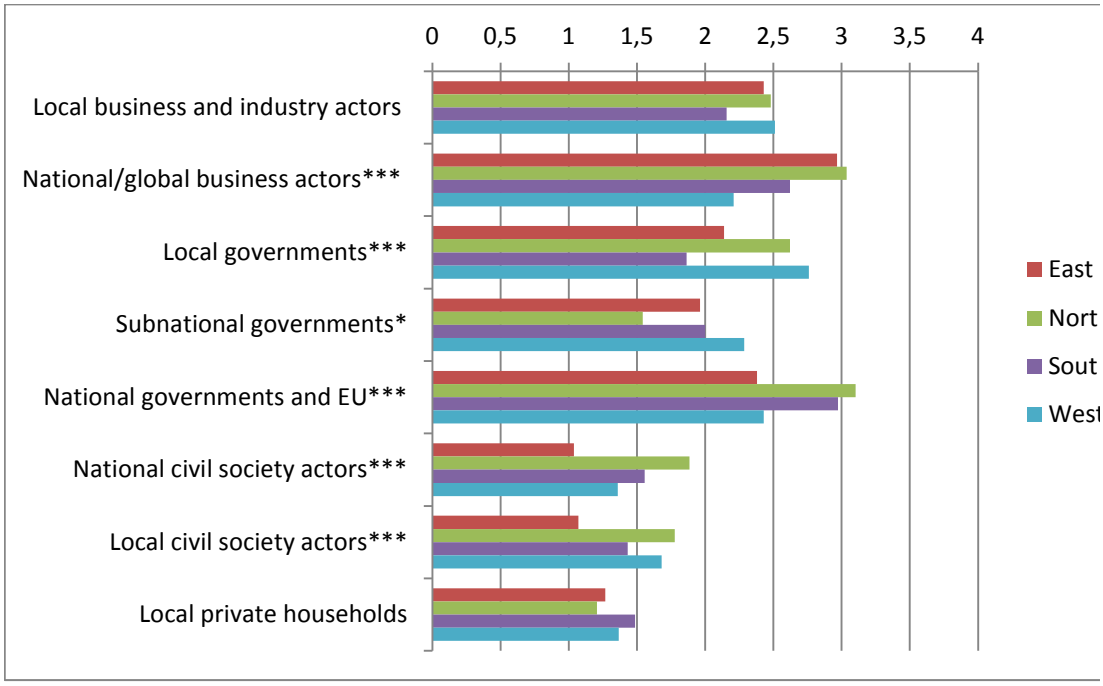

Figure 16: Influence on the local energy mix (scaled from 0: none to 4: very high)

ciety actors. The latter point is a pitfall, since it is not possible to conclude from the interviews to a distinct state of self-organisation in perspective of civil society. Further, the state of self-organisation depends on the kind of renewable energy resources: while wind energy is a collective undertaking, biogas digesters might be too expensive and solar panels on rooftops could be too individual for a citizens' initiative (Leeds, a2, 67). Diverging from this, self-organisation *takes oppositional influence* on planning processes introduced by municipalities. The citizens' initiatives do not start individual campaigns; they only involve themselves in governmental projects (Umea, a2, 64; Trieste, a1, 64–67). To foster grass-root or bottom-up self-organisation several key aspects can be found. First, the governance level for resource systems sustains civil society initiatives if self-organisation is positioned on the local level. Also the state (spatial, quality, etc.) of the resource system is of importance (Bilbao, a2, 123). Other important issues to enable self-organisation are awareness and a coherent mentality, which are motivational drivers for individuals to participate and self-organise (Lugano, a2, 87; Umea, a1, 115–120).

4.3 Actors, factors and lessons learned

This section describes involved actors and influencing factors on socio-ecological transitions. A second part will focus on lessons learned in the process of transitions.

4.3.1 Actors, actions and factors

Nearly everywhere, the **involved actors** were very heterogeneous. This means that transitions involved all aspects of urban characters from politics, economy and third sector or civil society. Every group has its own interests, involvement, and motivations, which differ in importance or influence on the matter. Anyhow, the realisation of socio-ecological transition as "decentralised revolution" necessarily can only take place, if central actors are involved and cooperate eye to eye. The main groups come from politics and administrations, economy, civil society and from (higher) education and science. In Freiburg, one actor stated that the whole city is involved in a

collective undertaking (Freiburg, a2, 84–85). Additionally, pronouncing individual responsibility is not the same as an active civil society that interacts, cooperates, and collaborates. The results of the quantitative inquiry suggest throughout all inquired actors, local as well as national or global business, and industry actors have the highest influence on the local energy mix, with peaks in North and East Europe (cf. Figure 16). In addition, national governments and the EU have high influences (especially in North and South Europe). For West and North Europe, local governments have a solid influence, which stems from the specific autonomy of local governments, especially in Germany or Sweden. Very interesting is the importance of local private households: while assessing the impact and possibility of self-organisation as a transition driver, the roles of individual behaviour and consumption choices were emphasised. The inquiry shows that local households are least important for constituting a local energy-mix although the argumentation for self-organisation tends to pronounce a market-driven 'supply and demand' mechanism as driving forces. This contradicts the described citizen driven socio-ecological transition, which is facilitated by a sustainable consumption choice and individual behaviour. Households—individuals—are least capable of shaping such a transition, which suggests that aggregated individual choice is not suffice. This supports the argument for a vivid civil society. In addition, the overall possibility of civil society to take influence on the local energy mix is low to medium.

Cooperation spans a diverse set of actors that include politics and administration nearly everywhere as well as business associations and business companies. On several occasions, NGOs or citizens' associations were additionally included (e. g. Madrid, a2, 46; Milan, a2, 50). A special cooperation partner is found in universities that are taking part in education and research (Copenhagen, a1, 41–44; Dortmund, a3, 74; Freiburg, a1, 120; St. Gallen, a1, 46).[10] Freiburg constitutes a vivid example where university and research institutes participate in a public discourse on sustainability. This commenced as generating counter knowledge against experts from nuclear industry in the 1980s (Freiburg, a1, 54). The field of education includes kindergarten, pre-schools, or primary schools where they teach children basic sustainable behaviour in anticipation that they reintroduce this knowledge at home (Giurgiu, a2, 46). The influence of NGOs is sensible and reflected; their success in projects, frames, and so forth though, is quite different. They participate either directly in projects, or foster social cohesion but they do not initiate developments on their own (Kiel, a1, 40; Rennes, a1, 73; Saarbrücken, a1, 40; Thessaloniki, a1, 51). Besides, sometimes only political actors were mentioned to have a part in the dynamics, e. g. in parliamentary processes (Paris, a1, 20; St. Gallen, a1, 37).

Elaborated networks that institutionalise collaboration are particularly important. These emerge either as a response to urgent socio-ecological transitions (Birmingham, a2, 41; Glasgow, a1, 49; Rome, a2, 38), or because of longer ongoing fundamental changes in socio-structural dynamics of cities, e. g. transformations towards post-industrial cities (Dortmund, a3, 36). Within these collaboration networks, different heterogeneous actors are involved, like unions or churches, especially to address economic and social topics.

The interviewees discussed only a few conflicting constellations: the chamber of commerce worked against environmental goals (Kiel, a1, 40). Construction industry in Rome proved to be a specific conflicting sector, since energy efficiency in buildings adverse the intentions of industry magnates (Rome, a2, 26). A complete deficit of cooperation between industry and the municipality occurred in Timisoara (a2, 59). All in all this resembles to the indicated low level of conflicts, inquired by the questionnaire.

[10] Especially in France, the *Grandes Écoles*, elite universities, that train the "Grand Corps" (Paris, a3, 59), are a central part of creating influential expertise. Graduates like engineers fill important positions and are thus able to make important decisions on the resource system and energy topics (e. g. Rennes, a1, 103; Strasbourg, a1, 94).

The actors undertook **different kinds of actions** in socio-ecological transitions. These were collected and put together into a collage of local activities. Overall, many diverse activities and actions can be reconstructed but in this context they will be grouped according to underlying functions.

Incentives are used to trigger active sustainable behaviour. This is sought through different mechanisms like reducing prices for public transportation, or introducing eco-tickets (Linz, a1, 41). In addition, clean vehicles are subsidised while polluting ones are punished, e. g. by raising taxes (Madrid, a2, 86). These measures aim at reducing CO2 emissions. Moreover, actions directly related to energy incentives were done: e. g. subsidies for switching to long-distance heating, changing to energy economical boilers, and so forth (Linz, a1, 113; Madrid, a2, 62). A more general approach was fostering local circular or 'close' economies that are energy efficient in the sense that spatial dimensions were reduced and product cycles were kept to a minimum (Leeds, a2, 78).

Planning procedures and strategies for local transition processes are additional activities related to transition processes. It has already been discussed that sustainability goals were derived from program strategies, negotiated internationally. Translating these global agreements into local strategies and action plans is a decisive step to reach the outset targets. Setting up plans for local circumstances referred not only to energy issues but also to CO2 emission reduction and traffic/public transportation topics. They included for example the planning of a public transportation system (Rennes, a1, 57), a "table of mobility" (Madrid, a2, 22), a 'master plan energy transition' (Dortmund, a3, 34), or were derived from Agenda 21 goals (Rome, a2, 36). Planning makes the local problems visible and lays out the fields of action to a broader public (Trieste, a1, 41 and a2, 99). Planning and deriving of strategies bring local stakeholders together and fosters their cooperation, since their interests are included in the discussions (Aalborg, a1, 46). Especially joining networks like the *Covenant of Mayors* is a particular initiative of the cities' political actors to exchange on specific topics (Bilbao, a1, 38; Naples, a2, 12). This intersects with 'networking' which tries to bring together several different stakeholders. Especially for interviewed business actors, this produces local synergies (Aalborg, a3, 19–20; Dortmund, a3, 64). Networks also include universities and institutions of higher education (Aalborg, a3, 54; Nice, a1, 83). This fosters integrating social innovations (Leeds, a1, 40; Leeds, a2, 35; Rennes, a2, 15). The performed actions indicate that especially municipal institutions lay their goals in catalysing the cooperation and information exchange in networks—but also in participating in such networking contexts.

On a smaller degree, actions undertaken consisted of actively funding projects. The cities' tasks are financing and maintaining cost intensive projects or buildings (Jihlava, a1, 11). Backed by the EXPO-Framework for the World Exposition 2015, financial assets were made available e. g. for a public transportation project (Milan, a1, 27). Funding is provided for building refurbishments to support individual contributions to better energy efficiency (Innsbruck, a2, 47).

The most substantial part of activities consisted of distributing information, raising awareness and educating about sustainability in general or very detailed and specific aspects. The range went from information campaigns to the installation of fixed public relations departments to address citizens. Among these was the implementation of a festival with 70 events about sustainability as a joint undertaking of a broad coalition of the municipality, business, and civil society actors (Aalborg, a2, 48–49). Also expert lectures were considered as a way to provide the city with detailed information (Aalborg, a3, 39). Dortmund started an information campaign that addressed the population and tried to reach them with local-football enthusiasm and identification ("Climate is a home match" and "We are climate fans"; Dortmund, a2, 80, 82). Further, an information centre was installed to inform the citizens and to provide consultation services (Dortmund, a2, 72). A business actor acts as an "information broker" on new technologies and developments sensitising local business companies (Dortmund, a3, 34, 64). Information via leaflet drops (Prague, a1, 39) covered more basic information about sustainability issues, but also

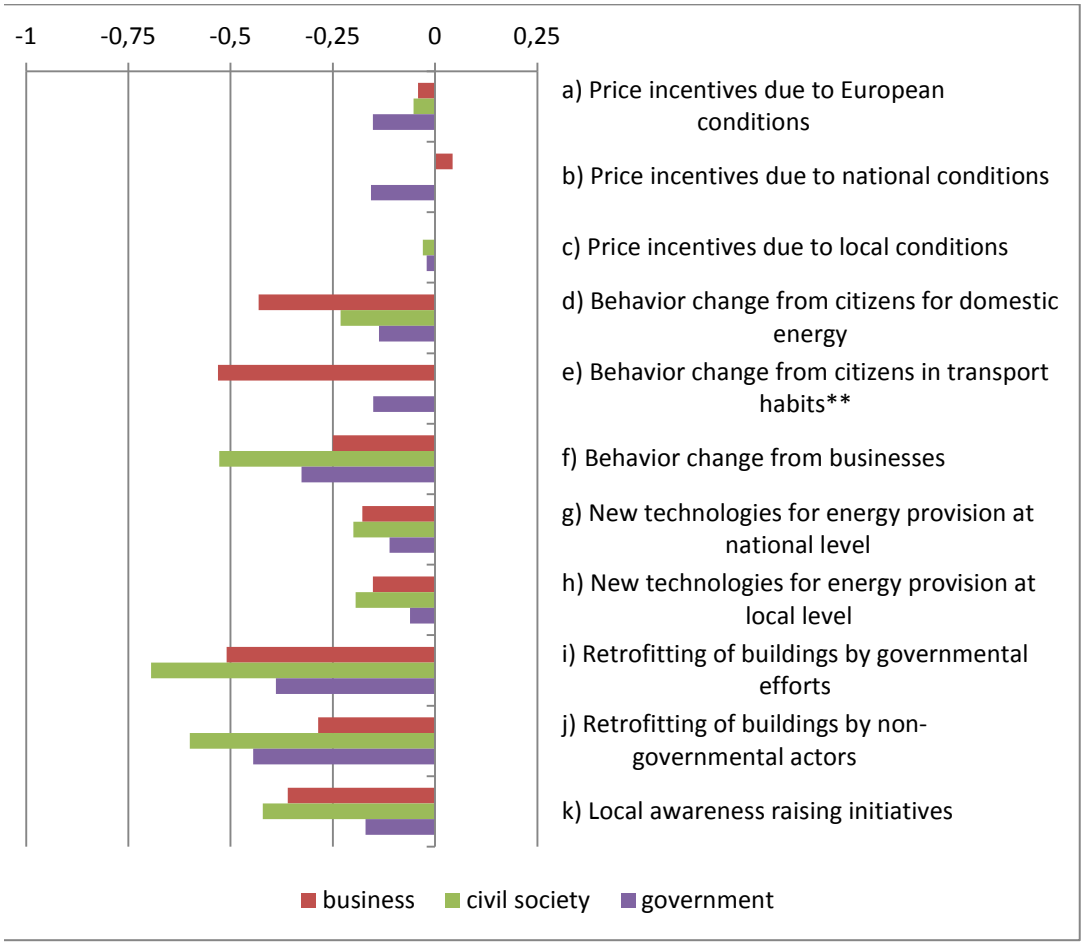

Figure 17: Influences on the energy consumption in the past 10 years (scaled from -2: decreased a lot to +2: increased a lot)

more detailed and concrete information about the resource system were made available by cartographies of energy consumption (Nice, a1, 28). The local work of NGOs is supported by providing an information space (Saarbrücken, a1, 41). More generally a focus lay on distributing information and raising awareness among the citizens and sometimes also among industry and economy; these actions were in all regions sensible but dominant mainly in Eastern and Southern European countries (Birmingham, a1, 48; Giurgiu, a2, 46–49; Larissa, a2, 45; Strasbourg, a1, 55; Thessaloniki, a1, 51 and a2, 31).

The last point describes individual actions. This refers to residual activities and programs that resulted in specific outcomes. For example, Trieste refurbished old buildings from the 1960s and 1970s (Trieste, a1, 12). Energy efficiency and awareness was increased in the past by increasing energy efficiency on several levels, from light bulbs at home to street lighting (Birmingham, a1, 36; Lodz, a1, 49; Saarbrücken, a1, 41; Trieste, a1, 33). Another, yet disciplinary, approach actively changed taxation and charged specific unsustainable behaviour. This correlates with goals in traffic and emission reductions to “challenge the citizens to make them understand” (Milan, a1, 21). In another sense, this creates incentives to act and behave environmentally friendly and solves problems with dense traffic and pollution, e. g. the pollution badge for older cars that are forbidden to enter inner cities in Germany. Another variety of directly undertaken actions was the renovation of public and administrative buildings in the cities and municipalities. They are updated with new insulations, new heating systems and by installing solar panels and alike (Larissa, a1, 72; Nice, a1, 29; Paris, a1, 33). Usually these measures only ap-

ply to public buildings, since the local administrations do not have any direct influence on the private hand. A more specific insight delivered the questionnaire and described influences on energy consumption: an especially high effect has the retrofitting of buildings by governmental or private owners. Civil society actors additionally named the greening of businesses as a factor. The business actors claimed that behavioural changes in transport habits and in energy consumption are responsible for a decreased energy use, thus each pointing to past activities and different leverages (cf. Figure 17).

The further topic of **factors** that foster or hinder—or more generally have an effect on—socio-ecological transitions is divided into three distinct groups. Interviews assessed local and non-local factors and additionally temporal aspects. These factors influence transitions in certain ways and are a key to understand the action situations of local sustainability campaigns and decisions. They relate to manifold aspects of the urban system, stretching from material texture, to dynamics of the social and technology. A clear distinction between hindering factors and challenges was not always possible.

As a first estimation, the goal to set examples can be considered: taking a pioneering position in the transition process, two actors explained that providing good examples is a key factor for their cities (Copenhagen, a1, 46; Freiburg, a2, 198–200). Especially Freiburg's self-conception as a beacon for other cities in transition displays itself as a 'best practice' example.[11] Another local factor with influence on sustainability transition is the importance of awareness. This also has been discussed above under the topic of challenges for participation and self-organisation as well as in the light of concrete actions undertaken in the transition. This clearly shows the acknowledged importance of awareness by the interviewed actors. Education is a primary aspect to raise awareness (e. g. Dortmund, a1, 32; Gothenburg, a2, 27–31; Linz, a1, 67 and a2, 31; Rennes, a1, 50). Timisoara relies on consumption self-monitoring, an individualisation of sustainability development to make citizens aware of their consumption (Timisoara, a2, 94). Likewise, the relevance of planning processes was stated, especially in combination with setting goals and 'translating' EU or national strategies in local action programs. Planning and steering is realised by environmental management systems that imply to a certain degree that controlling the transition is possible (Aalborg, a3, 77; Freiburg, a2, 158). An actor compares reflections on planning to a "Stalinist view" indicating rigidly planned steps of a centrally planned economy (Rennes, a1, 32). Further, planning is a "tradition of prospective, of territorial planning" (Rennes, a2, 14) that structures and guides transition movements (also Kiel, a1, 112; Kiel, a2, 38; Strasbourg, a1, 43).

In addition to these factors, structural changes of cities act as transition factors. In the light of post-industrial cities, this has been discussed above and can be denoted as a factor. Structural ruptures can provide the drive for a socio-ecological transition as well as be an obstacle for the development. Successful developments from industrial to post-industrial cities ease sustainability transitions (Bilbao, a2, 38) and may lead to new fields for sustainable socio-cultural and economic developments (Linz, a1, 67). Several actors operate as transition factors. Especially universities and institutes for the environment play a major role, especially in knowledge exchange and technology (cf. Figure 14). Their tasks consist of research as well as education ("green university" and the Institute for Applied Ecology Freiburg, a1, 40, 66, 120; PIK[12] Potsdam, a1, 60; EMPA[13] St. Gallen, a1, 46). A more subtle factor can be described as a 'pro-active' culture of problem raising—a well-functioning public discourse about local problems and challenges

[11] The term 'best-practice' is problematic. Since it implies a normative approach to sustainable transitions that is believed to be generalisable for other cities, it neglects the uniqueness of a city. It implies that 'one-size-fits-all' is a valid approach to individual and unique urban systems.

[12] Potsdam-Institut für Klimaforschung—Potsdam Institute for Climate Impact Research

[13] Eidgenössische Materialprüfungs- und Forschungsanstalt—Swiss Federal Institute for Material Testing and Research

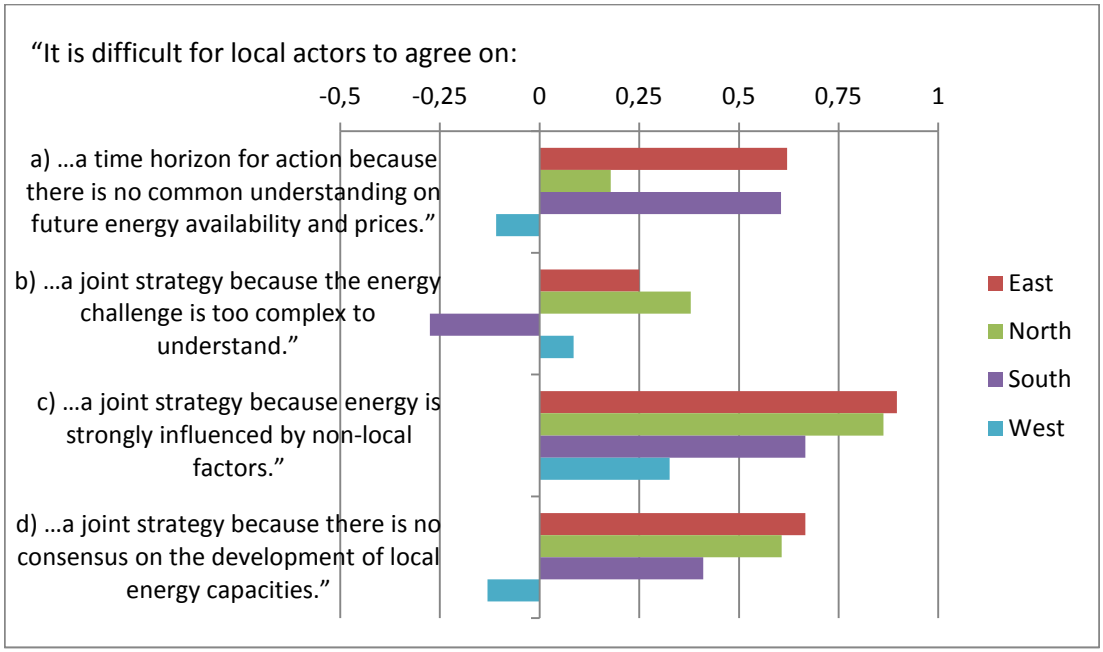

Figure 18: Difficulties to agree on local energy strategy (scaled from -2: strongly disagree to +2: strongly agree)

among several stakeholders is considered helpful (Rennes, a1, 50). This can be extended by collaboration among a majority of involved actors (Dortmund, a2, 41; Timisoara, a1, 57–61).

The last point covers structural aspects, a variety of heterogeneous factors that influence socio-ecological transitions in many different ways. For example, spatial attributes of the urban region influence transitions (Barcelona, a2, 35; Lugano, a2, 31). Socio-structural aspects, like the population and its affinity to cars in a "class city"—a city that is characterised by class distinctions—are distinct traits that have effects on socio-ecological transition (Birmingham, a1, 32). Further, the local influence of specific political parties—especially ecological parties—or political guidelines for the administration (Freiburg, a1, 39; Saarbrücken, a1, 29–30) as well as legal frameworks that enforce sustainable behaviour (Rome, a2, 26) take their influence. Finally, the overall context of a city is unique, and thus, there are no one-for-all solutions (Potsdam, a2, 54) and this uniqueness influences transition towards sustainability individually (Glasgow, a2, 37).

Non-local factors include regional, national, or European influences. First, the given legal frameworks have their own influences on socio-ecological transitions. Especially the degree of local autonomy is directly connected to the impact of national administrative frames and European directives—thus, the state of de-centralisation is an essential indicator for the overall independence of the local level and its possibility to enact a transition (cf. chapter 3.2.1). In a broader sense, local actors have to correspond to legal standards in a varying degree with the level of (de)centralisation (Saarbrücken, a1, 36–38). More generally, "regulation pressure always makes things move" (Strasbourg, a3, 50), although this is a one-dimensional argument that has a potential to neglect hindering aspects of legal frames. Their influence as transition factors is at least ambivalent, as their assessment for self-organisation capabilities has shown (see above). Funding issues can be included into legal frames since they relate to specific development programs or directives that provide financial coverage (Dortmund, a1, 32). Legal frameworks as well as funding policies on national or European levels are the main foundation and are central for promoting and advancing socio-ecological transitions. These consist of several parts like goal setting and the controlling of goal attainment (Potsdam, a2, 74); the support of pilot projects on local level for later use in a national application (Giurgiu, a2, 44; Lugano, a1, 61–64)—

above all, controlling functions are fulfilled by national governmental levels. Contrasting this, governmental levels can also hinder transitions equally by legal means or by denying the importance of sustainability, by neglecting regions or specific urban areas (Barcelona, a1, 39) or by being “unbearable conservative” (St. Gallen, a1, 31).

The temporal dimension converges with time horizons in set out goals, discussed in chapter 4.2.1. More specifically, time horizons can be interpreted as transition factors. Actors consider the temporal frame as an important and contested factor in socio-ecological transitions (cf. Figure 18). The road towards sustainability is a long one—in parts it is argued that its endpoint is never entirely reachable (Barcelona, a1, 36)—and changes will take a long time to have any visible and sensible effects (Umea, a2, 80). Therefore, socio-ecological transition has to aim at long-term investments, e. g. in education, which has an impact on individual behaviour of the next generations (Trieste, a1, 24). In addition, depending on the size of a local project, it takes respective time to realise an endeavour. This means to accept, plan, and implement or build the deliverable, since the complexity of a project increases in relation to its size (St. Gallen, a1, 52). Development plans have different time horizons in respect to the ownership (public, municipal, or private economy) and the desired development path (Aalborg, a3, 35). Condensed, short time economic gains stand against long-term goals of sustainability—as reflected above in the common definitions of sustainability (Umea, a2, 30). The long timeframe perspective is not alone the central temporal factor. Depending on different measures, different time frames in realisation, efficiency, and impact exist (Timisoara, a1, 65–67). Radical shifts though are rather uncommon as “constant dripping wears away the stone” (Potsdam, a2, 52).

4.3.2 Lessons learnt

In process of a socio-ecological transition, the involved actors gain experience in a wide variety of fields. “Social learning” is an important asset in transition processes that are participatory or self-organised (Eneko Garmendia and Sigrid Stagl 2010). These experiences help in successfully achieving upcoming projects, tasks, etc.; they are **lessons learnt** about different facets of a complex, contingent, and unstable transitional process. These lessons learnt can be grouped in different categories. In this context, the experts’ narrations reflected especially the roles of actors and actions undertaken, processes and details of the field, governance issues, contexts of the resource system, and individual experiences as a residual category. Figure 18 shows that there are difficulties to agree on common strategies on the local level. These extensive issues are difficulties arising from non-local factors. Here, East and North Europe achieve the highest approval, albeit it is—in relation to the initial scale—low (around +0.8). The only significant group differences exist in ‘time horizon’ and a ‘joint strategy’. Especially Eastern and Southern Europe anticipate difficulties in finding a common time horizon. Joint strategies for developing local capacities are common in East and North Europe and a bit in South Europe. The highest agreement (without significant group differences) scored the topic of joint strategies influenced by non-local factors.

A first point discusses experiences made in interaction with local stakeholders. The reference to these was rather general. Administrative processes have to involve stakeholders in socio-ecological transitions and they should ask for their visions and scepticisms (Innsbruck, a2, 85). Any new undertaking can face resistance from the population, so integrating them into processes can ease common doubts (Linz, a2, 75). Mainly, the problem is to satisfy every single citizen, since the population perceives local projects not always well (Bilbao, a2, 110). Cooperation and keen leadership are strong influences on a transition that try to outmanoeuvre the problems of disinterested or opposing citizens (Gothenburg, a2, 53–55). Glasgow’s actors argue for the involvement of as many people as possible and the importance of a socio-ecological transition on everybody’s agenda (Glasgow, a1, 64; Glasgow, a2, 71). Therefore, a specific culture of discussion is imperative that consists of compromising, negotiating and respecting others’ ideas (Prague, a2, 55). Moving things together and having a common task and goal are essential

points that have major impacts on local transitions (Aalborg, a2, 66). The linking of actions is important: in reflection of the denoted 'holism' in sustainability definitions, each action is meaningful but only together they "become a pertinent policy" (Nice, a1, 84).

A second field provides insights into learning processes, experiences, and especially issues about information and educational facets. More and especially more detailed and transparent information are important and sustaining in socio-ecological transition (Linz, a1, 97). Associations to help local businesses in switching their sources could address questions and problems about renewable energy (Strasbourg, a3, 96). Cooperation helps a lot, especially when exchanging experiences with other cities in networks, like *Covenant of Mayors* (Lublin, a2, 48). Cities are potent actors, so the wish to cooperate is there from other actors—at least in the self-description (Leeds, a2, 53). Interviewed actors pronounced the value of information and cooperation already in regard of participation and self-organisation. This indicates that there are learning processes and that the importance of these two aspects cannot be neglected. To be successful in bringing together several different actors and engage in cooperation as well as motivate civil society and others, a strong narrative of sustainability is required that activates all parties (Birmingham, a1, 52). Lastly, there remains a more general question about how to handle these gained experiences and insights. A basic structure for assessing and saving lessons learnt is important to draw value from experiences (Kiel, a2, 110). Nevertheless, the urge for cooperation is no distinct alternative to level out external market effects or as an opposition to governmental hierarchy.[14]

The third group of lessons learnt applies to governmental processes, issues and topics related to financing and funding. The latter assesses that especially projects need secured funding possibilities, for which a reliable and straightforward government system is required (Nice, a2, 54). The urge for European funding is pointed out on several occasions and especially for pilot projects that introduce prototypical technology, processes and so on (Trieste, a2, 107). In addition, renewable energy projects should guarantee cost efficiency in economical reasonable dimensions. This emphasises that any socio-ecological transition also relates to market mechanisms (Strasbourg, a2, 105). Another aspect is the realisation that energy efficiency and energy savings come with the benefits of saving financial resources (Freiburg, a1, 87). However, this neglects *rebound effects* that slowly reduce these efficiency gains, e. g. by an increased consumption or changed behaviour that stems from additional financial resources (cf. section 4.1). The other set of experiences concerns governmental processes and experiences made with governmental institutions, like interactions or their relevance on transitions towards sustainability. Regarding the installed and maintained frameworks, consideration might differ: either, frameworks on European, national, or local level are helpful and productive to initiate campaigns (Rennes, a2, 54). Albeit, governmental institutions can slow down and delay processes due to their bureaucratic nature (Potsdam, a1, 118). These problems exist from local levels to European institutions (Naples, a1, 45). Especially, legal frameworks exist to guide and standardise efforts towards sustainability accordingly. However, this also includes a somewhat lax interpretation of 'binding' regulations: an actor states that (national) governmental instances not necessarily follow them (here this refers to EU policies; Thessaloniki, a2, 57). To a certain degree, the implementation of new regulations is considered helpful in Istanbul (a2, 52). It has been realised that with changes and extensions of the legal framework, efficiency and understanding of renewable energies can be improved—directly easing financial needs.

In Germany, the focus on industry exempts businesses from higher reallocation charges for renewables. This especially affects private persons, on who higher charges are burdened (Dortmund, a2, 70). A severe imbalance in the cost distribution between actors is perceived. Lacking

[14] Organisation theory has made several approaches to this issue. Following Walter W. Powell (1990) networks are a growing alternative to 'classical' forms of organisation—in the sense of business units. This is extendable to some degree on other forms of social cooperation as well.

collaboration between local actors produced tensions. In the specific case public authorities with insufficient competences and the administration of the city council faced situations where complicated actions and decisions had to be made (Barcelona, a1, 57). On top of that, one interviewee reflected on better monitoring capabilities that inquire more frequently and more intensively to ensure better and faster project realisation—overall a more comprehensive project management approach (Timisoara, a2, 107).

Structural aspects learnt from socio-ecological transition processes concerned the local resource systems. A first insight is the complex nature of the resource system that is influenceable by many diverse factors. Thus, a development plan and transition towards sustainability has to include manifold interacting factors (Strasbourg, a1, 75). The importance of these context factors expresses itself in city planning in relation to design, nature protection, public opinion, and physical aspects of the resource system (Saarbrücken, a2, 111). Above all, the energy sector has a diverse connection to economic and social topics (see above; Thessaloniki, a1, 71). One actor could not assess clearly, what experiences he could draw from the ongoing processes, since the field was too fragmented (Milan, a2, 74). Overall, energy topics touch a wide variety of different actors, mechanisms, policies, and leverage points—it is a sensitive sector with many interests that requires well thought actions (Lugano, a2, 65). Individually experienced factors are for example economic aspects. Although, Leeds is very “backward” and not energy efficient (Leeds, a1, 56), a complete economic sector has been developed that is concerned with sustainability and produces jobs and economic growth (Leeds, a2, 59). Technology has a significant influence on the energy resource system, coupled with social improvements for the citizens (Lublin, a2, 46; Barcelona, a1, 67). Further, stricter behavioural constraints assist in sustainable action, e. g. recycling to make available the potential energy deposits in waste or maintaining strict levels of resource use to save scarce pools (Madrid, a1, 80; Umea, a2, 56).

Lastly, there were individual lessons learnt that derived from individual actions. Especially dealing with individual behaviour is a key for sustainability transition, since aggregated individual behaviour is a driver to a sustainable movement. This is also part of the experts’ reflections: individuals can achieve much, if they get involved (Saarbrücken, a1, 67). And even the worst city can reach a state of sustainability, if the citizens will actively take part in a transition process (Larissa, a1, 63) and change behavioural patterns (Naples, a2, 42). However, it often lacks motivation and—inherently—awareness; a fact that lets an actor demand for imposition instruments (Trieste, a2, 69). However, sustainability is about energy efficiency in many different fields and thus, several distinct access points lead to increased sustainable developments—but only in a holistic relation (Madrid, a2, 78).

4.4 Norm adoption and local decision making autonomy

Section 4 is concerned with norm adoption and local decision-making autonomy. Missing or to be adjusted governmental mechanisms are covered by the first one; the latter describes the possibilities of local level governments to decide autonomously.

4.4.1 Norm adoption

Stemming from lessons learnt in the transition process, actors were asked for their experiences and beyond that for policy instruments that could support their goals and if changes to them could increase their effectiveness. A basic indicator is building of trust and a development of a common understanding of the transition process. This means increased insight into the individual features and requirements of the transition as well as a trusting group cohesion that fosters reciprocity.

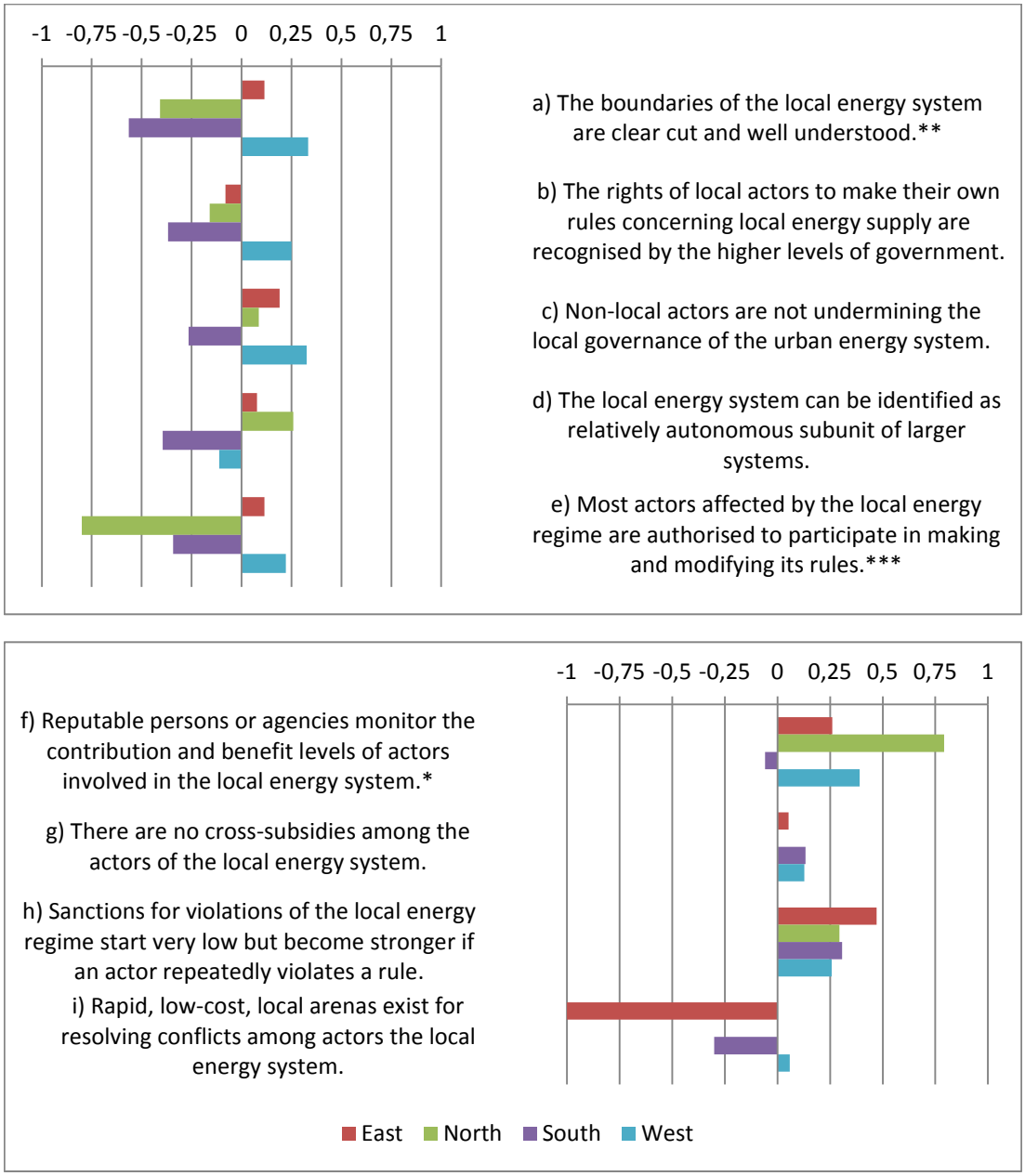

Figure 19: Agreement with governance principles for the local energy system (scaled from -2: strongly disagree to +2: strongly agree)

A part of this initial question has been discussed as *difficulties to agree of local energy strategies* (cf. Figure 18). The nearly neutral assessment of shared understandings is in high need of explanation. In the sections above, actors have discussed facets of socio-ecological transitions and sustainability that referred to the time horizon of transition, to the influences of non-local strategies and programs as well as to the development of local level resource capacities by raising energy efficiency. These reoccur to some extent in this question. Also in the light of governance principals, results are not distinct (cf. Figure 19). The most striking aspect here is the felt absence of local arenas for resolving conflicts in Eastern Europe; in other regions, this item is neutral. Other items with diverging opinions include a slight disagreement on the possibilities of authorized participation in rule changing for Northern Europe as well as an agreeing stance to-

wards the monitoring of contribution and benefit levels. For a more specific agreement on governance principles, clear-cut boundaries are missing in Northern and Southern Europe, indicating that the range of the system is unclear.

The qualitative inquiry yields a variety of interesting assessments of local political processes and their limitations. A first point covers legal aspects of policies and refers to more direct obligations, e. g. taxation to increase the pressure on unsustainable behaviour (Innsbruck, a2, 117) or in building laws to force sustainable renovations (Paris, a1, 57). In a broader context, relying on a higher level, legal frameworks are concerned. Especially the European procurement law has flaws that lead to bad quality and price dumping (Prague, a2, 60–63). Existing laws and frames should also be 'greener' and support or enforce topics of sustainability (Aalborg, a1, 110; Dortmund, a2, 110; Lodz, a1, 60). Further, consistency of legal frameworks is contested. An actor directly states, he wants to "'clean up' the legislative environment" since incoherent laws persist especially on national level (Prague, a2, 61). This is also a point of criticism in Barcelona, where clear rules are missing and lobbyists and economy influence existing regulations (Barcelona, a2, 88). In another case, the authority of legislation should be increased to facilitate processes (Aalborg, a2, 97). Elsewhere, the focus of EU policies is sought to be reconsidered. For instance the EU should change the emphasis of its policies from economy to social and environmental issues (Linz, a1, 141) and foster more supportive policies that do not only rely on incapacitating peoples' behaviour (Dortmund, a3, 101–104). This intersects with statements that pronounce the necessity to raise awareness for topics instead of seeing EU standards as impositions (Milan, a1, 67). On climate issues, actors demand more authority from the European Union; the EU should be responsible for all topics related to climate and consider a "single European Climate Mitigation Bill" (Potsdam, a1, 180–182). This asks from the EU to take a strong leadership position (Bilbao, a1, 90). Without the EU, an interviewee assesses, there would be fewer regimentations and standards for ecological sustainability. Thus, increased pressure from EU institutions fosters sustainable development (Saarbrücken, a1, 96).

Funding represents another field of EU policy; experts pronounce financial support of housing refurbishments and—generally—the increased incentivizing of funding processes (Rennes, a2, 54; Milan, a2, 101). The funding process is difficult and bureaucratic; here the EU should lend assistance with the complex process (Glasgow, a2, 98). Funding covers issues related to the amount of financial resources that are made available. Funding is always too scarce; more financial means nearly everywhere are seen as increased potential and improvement (Dortmund, a1, 94; Nice, a1, 71; Rennes, a1, 133). "[M]oney is not everything but without money, it's not much either" (Potsdam, a2, 226). Another factor is the allocation of the financial resources at hand: topics related to CO2 emissions, as transportation and housing are preferred over energy topics (Umea, a2, 80). The distribution process on the national level to the local entities must be optimised (Prague, a1, 71). The EU has established a framework to initiate projects—the *European Regional Development Fund* (ERDF) grants 5 % of its resources directly to cities, which is seen as insufficient (Linz, a2, 116). Cases with a general lack of financial support exist, too and in providing the money, e. g. for pilot projects, a socio-ecological transition is more likely to succeed (Naples, a1, 80; Trieste, a2, 107). There is also a necessity for EU funding since the structural weak regions lack investment activities from private or public hand (Lodz, a1, 60). A last point concerns autonomy: regions should distribute the financial resources and entrust cities to act on their own (Leeds, a1, 95). Combined with requirements in sustainability goals, the granting of funding could be tied to specific criteria that foster a local transition and rely more on mechanisms of incentivising (Leeds, a2, 80; Milan, a2, 101).

In terms of available instruments to foster socio-ecological transitions in cities, the promotion of Agenda 21 and the consolidation of the CO2 exchange have to achieve a better performance. Agenda 21 proves as powerful tool in supporting cities in sustainability transitions and therefore needs to be disseminated. It proposes a variety of tools, plans, and strategies that already describe a detailed sustainable development for a socio-ecological transition (Bilbao, a1, 80; Nice, a2, 67). In addition, the EU has to implement the CO2 trading exchange "the way it was intend-

ed" and it should handle it entirely (Potsdam, a1, 178; St. Gallen, a2, 83). Instruments that are more diverse cover the increase of local autonomy to support cities in decision-making (Copenhagen, a1, 84–87). In addition, an alignment of politics and decisions to global scales is necessary (Istanbul, a2, 74). The most basic tool for approaching local problems is a vivid discussion and a public discourse (Prague, a2, 59). This last statement shifts the 'instruments' to a broader perspective and emphasises the necessity of an active civil society. As a sum of political factors, interviewees referred to the necessity of strong EU leadership in renewable energy topics. For one actor even dictatorships promise adequate results, since they can be "damn effective" in prescribing laws (Aalborg, a3, 107). In terms of local levels, regional and national governments emphasise and have to take the policies for renewable energies and energy transitions more seriously (Freiburg, a1, 134–135; Kiel, a2, 132). This requests a supportive stance from national governance. In this light the European Union is a potent actor that could shape and influence local markets accordingly (Saarbrücken, a1, 96). This aspect further neglects an increased claim for more independence and autonomy of local levels. However, the barriers to communicate with the EU due to bureaucratic hindrances are high (Trieste, a1, 89); and the request that the European Union should directly address cities, without having to include national or regional governments and institutions is stated (Rome, a2, 75). For Turkey, Istanbul's actor answers the question that the EU should take in Turkey to accelerate the sustainability process and foster innovations (Istanbul, a2, 80).

The last point reflects the city as social institution. This means that cities are conglomerates that emerge from socio-historic, cultural, and economic contingencies. Their uniqueness lies in this specific historical development that shows itself in political, economic and social thrive. Cities' social structures have a particular role in socio-ecological transition. Their specific role and their influences on socio-ecological transitions should be reflected by installing a ministry of cities, since cities are considered the most severe contributors to CO2 emissions and climate change (Birmingham, a2, 105). However, the actor does not go into details any further. The city as a social institution is seen as a relic from 19th century that evolved alongside an industrialising society on the doorsteps to modernity. On the one hand, the question the actor implicitly raises is about the *sustainability* of the city as a concept. The "problems are cities, and the problems of cities are created by the fact that they were nineteenth century institutions in main, and they've been run at best twentieth century governance." (Birmingham, a2, 105) The solution would be an 'up to date' governance of "twenty-first century" (Birmingham, a2, 107). Although on the other hand this position is contrasted by a return to an "European city" (Kiel, a1, 124) which represents traditional urban planning and development that centres around a market place with short distances between private and public spheres. No matter how role and form of cities are considered, their importance and their structural problems cannot be neglected.

4.4.2 Local decision-making autonomy

The final research question reflects local decision-making autonomy and financial autonomy of the cities. These two greatly influence the possibility and the efficiency of self-organising capabilities. The state of the socio-ecological transition, self-organisation, the involved actors, and influencing factors as well as actions undertaken are entangled and produce experiences that drive the process to norm adoption according to the lessons learnt. These then influence institutions that constitute potentials and constraints of the local level.

The **individual estimates of autonomy** in the city sample are quite heterogeneous and show a diverging meaning of 'autonomy'. The degree of administrative decentralisation directly influences the degree of independent decision-making. EU policies and programs also influence the level of autonomy, especially in countries that are under fiscal control and subject to austerity politics. Depending on the national constitution of legal frames, certain policies are not decided at the local level but at other levels. Exemplary, this can be seen for energy policies that are subject of national politics in Germany or France; local autonomy refers to city planning and ur-

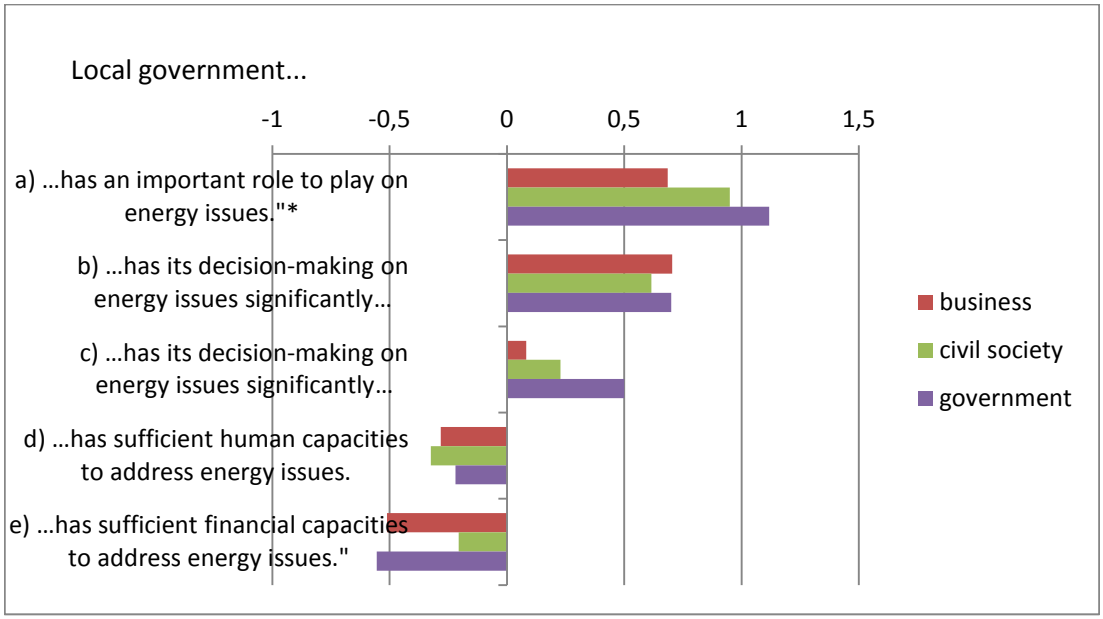

Figure 20: Local decision-making autonomy for different sectors (scaled from -2: strongly disagree to +2: strongly agree)

ban development but always reacts to standards 'from above' (Dortmund, a1, 86; Rennes, a1, 111). Especially Germany has a very high degree of local autonomy, rooted in the lowest administrative level, the communal level (Freiburg, a1, 98; Potsdam, a1, 174). In terms of infrastructure, for example, municipalities can decide for themselves but projects with a higher investment volume have to be realised in business partnerships (Potsdam, a2, 160). Local made decisions always influence or are influenced by actors from other sectors. One of the most common assessments points out the nexus of different reciprocal positions. The possibility to make decisions is embedded into a social field of conflicts and interests. Therefore, they have to reflect either their influences on economy (employment rate, location factors, etc.) or on the opinion and behaviour of individuals (consumption choice, energy saving, etc.). The latter point refers to sustainability frames that are set by municipalities and address the behavioural aspects of socio-ecological transition (e. g. Giurgiu, a2, 86; Gothenburg, a2, 61; Umea, a1, 101 and a2, 60).

Two interesting cases are Switzerland and Greece. The first has a specific constitutional framework of direct democracy that suits bottom-up initiatives and decisions. Also on the cantonal level, governance structures are very independent (Lugano, a2, 75). However, these possibilities could be used more efficiently (Lugano, a1, 109). Cantonal independence in St. Gallen is visible where the local directive consists of "as little government as possible and as much private initiatives as possible" (St. Gallen, a1, 56). Greece—on the other hand—had to undergo an administrative reform to comply with imposed objectives of austerity politics. This "Kallikratis"-reform included an enforced decentralisation of administration and shifted decision-making capabilities to the lower levels. A more implicit goal was to impede the possibilities for corruption and downsizing of bureaucracy. In the interviews, this transfer of competences is assessed quite differently: it is (still) seen as a bad situation where local administrations are helpless against central government's decisions and especially concerning smaller problems on local levels (Larissa, a1, 75 and a2, 87). Contrary to these opinions, the Kallikratis transition is considered a smooth process that has already transferred many competences to the local level (Thessaloniki, a2, 65). Other interesting examples are Germany and France that are quite opposite cases. While Germany has a high degree of decentralisation, France is a centralised

state, in energy politics and in the local decision-making autonomy where “[l]ocal authorities don’t have anything to say” (Nice, a2, 101). The effectiveness of local decision autonomy in France is differently assessed, though (cf. the statements from Rennes). Contrasting, the independence of Istanbul from national governmental levels does not exist; all authority is centralised although the local level has the best insight in local problems and the interconnectedness of actors and factors. Altogether, local administration is powerless (Istanbul, a2, 25).

The following paragraph evaluates **impacts of decision-making autonomy** and describes possibilities municipalities or administrations have in deciding relevant local strategies and policies. The sphere of influence of local decisions touches strategies and planning processes. First, according to the quantitative analysis, governmental institutions have the most important role on energy issues. There are almost no legal constraints to the mandates of each group of actors, according to the inquiry (cf. Figure 20). City or urban planning as well as the implementation of sustainability strategies and the like are rooted in local level activities and decisions (Gothenburg, a2, 63; Lugano, a2, 77; Prague, a2, 57; Rennes, a1, 111; Timisoara, a2, 118). This is reasonable since the handling of local environment falls to local level actors with in-depth knowledge. This marks the complaint of the Turkish actor in Istanbul, stated above. The capability to set or alter laws usually is not given to local actors since the legal frameworks are handled on national level. Urban areas thus cannot decide upon constitutional and legal frameworks, etc. One possible intervention is achievable by introducing rules like a land-use plan that can be outfitted with binding guidelines on energy efficiency for new built houses. In some cases, this potential only reaches as far as municipal buildings and leaves out individuals (Innsbruck, a2, 93; Linz, a1, 105). A key factor can be the power to direct the municipal energy utility—at least if it is in public hands and city owned. This opens up potential for direct influence on the use and production of renewable energy (Timisoara, a1, 102–105).

More interesting—and in a way structurally more important—are the **obstacles in local decision making**. Their evaluation allows for a thorough interpretation of institutional and structural preconditions for and effects on local level decision autonomy. A first important factor is (in)dependence from higher governance structures. Especially, centralised states undermine local level autonomy (Larissa, a1, 75; Rennes, a1, 103; Strasbourg, a2, 40). It is striking that centralisation is a problem in France, since the energy provider, EDF, has a powerful position in the energy market, and additionally even cannot be influenced by the national government. Further, Greece suffers from a yet high level of centralisation although the Kallikratis reform aimed at shifting responsibilities and influences to lower levels. One reason might be the short timespan this constitutional and political reform is in place, which can result in the lack of consolidated procedures. Additionally, the political responsibilities for the local level were not extended far enough. On central topics, the local administration has little to no influence at all (Thessaloniki, a1, 92). In general, if regulations of the energy system are in national or European hand, the decision-making capabilities of the local level are restrained (Strasbourg, a2, 115) and—also relating to this issue—if higher levels have not yet made certain decisions, local hands are tied (Aalborg, a2, 72–75). Next to governmental obstacles, the role and influence of economy and business actors on local decision-making autonomy is important. Particularly the interests of business actors with an economic logic—realising profits and prevailing on the market—fosters antagonistic behaviour. This relation shows itself in decisions which interfere with economic interests, e. g. by introducing higher environmental taxes or enforcing the use of clean energy. The influence of individual business actors can be felt in local decisions (Rome, a2, 57). An interviewee asserts this problem more drastically as “blackmailing” (Kiel, a1, 88). The leverages are jobs and economic growth, directly related to the financial and social well-being of a city. Tax revenue and jobs (which lead to a socially secured population) are driving forces that secure financial autonomy of the cities at the costs of cuts in decision autonomy, since adversely affecting economy is considered not an option (Saarbrücken, a2, 134). Thus, cities are both, dependant and independent at the same time, since their decisions have to evaluate and account for different interests (Kiel, a1, 88). Being dependent on national funding

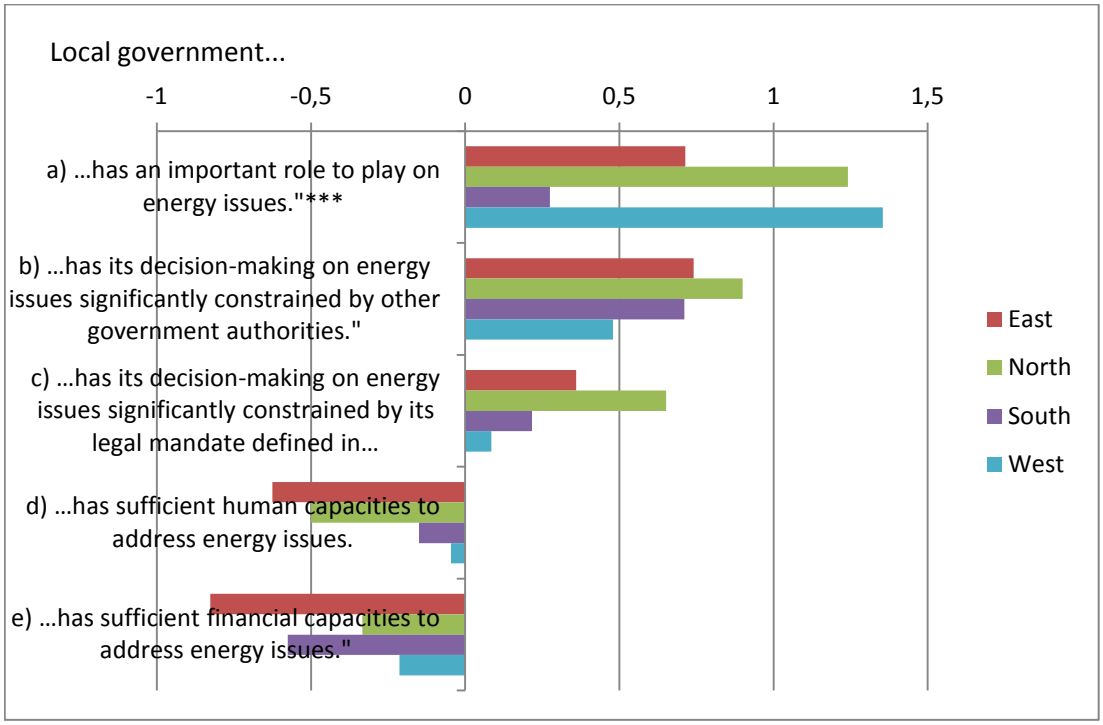

Figure 21: Local decision-making autonomy for different regions (scaled from -2: strongly disagree to +2: strongly agree)

can also be a pitfall for local autonomy if the local plans and programs are not backed by politics on higher levels, e. g. if different parties are governing the local and the national level (Naples, a1, 52). The relation to financial autonomy will be discussed in detail at the end of this section.

Other obstructions to local decision autonomy can be found in strategy and planning issues as well as in the resource system itself. The planning process usually is embedded in a legal framework that can restrict autonomous decision-making. Especially Greece and Italy refer to preservation laws to safeguard the antiques. This prohibits altering of the building substance as well as it hinders the construction of new buildings (Thessaloniki, a1, 79–80). Also, a lack of decisive national planning for sustainability and clear cut programs and strategies have a negative impact on local level autonomy since no clear derived goals are available and local action appears contextless or is not induced at all (Milan, a1, 43). The planning policies and strategies for a socio-ecological transition need to remain on the local level though, since the administration and municipality in cooperation with local actors are best aware where problems occur and what actions are best suited to solve them (Leeds, a1, 89). In regard of influences and special features of the resource system, decision-making autonomy is limited, too. This results from the spatial dimension of certain resource systems. Energy can easily surpass urban areas of influence (Rome, a2, 61). Another effect on autonomy has the spatial constitution of the urban area. Further above, it has already been stated that spatial attributes delimit local possibilities (e. g. it is not possible to pave an entire city with solar collectors). This leads to the problem that local decision autonomy might not have enough space to decide upon (Bilbao, a2, 116). A too huge area in a municipality is not productive, either. The far-reaching territory suffers from a dispersion of responsibility, since the municipality cannot cover the whole territory (Thessaloniki, a1, 79–80). Additionally, the energy resource system is a field that focuses on interventions on the individual level, like consumption behaviour, and awareness (Strasbourg, a2, 99–102). However, possible actions only involve incentivising individual sustainable behaviour or the banning of

unsustainable products like light bulbs. A direct influence on energy efficient behaviour or consumption exceeds the possibilities of local or national governments—gladly.

Nonetheless, an actor states that more and more cities are successfully engaging themselves in sustainability issues on their own, decoupled from national politics (Birmingham. a2, 93). However, this cannot mean that urban areas need to be left alone to tend to themselves. On the one hand, it is crucial for local governments to influence respective frameworks; on the other, national governments depend on the information and inputs coming from the local level to design their funding and support programmes. Structural and supportive embeddedness are important key factors to guarantee cities to become “masters of their own destiny” (Birmingham, a1, 72). This last point stresses financial autonomy for the cities. In particular, tax revenues and alike should remain in the cities and be reinvested locally (Birmingham, a1, 72; Timisoara, a1, 51). Overall the topics of local decision autonomy and financial autonomy are closely connected. Decisions need to be backed financially for translating them into concrete action or to support further engagement (Timisoara, a1, 101). A broad selection of interviewees assesses the state of financial autonomy negatively. This also matches the quantitative analysis (cf. Figure 21). Especially Eastern and Southern Europe suffer from insufficient financial means to address energy issues. Household assurance concepts restrict autonomous decisions on finances when municipalities are in debts (Dortmund, a2, 87). This is comparable to the field of austerity politics on national scale, which has an impact on local level as well. Broadly, the absence of financial autonomy directly influences the potential to act and decide independently (Milan, a2, 81; Potsdam, a2, 162). Further, the dependence on other private actors as partners for financing undertakings bears too much complexity (Barcelona, a2, 73). Financial autonomy has to be secured by funding programs from the national level (Naples, a1, 50). This underlines an aspect of autonomy that concerns financial sustainability and self-sufficiency in relation to financial autonomy: the interviewee does not necessarily connect one with another—more particularly, a general availability of financial resources is sought whereas the sources are not important. In terms of energy and financial autonomy, city owned energy utility providers are helpful. Energy markets play a particular role in generating revenue. Thus, subsidies and other distorting actions lead to decreased market prices and are potentially threatening the much more expensive renewable energies (Umea, a1, 110). Strasbourg, for example, sold its energy supplier and traded parts of its financial independence to a national corporation (Strasbourg, a1, 80). To allow the municipality in Leeds to initiate plans, solid business cases are mandatory. Self-sustaining economic activity which reliefs the city administration from overhead financial resource use is mandatory (Leeds, a2, 65).

The necessity for financial resources is clearly visible. Not only for financial autonomy and for thus extending possibilities to realise local decision autonomy, but also for general investments and procurement activities, funding is required. This is also shown in the interviews above: financial resources always could be increased. In relation to self-determined decision-making, financial backing is a central requirement. The interviewed actors state that several policies enforce national and/or local level government institutions to rigid saving and budget discipline and endanger this special relation. The impact of these measures on socio-ecological transition has to be seen in the future. Until now, only a few direct effects are sensible and visible, but the full scale might only be recognisable after a specific timespan.

4.5 Discussion of the findings

The empirical inquiry shows interesting details of socio-ecological transitions in the 40 selected cities. The research questions that guided the field research produced a kaleidoscopic picture of distinct sets of institutions.

Starting with the state of transition this chapter shows the different local features of the cities but also the underlying frames of thought visible in the definitions of sustainability. Within the Euro-

pean Union, a cohesive image of sustainability transitions exists, referring to a three-pillar model and to common strategies like Agenda 21. Some actors extend this model by a fourth pillar, which indicate the necessity to transform governance structures as well. Sustainability in governmental administration and governance structures displays itself in occurring challenges. The transition processes faces several distinct problems that show that a socio-ecological transition must be seen and treated holistically. Moreover, it has to take into account social, economic, legal, governmental, and societal problems and societal needs (Fjalar J. de Haan et al. 2014).

Concerning the main research question about self-organising capabilities, the inquiry covers the dynamics of civil society and the role of self-responsibility. This is best shown by the increasing demand to individually participate in the transition process and adopt sustainable behaviour and awareness. A complex and multi-faceted process like a socio-ecological transition can be realised neither solely by individual citizens, nor by a national or local government alone. The interviews indicate that an increased individual awareness is essential to change consumption patterns and usage behaviour of energy—and that this is the foremost leverage for political and administrative action. Central is the relevance of the individual although the questionnaires indicated that especially on local energy mixes, citizens only have little influence. Expanding education is a set goal to raise awareness among the citizens and change their behaviour accordingly. Political and administrative actors judged this form as *self-organisation.* The misunderstanding is clear, since this refers not to a bottom-up organisation of civil society. The nucleus of transition remains aggregated individual actions. Moreover, the interviewees refer primarily to participation, which is a misinterpretation of self-organisation. Self-organisation would require the establishment of alternative political processes *next to existing ones* that are formed by citizens to foster a yet individualised but still collective form of energy transition. Such parallel structures do not exist in any inquired city.

Especially actors from the United Kingdom state that in terms of decision autonomy some cities are initiating own sustainability transitions. It is striking that the individualised responsibility—for individuals and cities—is clearly observable in nations where liberal welfare state regimes are at place. Individuals are addressed as subjects, responsible for their own well-being and for the well-being of the socio-ecological ‘space’ they live in. This approach shows itself in the emphasis of education, private energy efficiency and so on (Birmingham, a1, 40). The key factors are frameworks that facilitate liberty to act and decide in a wide variety of topics and lay responsibility to the individual. Against rigid rule-sets, diffuse activation of sustainable behaviour and action is imposed. The concept relies on aspects of economic self-sustainability, which in turn means that a central aspect to organise action relates to market logic with supply and demand mechanisms, like an invisible hand that guides the individual and benefits all. Anyhow, this approach can hinder the idea of bottom-up processes that rely on ideas of community. There is an inherent opposition of two different political philosophies.

Local actors advance holistic socio-ecological transitions. It has to involve a variety of resource systems, strategies for sustainability and finally different and heterogeneous actors into the transformation process. It is important for the research to assess the involved actors and ask for the representation of local stakeholders. This involves also the cooperation of local actors and special challenges that emerge in interactions. Almost every city had a variety of its actors taking part in the energy transition but not always with equal rights and wills to participate. Very interesting is the role of local universities and scientific institutes—and sciences in general—that provide knowledge and technical assistance or uphold a counter discourse for sustainability issues (Harald Rohracher 2008; Marko Joas et al. 2013). The discourses that are brought forward in the process of any transition need to be analysed to understand the mechanisms of knowledge production and distribution in the field (Philipp Späth and Harald Rohracher 2010). Especially the creations of networks were efficient actions to generate a drive for sustainable movements—and broader: to exchange experiences with other cities. Conflicts in cooperation are common and the interviews showed that especially conflicting aims are an issue. Local transitions faced manifold factors that influence socio-ecological transitions. They can be differ-

entiated into political, administrative, structural, and legal factors. The influences of politics and administrations are quite clear and include different levels of governance, from the local to European level. Particularly interesting are structural effects on the transition. Socio-structural features and traits of the cities influence its performance as well as global aspects like economic crisis.

Regarding perceived problems on an institutional level, the inquiry indicates that funding is a fundamental issue. This is not surprising, since financial means are the first bottleneck when initiating transition projects. The topic appears together with a general urge to simplify bureaucratic procedures and make administrative processes more accessible on European level. The relevance of local autonomy is visible, especially from national governments, while on behalf of legal frameworks European directives indicate an increased leadership. The influence of national legislation should be more coherent and/or reduced and on the same hand, the leadership of EU directives should be increased. This resembles for more local autonomy wherefore the European Union should draw the constituting rule framework. This would strengthen local decision autonomy to an extent. Nonetheless, differing interests of other local actors affect this autonomy and limit it. Autonomy is always constrained to certain degrees, since local interests are diverse and contradicting. A more direct influence on decision-making autonomy is the possibility to enact financial resources. Cities that are suffering from debts are less able to take decisions accordingly. This points back to funding issues and involves the European Union to assist with funding programs and national states with a more generous distribution of financial resources. Especially in United Kingdom actors request greater shares of revenue generated by the city to reward economic success. However, there exists a severe imbalance between successful and challenged cities—and on greater scale also countries. The problems can be seen in structurally weak countries like Greece that suffers from a variety of problems. Especially rigid austerity politics, the restructuring of administration, and a vast pauperisation of the population led to distinct phenomena. CO2 emissions from cars were reduced due to a decrease in usage that mainly resulted from high fuel prices—but this CO2 reductions where entirely eradicated by the development of alternative heating. By burning crude oil in old stoves residuals and emissions were set free—and above that illegal clearing of woodlands around several cities produced CO2 emissions and destroyed green spaces that were a compensation for pollution (Thessaloniki, a2, 52; Daniel M. Knight 2014). The relations are very complex and this example indicates that a healthy eco-system needs also a healthy socio-economy. This aspect is not always given in cities transforming from industrial to post-industrial structures.

Further, the forms of cities need to be scrutinised. The city as a social institution from the 19th century is a form that developed itself into the recent form from the beginning of industrialisation, the beginning of modernity. Cities—as institutions—never rest, are changing, and transform more or less rapid, according to many different aspects. The process of urbanisation is continuing with no foreseeable end, thus cities and urban areas have to be shaped accordingly to allow and foster a socio-ecological transition. This is especially urgent for the energy system since cities have the highest energy density, correlating with population, jobs, industry, and other aspects of societal life. These cannot be prescribed developments, derived by social engineering. They instead need to be rooted in a broader basis. The possibilities of self-organisation in socio-ecological transition and in sustainable reforming cities cannot be underestimated. However, the central conflict lies between an ingrained system of political representation and a bottom-up system of public initiative and active civil society. Solving this contradiction is a priority to enable a democratic and holistic transition.

To draw the conclusion for self-organising capabilities, a central problem resembles around the misunderstanding of participation and self-organisation—at least in the interpretation of central political and administrative actors. The role of the European Union could be to strengthen the possibilities for citizens to participate in (transparent) institutional processes and above that to initiate own independent programs or co-operations on the local level. These need structural coupling to funding channels and programmes. This also implies that the two modes of demo-

cratic interventions of the citizens need to be thoroughly defined and distinguished: participation and self-organisation. Nonetheless, the central problem of an active, informed and political public sphere remains. The lack of such a public sphere leads to an absence of critical opposition against institutional structures. In conflicts of an healthy public sphere on the one side and governmental representation on the other side, lies a key to productive public discourse—and further to changes, necessary for a successful socio-ecologic transition. This refers to conflicts as driving forces behind models of social innovations. The interviews and the questionnaires have shown that self-organising capabilities need to meet essential aspects. First, awareness about the resource system, the need for a transition, the process, etc. are crucial. Second, a possibility to meet and engage in discussion and to mobilise others is needed. Third, institutional channels to communicate opinions and local decisions to politics and administration are required. These points all need a specific constitution of a public sphere. The shifting and transformation of this public sphere has been largely discussed in sociology and political sciences (cf. Richard Sennett 1976; Habermas 1989; Richard Sennett 1992). The de-politicisation of the public sphere and the expansion of the private sphere into public life is a broad diagnosis that takes into account many different aspects from the individualisation of responsibilities to the emerging faces of consumerism and new roles of media. The arguments consolidate movements of individualisation, a profanation of public discourse, a rapid developing political focus that addresses individual self-responsibility, and a de-politicisation of the masses by political believes that are 'without any alternatives'—in an era of "post-democracy" (Colin Crouch 2004).

An alternative development can be seen in the topic of green spaces (cf. chapter 5.5) and more generally in the emerging discussion about participation in and self-organisation of urban spaces (Harvey 2008, 2012). The targeted democratisation process as a 'right to the city', of living in and shaping cities might yield a potential for a 'holistic' approach to sustainable cities that covers political, social, economic, and ecological topics. In the words of Jürgen Habermas, the shift from "culture-debating" to "culture-consuming" (Habermas 1989, 159–67) has to be reversed again to enable a public decision process, a discourse about living together—and about alternatives. For energy, this can mean completely different approaches to urban energy production and consumption. Therefore, different modes of organising energy as a common good need to be assessed, for example in the sense of an "energy democracy": the "de-centralisation and independence from corporations, distribution grid use rights and control over municipal energy suppliers, moderated forms of reconciliation of interests, and union co-participation." (Conrad Kunze and Sören Becker 2014, 8) Moreover, "governing the commons" (Ostrom 1990) implicitly refers to alternative modes of organising: "organising in common", "organising for the common", and "organising of the common" , which refers to the act of "commoning", what actually "is done in common" (Valérie Fournier 2013, 448). Self-organisation of a resource system exceeds the political dimension, it includes *per se* a broader approach to production, consumption, as well as social organisation,—all of which has to be reflected.

5. Socio-ecological transition in the resource system green spaces

5.1 The role of the resource system green spaces in sustainability transition

This chapter describes, analyses, and discusses the role green spaces in the socio-ecological transition of European cities. In the European Union, **land use** changes are mostly and increasingly marked by land consumption, due to ongoing urbanisation with concomitant urban sprawl leading to a decreasing density of cities (Stefan Bringezu et al. 2014, 50). Biodiversity, threatened by the introduction of invasive species and the "replacement of natural areas by artificial green areas" (European Environment Agency 2012, 32), is additionally endangered by this development (Bringezu et al. 2014, 50). Another problem, linked to the process of structural change, is soil degradation and contamination on abandoned brownfields (European Commission 2011, 15).

It is the European Commission's aim, as expressed in its *Roadmap to a Resource Efficient Europe*, section of the *Europe 2020 Strategy*, that its policies consider their consequences on land use in order to prevent net land take by 2050 (European Commission 2011, 15). To reach the goal of no additional land consumption after 2020 by 2050, land take has to be reduced "to an average of 800 km² per year in the period 2000–2020" (European Commission 2011, 15). Measures to reach this goal include favouring concentrated development and re-development of urban areas, minimizing soil sealing, ensuring sufficient and connected green spaces and avoiding invasive alien species spread (European Commission 2011, 24). Yet, obtaining the aforementioned goals is complicated by the fact that the finite and shrinking resource of land is subject to competing pressures. Specifically across European cities, the use of green space is highly controversial and is torn between diverging interests, yielding a high conflict potential.

Nevertheless, achieving sustainable land use management is crucial for a socio-ecological transition in Europe. The role and governance of the resource system of green spaces in European cities play an important part in this process due to increasing urbanisation and to the multiple functions urban green spaces provide. They offer various social, economic, and **ecological benefits**, which are not distinct but mutually influence each other.

By their mitigation and adaptation capacities, urban green spaces play an important role in building climate-resilient cities (e. g. in "post-disaster" cities; Yuki Kato, Catarina Passidomo, and Daina Harvey 2014). In cities, climate change impacts are exacerbated by the urban heat island effect[15], making them especially vulnerable. As a counterweight, green spaces limit the accumulation of heat in concrete surfaces (European Environment Agency 2012, 6, 10, 31). The high share of imperviously sealed ground increases the risk of urban drainage flooding because extreme amounts of rain water cannot drain into the ground (European Environment Agency 2012, 6, 41), also cf. chapter 6). Here, green spaces' mitigating capacity of absorbing rainwater, attenuating surface water run-offs and fostering ground water infiltration, is highly needed. In times of water scarcity and droughts, green spaces' "capacity of storing water" (European Environment Agency 2012, 60) is essential. They prevent soil erosion and significantly ameliorate the urban climate by improving air quality by their capacity of filtering the air. They are capable

[15] The urban heat island effect designates "the increased temperature of the urban air compared to its rural surroundings" (European Environment Agency (2012, 21). This is due to "a high amount of artificial surfaces [which store] heat and cause raised temperatures in cities compared to the surrounding region" (European Environment Agency (2012, 6). Therefore, the difference is particularly big at night.

of sequestrating carbon, absorbing air pollutants, releasing oxygen and regulating air humidity. This is especially important in times of rising average temperatures which increase the probability of air quality problems (European Environment Agency 2012, 29–31). Green spaces also contribute to biodiversity conservation by providing habitats for plants and animal species (Tüzin Baycan-Levent, Ron Vreeker, and Peter Nijkamp 2009, 195) even more if urban green spaces are interconnected, providing the "possibility of species migration" (European Commission 2011, 7).

Numerous values can be subsumed under **social benefits**. Green spaces improve the quality of life of city dwellers inter alias by their high recreational value (Baycan-Levent, Vreeker, and Nijkamp 2009, 195). By providing space for social interaction taking place outside in nature, they foster social and environmental practical learning across generations and cultures. They provide opportunities for informal hands-on learning, for experimenting with rule making, coping with conflicts and group dynamics. Thus, they also constitute a counterweight to the trend of virtual communication.

Urban green spaces can be productive also in **economic** terms. By producing urban timber, fruits, compost but also increasingly vegetable originating from urban agriculture, they can enhance the attractiveness of city districts by creating new employment options (Baycan-Levent, Vreeker, and Nijkamp 2009, 196).

The analysed qualitative data, one to four interviews per city, stems from 29 cities covering all regions and participating countries (Aalborg, Bilbao, Copenhagen, Cracow, Dortmund , Gothenburg, Glasgow, Innsbruck, Istanbul, Jihlava, Larissa , Leeds, Linz, Lodz, Lublin, Lugano, Madrid, Milan, Naples, Paris, Potsdam, Rome, Saarbrücken, Sibiu, St. Gallen, Strasbourg, Thessaloniki, Timisoara and Umea). Six interviews from political, one from an administrative, 21 from business and 27 from civil society actor(s) were obtained. This data is supplemented by 40 case study reports, one per city, written by the respective field researcher with a section on characteristics of the resource system of green spaces. The analysed quantitative data stems from 167 questionnaires (41 administration, 63 business and 63 civil society) including the interviewed actors (cf. chapter 3).

5.2 Self-organisation capabilities and sustainability transition

This section provides insight into two major components of socio-ecological transitions. The first subsection describes the observed sustainability transition whereas the second one examines existing self-organisation capabilities.

5.2.1 Socio-ecological transition

The collected quantitative and qualitative data yields insights into the actors' understanding of the sustainability concept and into their estimation of the state of the socio-ecological transition in general as well as into the status of the resource system green spaces in particular. Additionally, their perceived transition urgency, experienced and expected challenges as well as existing conflicts are inquired.

As per the resource systems energy and water, when asked to **define sustainability**, most frequently and independently of the sector, interviewees, explicitly or implicitly refer to the "three pillars" (Istanbul, a1, 9–11; Linz, a3, 11; Sibiu, a4 19–20; Umea, a3, 11) (cf. chapters 4 and 6). Yet, some actors also explicitly refer to green spaces. They define sustainability as the necessity to preserve them, to consider the sustainability aspect in investments made into public green spaces (Timisoara, a3, 19 and a4, 49–61). It is the necessity to find innovative ways of "sustainable maintenance […] to maintain them without using many resources" (Madrid, a3, 16) in

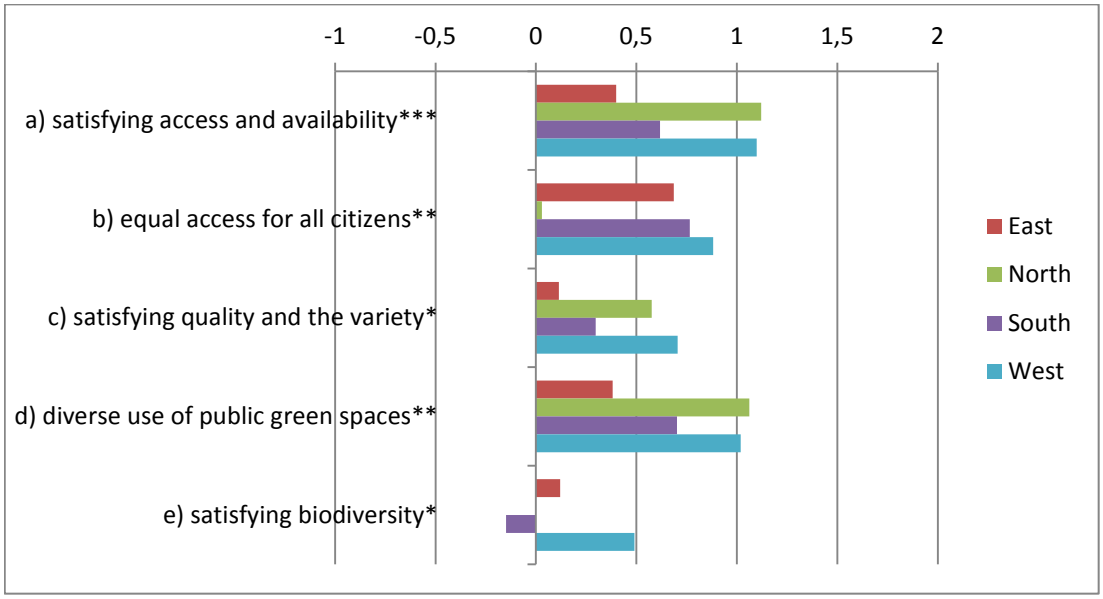

Figure 22: Regional differences in assessing the status of green spaces (scaled from -2: strong disagreement to 2: strong agreement)

times of very restricted local budgets for green spaces, for example by choosing plants needing less care and water.

The concept is considered to be a very ambitious one (Bilbao, a4, 19), especially due to its abstractness and wide scope (Glasgow, a3, 14; Gothenburg, a3, 11; Timisoara, a4, 21) which makes it extremely difficult to define (Leeds,a3, 30–31, 120; Timisoara, a4, 21). Actors also note an increased misuse of the term, having become a catch phrase (Cracow, a3, 14; Glasgow a3, 13–14; Sibiu, a4, 21; Strasbourg, a4, 16). Some actors stress that there cannot be one overall definition but that locally varying ones are needed according to each region's specific challenges (Cracow, a3, 14, 26; Larissa, a3, 17).

Regarding the **status of the local resource system**, in the majority of cities from all regions a good to very good *availability* of green spaces is reported. Yet, the quantity of most types of green spaces is higher in the North and West than in the South and East of Europe. In some cities from the East, West and South availability is rated as not good to very bad. Patterns are very diverse. Whereas availability in the city centre can be good – there are for example well-maintained parks – the outer districts might be abandoned (Naples, a4, 46–47), up to the situation that almost no green spaces exist at all. The inner city can also be very dense and mineralised (Lugano, a3, 107–109 and a4, 49–56; Paris, a3, 29; Strasbourg, a4, 76–87) not providing any ecological corridors (Timisoara, a4, 30,98–100). The reason for the bad availability is without exception building and infrastructure development.

In several cities from the East, West and South there is very good to good *accessibility* (Larissa, a4, 59; Madrid, a4, 43–50; St. Gallen, a4, 9; Timisoara, a4,108, supporting Figure 22) showing the low rate of equal access for all citizens in the North. Concerning the *diversity* of green spaces, public parks and lawns are most common, followed by sport facilities and forests. Green roofs hardly exist. Whereas green spaces are very often used for recreational activities and as a community gathering place, they are still far less often deployed for growing food, illustrating that this is still a relatively recent phenomenon in European cities (cf. Barthel, Parker, and Ernstson 2013).

A good *quality* linked to a high maintenance level is reported from several cities in all regions (Larissa, a4, 54–55,58–59; Leeds, a4, 79–88; Lodz, a3, 62–72, Saarbrücken, a3, 31–36). The same holds true for *(bio)diversity* (Lublin, a1, 17; Madrid, a4, 54–55; Potsdam a3, 135–140; Umea, a3, 59). Respondents from the majority of cities report that biodiversity is threatened by the continuing decrease of green spaces due to construction development, with Figure 22 revealing the lowest level of biodiversity in the South. A varying quality is reported from a smaller number of cities in all regions. It varies according to the district (Naples, a3, 33; Strasbourg, a4, 76), the type of green space (Aalborg, a4, 60; Lodz, a4, 37–38) or their size—for example it is fine in bigger parks but moderate in smaller ones (Cracow, a4, 40). Cities also report insufficient quality of green spaces, mostly due to insufficient maintenance. This mainly stems from lacking financial resources, which sometimes limit even basic maintenance. With the privatisation of maintenance services and due to the critical financial situation, most often the lowest bidder is selected, leading to a significant decrease in quality (Thessaloniki, a3, 49–53). Soil pollution due to former industrial activities or (illegal) dumping activities without immediate subsequent soil reclamation is named in a handful of cities (Milan, a3, 27, 55; Naples, a4, 25–26; Sibiu, a2, 122).

Altogether, Figure 22 shows that three out of five subcategories on the status of green spaces are rated lowest in the East while the same share is rated highest in the North. Yet, a generally better situation in the North cannot be derived from the qualitative data.

Looking into the future, the actors' statements are sometimes contradicting, depending on which sector they belong. For example, the political actor claims that the percentage of green spaces is slowly increasing (Cracow, a1, 38), while the business actor admits that urban sprawl will create immense costs since infrastructure will have to be built and maintained (Cracow, a3, 23–25). Civil society fears the diminishing of green spaces due to densification and urban sprawl, calling it "developers' aggressiveness" (Cracow, a4, 40). Green spaces are threatened, if they have a low status in municipal planning which can result in their constant reduction for construction development, leading to an acute overuse of the remaining ones (Istanbul, a4, 43–46). Dependencies across resource systems become apparent for example, where city-near forests were damaged for the construction of water lines. This was done because the city cannot provide drinking water from its own area for its growing population any more (Istanbul, a4, 81–84).

Apart from being specifically questioned on the state of the local resource system, actors were interviewed on their general estimation of the local **state of the socio-ecological transition**. Positive and negative estimations are given in all regions. Positively, *structural change* can be used to increase the level of sustainability, thus increasing the amount of green spaces. This visibly improves quality of life and the cityscape (Bilbao, a3, 20, 38 and a4, 21; Linz, a3, 103, 109). A *common understanding* of sustainability transition for green spaces is evolving across sectors in several cities. This "new way of thinking city," (Copenhagen, a4, 15) includes developing *joint, trans-disciplinary strategies* as well as *institutional changes*, such as setting up a sustainability department. Roots for this are a *change of awareness and attitude*. In a Swedish city, the community commenced with this already in the 1990s. This evolved into a large movement leading to the ongoing vivid implementation phase involving political and technical solutions as well as *constructive conflicts* (Gothenburg, a4, 21–23).

However, other actors admit that the socio-ecological transition is still in its infancy. Several reasons are invoked for this. Actors state a lack of clear joint vision and of a long-term strategy going along with long-expired urban plans (Timisoara, a4, 23), a persisting conservative attitude in the administration (Lublin, a4, 16), the complexity of city governance as such (Leeds, a3, 20–23) as well as insufficient local autonomy (Lugano, a3, 14).

Further actors give an even more negative estimation up to denying the existence of any transition. Reasons range from not providing common public space for discussions (Strasbourg, a4,

126) and the *lack of financial resources* (Milan, a4, 15–18) to continuously sticking to the logic of ever increasing population. In addition, *economic growth* manifesting itself in ongoing construction and consumption leads to the soil sealing (Istanbul, a4, 12), by paving instead of extending green spaces (Strasbourg, a4, 20–25).

The **perceived transition urgency** can be derived from named *goals* as well as from the time horizon indicated. Concerning goals specifically related to green spaces, the quantitative data reveals that actors across cities and sectors consider 'avoiding land use change—turning green spaces into constructed land', 'improving the ecological quality and biodiversity of available public green spaces', 'enlarging their size and number', 'increasing the demand for them', 'adapting to climate change', 'avoiding their misuse by human activities' and 'improving the legal framework for green spaces' as important. The significance of almost all named objectives is rated higher in the South and East than in the North and West, which could point to a backlog demand in the first two regions.

In the interviews, few goals directly relating to green spaces were named but rather general environmental, social, and economic ones. The majority of actors from all sectors and regions believe that environmental, social and, economic goals must be balanced against each other with none being more important than the other (Glasgow, a3, 12–14; Paris, a3, 14; Sibiu, a2, 144 and a4, 200). "[W]ithout money nothing can be done, without the environment no money can be generated, without people it is not working" (Gothenburg, a4, 12–13).

Yet, for some—mostly civil society—actors, the economic aspects should not be on the same level as the environmental and the social ones (Istanbul, a4, 92–95; Strasbourg, a4, 17–18; Umea, a3, 109–112). These respondents stress that the **environmental aspect**, "a functioning ecosystem" (Umea, a3, 31) is crucial, since it is the *basis* of everything, including of economy. In this regard, the "no net loss" (Umea, a3, 72,131–132) policy is recommended. This means not to lose even more nature, species, and ecosystem services, trying to keep what is left. Otherwise, re-compensation areas need to be created. Just as the whole of human society has to be managed within the global biosphere, the same is true for the local level. Each municipality "has to manage its impact within its own co-system" (Leeds, a4, 171–120).

Economy "only makes sense in a constituted society with its rules. Economy is part of society's creation but is not a tangible, vital element like social and environmental issues" (Strasbourg, a4, 18). Solving **social** problems is considered of utmost importance for the socio-ecological transition: "Only if the basic, short-term needs are met, one starts thinking about sustainability, long-term environmental issues and the common good" (Gothenburg, a3, 106–109, 132–133). Well-being is defined as increasing the citizens' quality of life by combining "economic prosperity with the creation of a sustainable environment offering quality of life and social cohesion" (Larissa, a3, 22), while respecting the environment on the short and long run (Glasgow a3, 14 and a4, 116; Larissa, a4, 25; Madrid, a4, 102; Thessaloniki, a4, 14, 79–80). Bringing nature back into the city by preserving and expanding green spaces is a well-being element, especially important for city dwellers who cannot afford to leave the city for vacation (Paris, a3, 56–57).

The named **economic sustainability goals** disclose contradicting opinions, which can be clustered into two strands. The first group of actors, mainly from the business sector, rely on *economic growth* as overarching goal which is the basis for and facilitates the implementation of social and ecological sustainability goals by providing jobs and wealth (Cracow, a3, 34; Innsbruck, a3, 142–143; Potsdam, a3, 173–174). Following this logic, sustainability must be financially affordable for producers and consumers. Making profit remains the core goal. A variation in this logic is also brought up, saying, "sustainability has almost become a commodity" (Copenhagen, a2, 21) Sustainable commodities have already become cheaper, creating financial, economic and political interests. It is suggested to end the prevailing of economic over social and environmental aspects "by introducing a governance mechanism taking into account and making visible social and environmental externalities" (Copenhagen, a2, 107–109).

In contrast, the second group of actors, coming mainly from civil society, argues for a *post-growth logic*, claiming that "[t]he economic system based on growth has to be drastically re-thought to become sustainable" (Linz, a4, 113–114). This can be done by relying on and by promoting local human, economic, and cultural assets (Naples, a3, 77–80, 85–86). Concrete actions include suggesting the use of local resource cycles (Potsdam, a4, 17) and preferring the use of local knowledge instead of foreign experts. This means to promote local businesses instead of attracting big foreign investors at all costs with public grants but minimal obligations (Sibiu, a3, 130–133), since these investors often generate social and ecological externalities, e. g. pollution, (pollution) locally, only skimming the profit before moving to an even cheaper location after a few years (Sibiu, a3, 131–132).

Having only been "a topic of environmentalists" (Bilbao, a3, 21–25) some decades ago, the mainstreaming of sustainability has partly been achieved. Sustainability has become an integral section of business plans, showing that this even saves costs on the long run (Innsbruck, a3, 42–43; Linz, a3, 17–19), or where it has been mainstreamed into all city policy fields (Copenhagen, a2, 18–21). Goals must be seen in small actions, reached step by step, starting from the bottom (Milan, a3, 71) since the 'crisis' does not allow for "big steps" (Thessaloniki, a4, 77–78).

The majority of actors expect a long **time horizon** to realise the goals. This is due to the difficulty of changing mentality and habits (Aalborg, a4, 14–16; Umea, a3, 101–108) and of reaching financial feasibility (Aalborg, a4, 14–16). Further reasons are "the slowness of the political decision processes" (Saarbrücken, a4, 77–80) and the dependency on political decisions being bound to elections and thus to short-term goals. Stated time spans range from up to five (Linz, a4, 99–100; Madrid, a3, 78–79; Potsdam, a4, 196–199; Rome, a1, 69–70) to 20 years (Lugano, a3, 146–149), depending on the type of goal to be reached, with the one of awareness-raising being considered to be reached relatively quickly. Yet, altogether patience is needed, making it a "generational question" (Istanbul, a1, 78–79; Saarbrücken, a4, 77) and emphasising the transition's process character. It is perceived as a slow but steady constant ongoing process, happening in small steps with a long-term perspective, without ever reaching a stationary system (Gothenburg, a3, 9–11 and a4, 11–13; Istanbul, a1, 9; Madrid, a4, 21; Sibiu, a2, 144 and a3, 23). With regard to the urgency of the transition, this could be a disappointing finding. Yet, a longer time horizon might in the end lead to a higher degree of sustainability than fast-track actions, due to the fact that longer time-frames seem to have a positive impact on the level of developed trust between actors and related positive socio-ecological transition outcomes (Poteete, Janssen, and Ostrom 2010, 229).

In trying to reach socio-ecological transition goals, **challenges** appear of which conflicts are part. In order to overcome them, they need to be clearly identified and grouped as a first step. Most experienced and expected challenges brought up can be classified as economic, political, or mental ones. A minor group belongs to social and environmental ones.

Amongst **economic challenges**, a *tight local budget* for green spaces is most often named in all regions (Glasgow, a4, 49–51; Madrid, a3, 77; Sibiu, a3, 35–37). This forces actors to find ways of decreasing costs and of finding new funding sources to keep up maintenance. In all regions but the North, *construction development pressure* is seen as a danger to existing green spaces. Partly resulting from a tight local budget, this pressure sometimes takes the form of excessive building speculation which reduces housing space for real needs and provokes urban sprawl (Naples, a4, 26; Lodz, a4, 23; Lugano, a4, 27; Timisoara, a4, 52–53).

Political challenges include legal and institutional ones and are equally brought up in all regions. They are quite diverse and sometimes opposed. Whereas a low *turn-over rate*, meaning politicians staying in power very long, can hinder the transition (Paris, a4, 52), a high turn-over rate, with politicians changing "too fast to establish a constructive relationship between civil society and politics" (Glasgow, a4, 44–45), can equally be problematic. Bad *city management* can

lead to de facto inability in coping with numerous challenges in urban planning, not following any sustainability vision (Istanbul, a4, 12; Milan, a4, 25).

A missing goal and strategy and an ineffective legal framework are named. The latter either means that regional and state laws do not prevent the consumption of the territory (Milan, a3, 27, 39) or that state and local laws do not leave manoeuvring room for local actors due to the local level having the least power (Istanbul, a1, 61). Furthermore*, lobbying against sustainability* is mentioned, keeping it "socially accepted to be unsustainable" (Aalborg, a4, 114). This makes it difficult to change public opinion, also because the "deniers" (Aalborg, a4, 114) misuse science to draw a less alarming picture. Still it should be tried to change public opinion by introducing "small doable things" (Aalborg, a4, 114). *Institutional* challenges emerge in all regions. A too big administration makes cross-sector communication between departments difficult (Strasbourg, a4, 52). Complicated budgetary procedures increase bureaucracy, since it is often unclear to civil society actors which department deals with what issue (Glasgow, a4, 44–48). Administration is often not perceived as proactive but as hindering (Madrid, a4, 70).

Mental models are considered as a challenge in all sectors and regions. It is deplored that urban dwellers "have lost their relationship with nature" (Paris, a3, 44–49) and that many politicians are not aware of the necessity of education to understand the need for the socio-ecological transition (Paris, a3, 51–53). Apart from that, some cities report a conservative mentality in the administration: – "[I]t can't be done. […] The developer knows better what's good for people" (Lublin, a4, 24).

Interestingly, only few **environmental and social challenges** are named, even fewer directly relating to green spaces. Most environmental challenges raised refer to air pollution (Cracow, a2, 15 and a4, 19–21; Timisoara, a3, 23–25 and a4, 74). The problem of invasive species is only mentioned once (Bilbao, a4, 59). Although the quantitative research reveals that the majority of respondents assess climate change as an important aspect for defining a future local sustainability strategy, climate change does not seem to be perceived as a big threat. Only few actors explicitly raise it as a challenge. They warn for example that heat stress will become a major social challenge, also due to the fact of an ever-ageing population in Europe for which cities will have to find strategies to cope with (Saarbrücken, a3, 20–23).

The reduction of green spaces due to infrastructure and building development, often linked to privatisation, has generated **conflicts** between urban stakeholders with highly diverging interests and a different understanding of the value of green space (e. g. Cracow, a1, 70–75; Istanbul, a4, 47–48; Lublin, a1, 22–23; Milan, a3, 54–55). This often leads to diametrical visions for city development. Conflicts are a challenge on the one hand and part of the problem-solving process on the other hand, if stakeholders dispose of institutionalized conflict management tools. Such tools seem to be widely missing, since only a minority of actors consider conflicts as a constructive component of the sustainability discourse driving forward the socio-ecological transition.

Named conflicts can be clustered into four different types:

- Firstly, they emerge due to different ideas on the *use of existing green spaces*. These can be intergenerational conflicts (Strasbourg, a4, 88), conflicts about different forms of usage (Aalborg, a4, 73–75), for example between dog owners and non-dog owners (Milan, a3, 54–55; Saarbrücken, a4, 52–53), or between cyclists and pedestrians (Glasgow, a4, 23–28; Madrid, a3, 48–49). Conflict can also emerge on the conversion of use, for example when urban gardening activities are started on public green spaces (Innsbruck, a3, 77; Strasbourg, a4, 92) or around the usage for recreational activities and nature protection (Copenhagen, a3, 81–82; Innsbruck, a3, 80–85; Rome, a1, 42–43; Saarbrücken, a3, 37–38).
- Secondly, conflicts emerge around the *accessibility of green spaces*. Parks can be closed (Strasbourg, a4, 88–92), or access can be restricted by entrance fees (Potsdam, a3, 141–

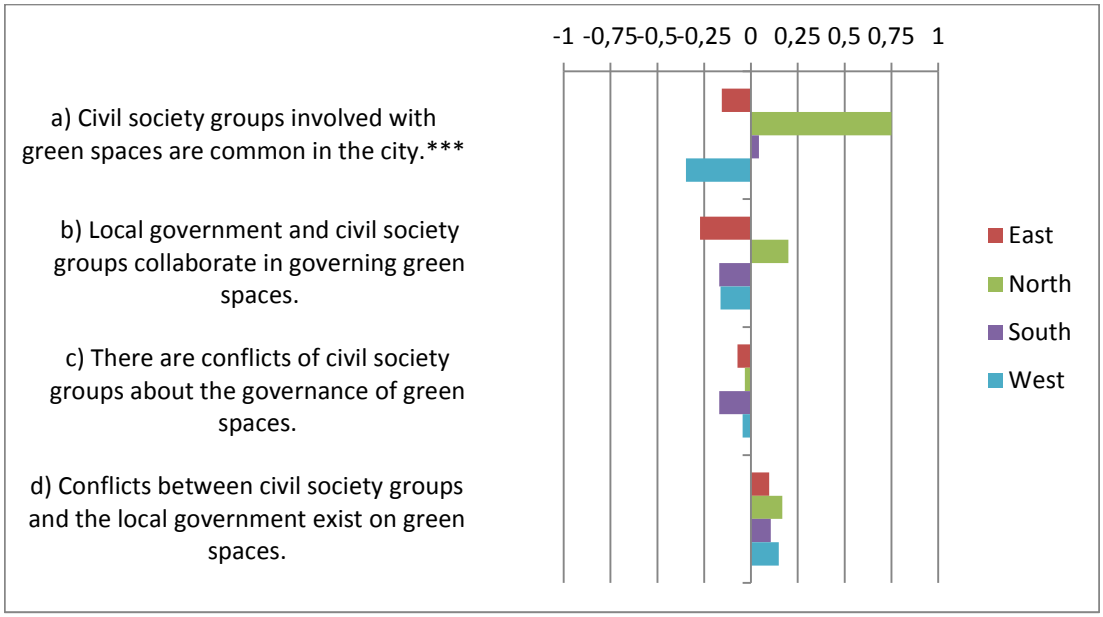

Figure 23: Regional differences for civil society involvement in green spaces governance (scaled from -2: strong disagreement to 2: strong agreement)

145). The city can partly assign the management of public green spaces to associations, which can also lead to restricted access (cf. section 5.3.1)

- Thirdly, in all regions there are conflicts *between preserving green spaces and building and infrastructure development,t* which in some cities heavily reduce green spaces (Cracow, a4, 48–49; Leeds, a3, 60–63; Milan, a4, 72–75; Saarbrücken, a3, 26), often entailing persisting citizens' protests (cf. section 5.2.2).
- Fourthly, conflicts can emerge *between sectors* – mostly civil society and local authorities (Cracow, a4, 50–51; Milan, a3, 54–55)—but also within a sector. For example, conflicts between civil society actors (Cracow, a1, 50–52; Gothenburg, a4, 35) or within the city administration between departments (Copenhagen, a2, 103–106) have been reported.

5.2.2 Self-organisation capabilities

To understand a possible impact of self-organisation on the transition in green spaces management, it has to be examined in how far citizens are involved in local decision making regarding green spaces and if opportunities for citizens to self-organise exist (for an overview cf. Johan Colding et al. 2013).

The regional differences (cf. Figure 23 and Figure 24) point to a higher degree of **civil society's action** and of interaction between civil society and government in the North compared to the three other regions. It supports the thesis of least civil society's influence in the governance of green spaces in the East. According to the quantitative data, only in the North civil society groups involved with green spaces are common and local government and civil society closely collaborate. Concerning conflicts between civil society and the local government, the sector analysis reveals that administration clearly rejects the existence of conflicts between itself and civil society, whereas civil society and business confirm the existence of such conflicts.

The case study report analysis points in the same direction. Out of 40 cities, 21 cities could be classified as having a very active civil society in the field of green spaces, nine as having an active one, and only ten as having a less active one from which six belong to the East (Cracow,

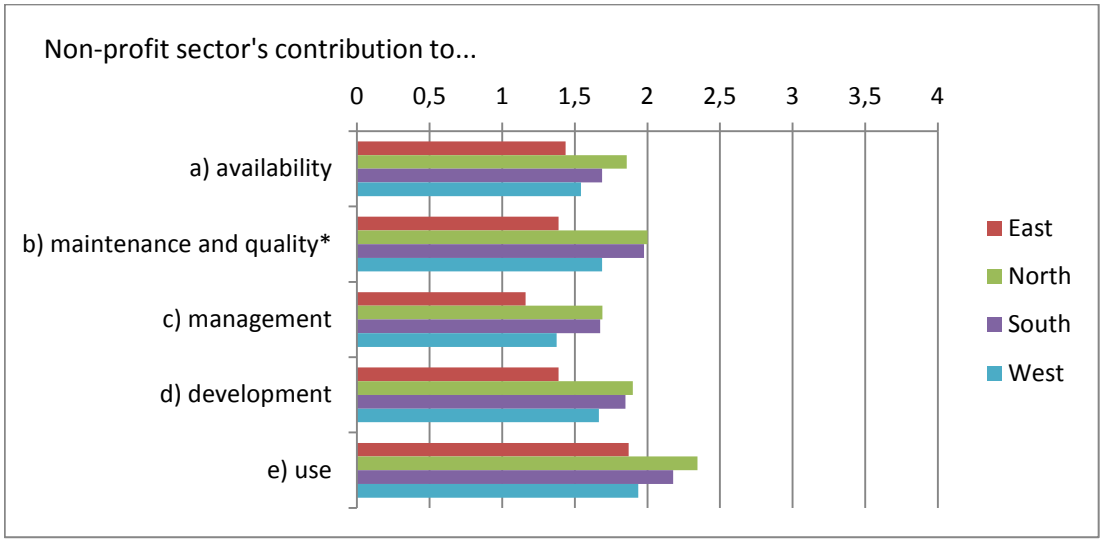

Figure 24: Regional differences in the contribution of the non-profit sector to green spaces (scaled from 0: none to 4: very high)

Giurgiu, Jihlava, Lodz, Prague, and Sibiu). Thus, the majority of cities with least civil society action in the field of green spaces as well as with the lowest degree of cooperation between civil society and local government are to be found there. Yet, these indications should not be overestimated since the qualitative data shows that forms of participation and self-organisation are to be found in every region (cf. underneath in this section).

Participation procedures are enshrined in the legal framework of most countries in the European Union. Yet, the level of participation actually applied on the local level greatly differs across the cities. It is tried to cluster observed forms of participation referring to the participation models explained in chapter 2.1:

- The lowest stage of *information* exists for example when providing a citizens phone hotline and a website (Madrid, a3, 52–53) or when letting citizens attend municipality council sessions (Istanbul, a1, 48).
- The second stage of *consultation* can be seen across all regions. This can happen on the district or the municipality level. Local authorities listen to citizens, citizens associations and neighbourhood commissions in information sessions or get their opinion via questionnaires (Gothenburg, a4, 63–66; Istanbul, a1, 70–71; Lugano, a3, 77 ; Sibiu, a2, 166–175). Citizens give input to the elaboration of the zoning plan in a workshop and afterwards via internet (Jihlava, a3, 40), or the mayor broadly invites to a public reflection for green areas (Copenhagen, a4, 52–53). District councils with a right to be heard by the municipal council exist for local decisions, constituting the intermediary link between the municipally council and the citizens (Copenhagen, a2, 55; Larissa, a4, 62–63; Lublin, a1, 24–25 and 39–41; Milan, a4, 76). They organise for example citizens meetings whose results are communicated to the municipality. Non-governmental organisations participate in round tables, or a Committee for public dialogue was created (Cracow, a1, 53 and a3, 16).
- The third stage of *stakeholder engagement* is also mentioned (Naples, a4, 18–19, 80–85). Here, city consultative committees on the municipality level exist, for example the Environmental Committee, for which each citizen can enrol to participate. Citizens take part in decision-making by elaborating a joint group proposal on a round table, which is then presented to the Chancellor. He/she has to consider it, yet is not obliged to present it to the Council.

- The fourth stage of *delegated decision-making* can be found in the form of the participatory budget through which citizens have a say in allocating the city's resources, as mentioned in several cities (Lodz, a3, 58–61; Lublin, a4, 34–36; Potsdam, a3, 113).
- The fifth stage of *co-decision making* is existent where there is collaboration in different councils—for example in a green council in which associations are involved (Aalborg, a4, 82–87). With Switzerland generally known for its system of direct democracy, another example is a referendum on a regeneration project of a park (Lugano, a3, 46–47). Citizens' committees approving of local decisions on green spaces also fall into this category yet can only wield influence, if decisions on green spaces are taken by the Council (Naples, a3, 29–30, 51–56).

Amongst the different **reasons for allowing citizen participation**, as traced for example by Liisa Häikiö (2012, 421–23) and earlier by Jürgen Habermas (1976, 136–37), the one of *increasing legitimacy* is mentioned by several actors, stating that participation is necessary since "citizens do not accept projects being imposed from above" (Rome, a1, 34–35). To avoid legal problems at a later stage of the planning process, citizens should be involved early (Lugano, a3, 110–120). Even social peace can be endangered, if no options for citizen participation exist (Bilbao, a3, 103). Participation is further considered necessary for *improving the quality of decision-making*, stressing that participation is "necessary to find the best policy solution due to the inclusion of local knowledge of citizens" (Sibiu, a2, 166). This means that all stakeholders are taken seriously and are considered as experts. Participation is also a means of *creating social support amongst stakeholders*. An active civil society can support the work of politicians working for the transition. This is for example the case if individuals or associations' representatives become involved in different councils (Aalborg, a4, 82–87). Monitoring and evaluating local politics and policies is a form of citizen participation that can contribute *rising levels of transparency and trust*. The right to do so needs to be in citizens' hands, for example by monitoring the local budget (Thessaloniki, a4, 86, 89–90; Naples, a3, 45–46). Here, self-organisation and participation is seen as a basic control element of local authorities in a democracy, especially in case of a weak opposition.

Self-organisation capabilities regarding the resource system green spaces are reported from all regions. They range from small citizens' initiatives on the neighbourhood level, often emerging in opposition to planned construction on public green spaces, to the formation of bottom-up social movements, for example in the field of urban food production. They arise as well in bigger associations and non-governmental organisations with a higher organisational degree and financial structure (Innsbruck, a3, 114–115; Larissa, a4, 80–83; Leeds, a3, 87 and a4, 15–19,113–116; Naples, a3, 71–74 and a4, 56–57). Forms of self-organisation can be clustered according to often-intertwined goals. The main ones are to *protest against building or infrastructure development on public green spaces* (cf. next paragraph) and to *use common green spaces for urban food production* (cf. section 5.3.1), sometimes after citizens have appropriated. These initiatives show that city dwellers become more and more aware of the need to protect urban green spaces in the face of ongoing urbanisation producing urban sprawl and the decimation of green spaces. They have understood that these spaces are not only essential in ecological but also in social terms, and they are willing to fight for their preservation. Their joint actions, such as the (re)appropriation of urban green spaces, make clear that they do not inactively tolerate an urban development strategy mainly based on economic growth and profit interests, but that their claim their right to the city by turning with their diverse actions these spaces into commons.

From all regions, *citizens' protests* due to conflicts between preserving public green spaces and building and infrastructure development are reported. Urbanisation increases building density and sealing, and is exacerbated by real estate and infrastructure speculation. This creates conflicts, out of which self-organisation can emerge, often starting with protests of informal citizens' movements (Cracow, a2, 36–39, 81 and a3, 73–76, 125–134). Measures to achieve the *(re)appropriation of public green spaces* take various forms, ranging from protest movements

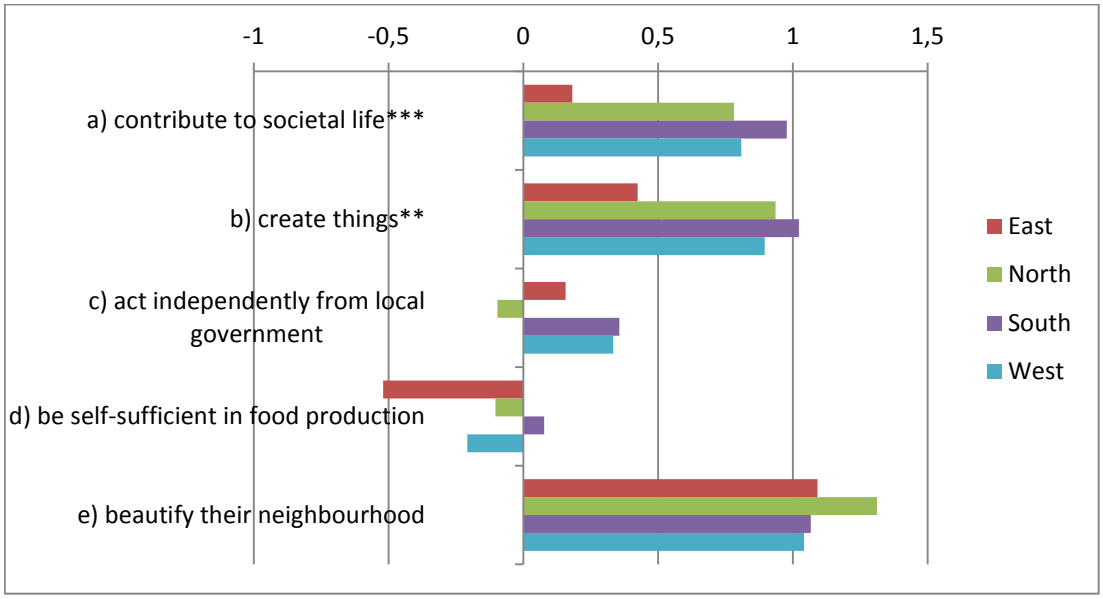

Figure 25: Regional differences in citizens' motivations for self-organisation in green spaces management (scaled from -2: strong disagreement to 2: strong agreement)

(Lodz, a4, 35–36) and going to court – often with organized non-governmental organisations filing a suit against the government – (Istanbul, a1, 39 and a4, 47–48) to fruitful collaboration amongst various civil society actors (Saarbrücken, a4, 67–73). Initiatives sometimes succeed, sometimes not or only partially, due to existing power structures or due to the fact that they come late in the planning phase. Some examples are given below:

- Citizens self-organise for protests against tree felling or planned traffic infrastructure projects (Linz, a3, 62–67 and a4, 65–68).
- A social movement has taken possession of abandoned areas (such as old military fields) to prevent construction on them and to develop green corridors by urban gardening activities (cf. section 5.3.1; Madrid, a4, 61–64).
- Conflicts on the accessibility of green spaces end in protests, with the most famous one being the Gezi park protests (Istanbul, a4, 47–48). Local non-governmental organisations and district politicians jointly fight against construction plans on public green spaces that provide for mosques with underground shopping malls in public parks. Actions range from demonstrations to court hearings (Istanbul, a1, 23–29, 42–47 and a4, 47–48).
- City residents self-organised with the support of a non-governmental organisation against the city's plan to sell pieces of land of a public park to the highest bidder for construction purposes. A consensus was reached in several meetings. Some green spaces were preserved, considering a significant monetary loss for the city's budget, whereas the rest was put up for sale (Cracow, a2, 36–39 and a3, 76, 125–134).
- Civil society actors founded an association to counter real estate development in the outer city district. They achieved an institutionalised hearing process for a participated planning procedure consisting of informative meetings with all stakeholders involved which is led by an external facilitator (Lugano, a4, 19–20, 61–68, 83–86).

In a rising number of cities, self-organisation helps to *mitigate public poverty*. Especially in cities in which local governments have severe difficulties in affording the provision of green space, new self-organised initiatives have emerged on the grassroots level for maintaining and even developing those, thus tackling local challenges and becoming active players in local governance processes (cf. section 5.3.1). Tasks, previously accomplished by public authorities, are

taken over by civil society, citizens, or associations, and in some cases by business actors, alleviating the public budget. This tendency has been intensified because of the multiple crises in 2008/09 and subsequent austerity policies hitting hard on local public budgets (Rome, a1, 35). In some places, self-organisation also *mitigates rising private poverty.* Using urban green spaces for growing food for self-consumption is a poverty-combatting strategy having its roots in European's 19th century industrial cities (Cordula Kropp 2011, 78). This function was driven back by economic growth in the second half of the last century and is now reappearing, especially in Southern European cities. Individuals take the crisis as a starting point to join others in becoming active. Public authorities can equally launch innovative processes.

According to the quantitative data, the strongest **motive** for citizens **to self-organise** in the management of green spaces is to beautify their neighbourhood. Other popular reasons are to contribute to societal life and to create things. To act independently from local government and to be self-sufficient in food production are no focal motives. This picture slightly changes when looking at the regional distribution, which shows that there are no significant differences for the strongest motive. However, the aims to contribute to societal life and to create things are weaker motives in the East than in the other regions (cf. Figure 25).

This is supported by the qualitative data, which displays that actions around urban food production have emerged in all regions but the East. Yet, the motive of self-sufficiency in fresh, healthy food at low costs, especially for citizens with a low economic status, is only raised in the South. When analysing the factors for successful self-organisation and participation, two aspects are striking. Firstly, all factors are raised in the North, West, or South. Secondly, most given factors are identical with the ones referred to as factors for a successful socio-ecological transition, suggesting that a successful socio-ecological transition is strongly linked to self-organisation and participation.

Political will and courage in the administration is seen as precondition to allow for self-organised initiatives. The municipality must have the sincere intention of involving citizens and believe in the value of citizens' input in the long term. This means to acknowledge and to acquire citizens' local expert knowledge (Copenhagen, a3, 61–64 and a4, 52–53; Saarbrücken, a4, 67–73). Depending on the level of participation, participation can be influenced by **aggregation rules**, which are one of the seven rule types defining the institutional setting of an action situation (cf. chapter 2.2). Aggregation rules determine "whether a decision of a single participant or multiple participants is needed prior to an action at a node in a decision process" (Ostrom 2005, 202). The more actors are involved in the decision-making process, the more the mastering of increased complexity in decision-making is needed. Participation procedures cannot be improvised but follow certain criteria. Clear rules as well as training for political and administrative staff on these are necessary (Naples, a4, 44–48).

The administration must transparently transfer information towards the citizens (Lugano, a3, 124–125; Naples, a4, 90–93). This confirms the need for **information rules** which "affect the level of information available to participants […] [and which must] relate to the set of all possible channels connecting all participants in a situation" (Ostrom 2005, 206). Clear communication also means that when participatory tools are employed, administration has to break the technical administrative language down into a language easily understandable by citizens.

Due to the complexity and the higher costs of citizen participation on the short term, some actors suggest to exclusively applying it in decision-making situations in which a conflict is emerging. Thus, where there is a need for people to get information and where a debate can be created (Copenhagen, a2, 82–85).The importance of *being involved from the beginning* of the planning process is stressed by actors from all sectors (Aalborg, a4, 82–87; Copenhagen, a2, 61; Lugano, a3, 121–128; Saarbrücken, a4, 54–59). Furthermore, the importance of *involving a wide range of actors* in the participatory procedure to make sure to not only take into account the best-organised group with the best lobbying capabilities, such as associations, is acknowl-

edged (Copenhagen, a2, 93–94). Experience has shown that successful involvement is done by activities appealing to different groups of people, otherwise only the already committed come (Copenhagen, a3, 65–66; Leeds, a4, 15–19).

Apart from that, *education* and *awareness raising* are seen as crucial, since they enable people to participate and to self-organise (Naples, a4, 31–32; Strasbourg, a4, 93). It is necessary to inform citizens and public authorities about the benefits of participation. It is about to activate bottom-up action and to reach those that are not sensitised yet in a process of communication. Perhaps these sensitisation processes can more easily be obtained in cities that follow rigorous growth logic despite already existing immense socio-ecological problems, since growth's environmental and social externalities are most evident there. If citizens want to participate, thus are politically very aware, this makes it easy for non-governmental organisations to gather support (Istanbul, a1, 42–47 and a4, 61). Raising citizens' interest for participation is also easier with *concrete issues* directly related to their neighbourhood than with more abstract planning procedures (Lublin, a4, 34–36).

The existence of *funding* schemes, for example from foundations, is a decisive factor (Copenhagen, a3, 36–37). Furthermore, *expanding participatory policy tools* such as consultative committees to district level as well as holding city referenda and civil audits[16] in order to give citizens a veto power on decisions is deemed necessary (Naples, a4, 86–93). This is because these tools serve to control politics. Thus, they surpass the state of mere consultation, for example on how resources are consumed, to increase transparency of the political process. Regarding projects of the European Union, it is suggested to set stricter participation requirements instead of just having participation indicators (Naples, a4, 78–79).

Barriers to self-organisation and participation are reported from all regions and partly mirror the named success factors. It is mentioned by actors from all sectors that organising participatory procedures is difficult and *complicated*, needs a lot of time and resources, thus is *expensive* and can *prolong decision making* (Copenhagen, a2, 79–81 and a3, 65–66; Linz, a4, 81–84; Lugano, a3, 152–153; Strasbourg, a4, 93). This increases the risk that in times of tight local budgets, funds to support self-organisation are cut (Thessaloniki, a4, 71–76). *Policy makers want to be in control* since politicians are responsible for political decisions taken (Copenhagen, a2, 79–81). Whether participation tools are applied and room for self-organisation is given, depends on the *political will* of local authorities. Some are very proactive (Aalborg, a4, 42–45; Gothenburg, a4, 45–46), yet political will can also be missing (Lublin, a4, 24; Madrid, a4, 70; Thessaloniki, a3, 32–33 and a4, 32–35). Citizens with the will to self-organise and participate might even be considered a "disturbing factor" (Naples, a3, 76), believing that citizens are not able to decide for the common good but just vote according to their own interest (Lugano, a4, 61–68). Local authorities might also be afraid of being criticized by citizens when allowing participation (Lugano, a3, 110). In numerous cities the will to let citizens participate exists and is requested by law, yet concrete policy tools are lacking (Madrid, a4, 84–91; Rome, a1, 77–78). For example, there is *no institutionalised regular mechanism of participation*, for example via a regularly meeting council (Bilbao, a4, 40–47; Milan, a4, 76). Instead, citizens are involved case by case.

Institutional barriers include *complicated* and *inefficient administrative procedures* and a high degree of bureaucracy, as well as *non-transparency* (Milan, a3, 44–45, 67; Naples, a3, 90–91 and a4, 50–51). Even if participation tools exist, citizens might not be well informed about their possibilities to use them (Bilbao, a3, 103; Cracow, a4, 74–77; Milan, a4, 76–83; Sibiu, a3, 85 and a4, 114–115).

[16] Meaning groups of actors from different background organise an investigation on a field of city management. The city has to deliver the requested information and the audit identifies problems. At the end, the city is accountable to the group.

Missing trust into public institutions is reported from every region but the West (e. g. Cracow, a4, 22–27; Glasgow, a3, 49–58 and a4, 77–80; Lodz, a3, 119–126). It can be due to experienced secret—sometimes illegal—entanglement between the public and the private sector with concomitant exercise of influence (Milan, a3, 83–84). As a result, people even refrain from joining associations and stop to care about the common good (Milan a3, 56–59 and a4, 26). Citizens might not trust association leaders any more, if they were led by personal interests in the past (Larissa, a3, 72–75), or they are scandalised by politics on higher levels as well as by the inefficiency of the legal system (Jihlava, a4, 80–83). It can also be that existing participatory tools have been badly managed by the administration so that citizens are tired of them (Bilbao, a4, 40). The *local mentality* and *culture* on the citizens' side and on the public authority's side is quoted in several cities from all regions but the South as a reason for a low participation and self-organisation rate. It includes not being used to the idea of citizens becoming active in common good matters beyond their voting right (Glasgow, a3, 49 and a4, 77; Sibiu, a3, 104–110 and a4, 189–190; St. Gallen, a4, 9–10; Strasbourg, a4, 93). Historic reasons for citizens rejecting participation are invoked in the East, saying that they associate it with "old-time communist social activism" (Lublin, a4, 49–50).

The *lack of education* (Thessaloniki, a3, 60) and a *lack of time* for voluntary activities is also mentioned, with the latter raised in the East and the West as reason for citizens' non-participation, due to their "fight for survival" (Sibiu, a3, 85) or employment (Bilbao, a3, 103; Strasbourg, a4, 93). Furthermore, *political oppression*—from hindering non-governmental organisations' operation to physical violence during demonstration—intimidates citizens and can demotivate them from becoming active (Istanbul, a4, 73). In addition, *legal barriers* are put up by the centralized political system giving little power to the municipal council (Larissa, a3, 78–79).

The regression analysis (cf. Table 17) shows that on the one hand a high local government's autonomy in improving and expanding as well as in investing in green spaces is beneficial to the *commonness of civil society groups* (cf. section 5.4.2). The same holds true for a high degree of leadership of the local authorities in ensuring the availability and quality of green spaces[17]. On the other hand, if the capacity of the local government in providing financial and human resources is high, this makes the commonness of civil society groups less probable. The same holds true for a satisfying level of monitoring of local land quality, pollution, and biodiversity. From this, it can be concluded that a high degree of local autonomy combined with a high degree of leadership of local authorities provides the right framework conditions for civil society groups to enter the stage. If then the local administration is capable of providing a satisfying level of monitoring, closely linked to its capacity of financial and human resources, civil society groups become less involved than in cities in which public authorities have problems in assuring a satisfactory level of green spaces management.

[17] The correlation between the variables "Involvement of local civil society actors in governance of green spaces" and "Civil society groups in the field of green spaces are common in the city" was proved to be insignificant. Both variables indicate different situations. Whereas the dependent variable refers to self-organisation which can emerge with or without cooperation with local authorities, the other variable relates to citizen participation, thus implying as precondition an interaction between civil society and local authorities.

Table 17: Influences on civil society groups' existence in green spaces

Civil society groups in the field of green spaces are common in the city	Coef.	Std. Err.
Satisfying access and availability to public green spaces in general	0,417	0,270
Involvement of local civil society actors in governance of green spaces***	1,221	0,324
Local government's autonomy in improving / expanding green spaces***	0,741	0,272
Capacity of the local government (financial capacity and human resources)*	-0,620	0,335
Leadership of Local government administration in ensuring availability and quality of green spaces**	0,641	0,248
Monitoring of local land quality, pollution and biodiversity is satisfying*	-0,433	0,238
Autonomy of the local government in investing in green spaces***	0,724	0,274
Local government and civil society groups closely collaborate in governing green spaces***	1,336	0,299

Notes: Ordered logistic regression, 128 observations, p-value = 0.000; Pseudo R^2 = 0.3815, Log likelihood = -117,92 (control variables: city and sector)

Actors also raise positive and negative **outcomes of self-organisation and participation**. Positive outcomes are named in all regions except the East. Participation leads to *shared experiences of a community*, thus building a more attentive community, which is the basis for sustainability (Rome, a1, 33). It is seen that the results of participatory processes are better than those achieved in top-down procedures without participation (Linz, a4, 81–84). *The more people are involved, the more satisfied they are* with the result and the more they use the city, identifying with it and its public space (Copenhagen, a2, 79–81). Even if citizens did not succeed with their opinion, participatory processes increase the acceptance of political decisions, since citizens have the feeling of having been listened to, thus of having been taken seriously (Copenhagen, a4, 52–53). Participation creates a feeling of *ownership* and *responsibility* with the citizens, raising their interest in the common good (Copenhagen, a3, 36–37; Potsdam, a4, 194–195; Rome, a1, 34–35). Local participatory processes can be seen as joint experiments that are evaluated after implementation. If they work, they can be scaled up "think big—start small—scale fast" (Copenhagen, a3, 36–37). In Spain, citizens' movements mushroomed after the end of the dictatorship. They have achieved an increase in green spaces in the neighbourhoods and have gained influence in the management of parks (Madrid, a4, 56). The adoption of public green spaces by civil society and business actors (cf. section 5.3.1) can be a counterweight to private actors' building and dumping activities on empty spaces (Naples, a4, 48–49). This can even weaken organised crime as in the case of associations managing land withdrawn from the mafia (Naples, a4, 65–75). This exemplifies civil society's correcting role towards state and market from below.

Negative outcomes respectively shortcomings of participatory procedures are equally named. The "*participation paradox*" (John E. Seley 1983, 20), meaning that groups with higher capacities to express their opinions are primarily listened to by policy makers, disadvantaging less powerful civil society groups, is existent. This implies that there is the risk of only the strongest and best lobbyist influencing on political decisions with the rest remaining unheard (Gothenburg, a4, 67). The *misuse of participation*, either for political reasons or for particular interests of citizens is mentioned in every region (Cracow, a3, 27–28). Individuals and associations try to get through particular interests, sometimes related to a NIMBY[18] attitude, hindering the socio-ecological transition (Cracow, a1, 50–53; Gothenburg, a4, 67). In several places participatory tools are only applied because they are required by law ("tick a box"—Copenhagen, a3, 36) without having an influence on further policy outcomes (Copenhagen, a3, 36–37,61–64; Istan-

[18] "Not In My Backyard"

bul, a4, 33, 61; Lodz, a4, 13; Paris, a4, 65–66). They are often only applied, if they fit the political planning process and are only suggested at a late stage (Cracow, a4, 74; Saarbrücken, a4, 54).

5.3 Actors, factors and lessons learnt

This section gives an overview on actors, actions, and factors driving the green spaces transition across the cities and summarises the lessons that actors have learnt from local resource management. Insight is gained by studying examples for (un-/less) successful actions and actors' (non-)involvement in them. In all cities of the green spaces' sample there are political, business and civil society actors involved, yet the degree and quality of their collaboration highly differs from city to city. Defining factors are subdivided into local and non-local factors and analysed along success and failure factors.

5.3.1 Actors, actions and factors

Across cities, **actors** from politics, administration and civil society have shown *leadership* in the governance of green spaces (the local government administration, the mayor, politicians of the ruling parties, local environmental NGOs, other local community groups). In contrast to the other resource systems (cf. chapters 4 and 6), local community groups play a major role in green spaces. Reflecting less civil society influence in the East (cf. section 5.2.2), local environmental NGOs and other local community groups are less important there compared with the other regions (cf. Figure 26).

The qualitative data shows that in all regions individual persons coming from all sectors are highly influential and can become **key change agents**. They often have a known reputation, as for example a dedicated mayor driving forward sustainability issues (Sibiu, a2, 68–71). Highly driven individuals working as civil servants in the Environment Department can be decisive (Gothenburg, a4, 45–46). The same applies for well-informed leading figures from civil society that are good networkers implementing innovative ideas, for example in the field of urban food production (Leeds, a4, 69–72). In addition, the position of the city's semi-public companies[19] on sustainability issues influences the city's orientation towards sustainability (Copenhagen, a2, 57–58; Saarbrücken, a4, 32–34).

The role of **science** is seen as bringing in a neutral perspective, highlighting problems, and pointing to the future (Linz, a3, 46–47). Universities should be rooted locally, work project-orientated in an innovative way and collaborate with local authorities and the business sector (Aalborg, a4, 46–51; Lodz, a3, 99–108; Lublin, a1, 42–51; Rome, a1, 73–78; St. Gallen, a4, 10). Innovation means strengthening these university-community linkages (e. g. Leeds, a4, 30–36). Science plays an important role in underlying sustainability issues' urgency in the public opinion and therefore can deliberately be misrepresented (Aalborg, a4, 114 (cf. also section 5.2.1). **Civil society** can be influential (Copenhagen, a4, 38–39; Lodz, a4, 31–36; Lugano, a4, 41–47; Thessaloniki, a3, 41–44 and a4, 13): In some cities the sustainability topic was brought up by citizens' movements, then taken up by politicians. High pressure from non-governmental organisations on local authorities can lead to the official involvement of civil society actors into local politics, for example in committees. This can have a spillover effect to also involving individual citizens, for example via local councils (Copenhagen, a2, 53–54).

A high level of **cooperation** is expressed in *regular institutionalised collaboration* between civil society representatives and the local council. Collaboration can be direct or indirect. For example, regarding the involvement of citizens in decisions about public green spaces, citizens can

[19] Semi-public companies are owned to more than 50 percent by the city, yet function like private enterprises.

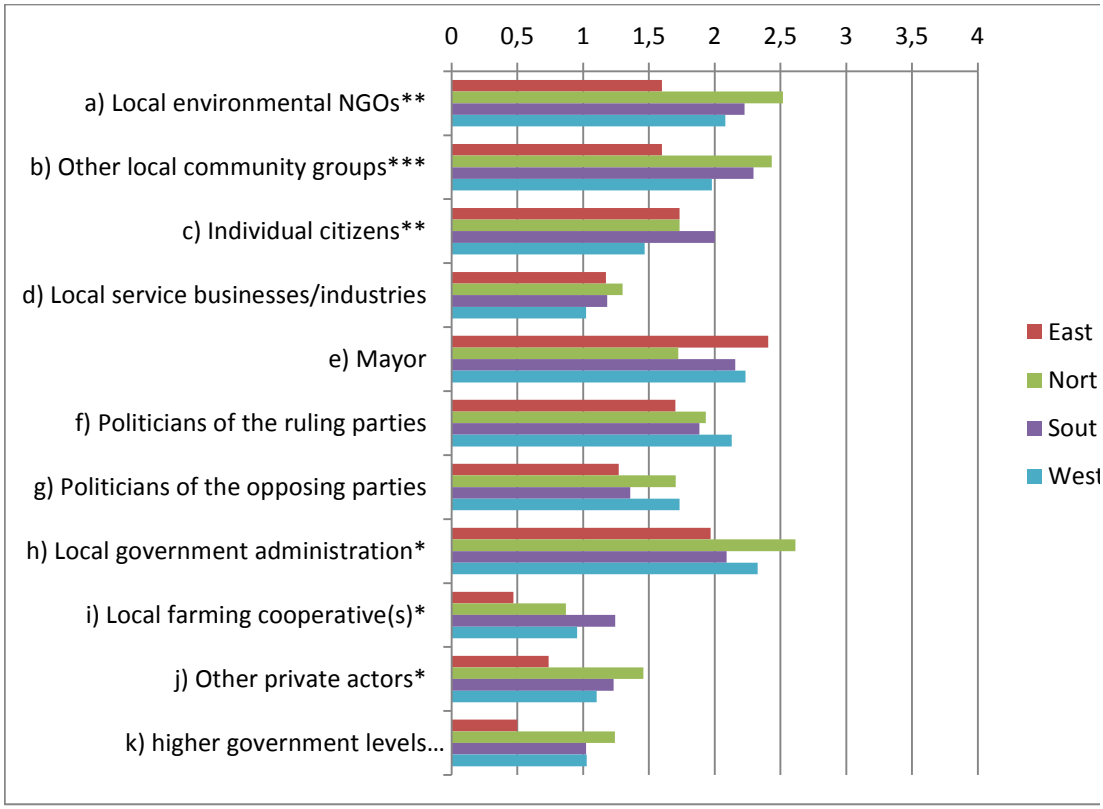

Figure 26: Regional differences in actors showing concrete leadership (reputation and capability) in green spaces management (scaled from 0: none to 4: very high)

participate directly in town councils, which are open to everyone. Indirectly, they can be represented in a city's green council by a member of a citizens' association. Often different civil society actors collaborate, for example a non-governmental organisation supporting citizens' initiatives to join forces and to increase chances of success (Copenhagen, a4, 62–64; Lugano, a4, 41–47; Saarbrücken, a4, 71–72). A high degree of cross-sector cooperation can manifest itself for example in numerous activities in the field of urban food production in cooperation with local authorities, schools, and universities (Leeds, a4, 30–36).

A minority of actors claim that cooperation between civil society actors and the local government does not exist at all. They deplore that there are no common projects between administration and civil society and that there is no response from the government to civil society actors' propositions or that it only happens by chance, for example via a personal relationship with government employees (Sibiu, a2, 123–128). This is often the case, if a general lack of organisation and knowledge is noted with local authorities, stemming from understaffing due to financial hardships or position assignment along clientelistic "criteria".

The various conflicts around urban land use raise the question of what kind of local control system is adequate to deal with this *new complexity and multiplication of actors* entering the governance of green spaces. This increases the conflict potential since rule definition, for example around fallow land, permanent permits etc., is further complicated by a rising number of involved actors. In some cities, **boundary rules** have partly been shifted: New actors from civil society and business are now eligible to enter positions that before were reserved for state actors only. The process determining which eligible participants may enter—or must enter—positions and, at a later stage, how participants may or must leave a position (Ostrom 2005, 193) has only started yet. This leads to conflict and sometimes disappointment and to the re-

treat of new actors that invested time and commitment. Due to not yet clearly defined boundary rules, they become sick of participating or self-organising.

There is a wide range of **successful actions** referred to in all regions: Numerous *information* and *awareness-raising* events have been held all over Europe. These include lectures (Jihlava, a4, 24–25), research studies conducted by non-governmental organisations (Larissa, a4, 14–17,47–49), tree-planting actions (Jihlava, a4, 24–25), park-cleaning events (Larissa, a4, 67) or pick-nicks (Thessaloniki, a3, 41–44). They are organised, depending on the city, mainly by civil society or by local authorities, often in collaboration with each other, sometimes also involving the business or science sector. Tendering *sustainability prizes* within the city or taking part in (inter)national tenders as a whole city is getting more common and seems to be a functioning incentive (Copenhagen, a4, 14–15; Innsbruck, a3, 146–149). In several places the *adoption of public green spaces* by associations as well as private companies to take care of them has become common (cf. section 5.3.1), and in several cities citizen movements get together to protect endangered green areas (cf. section 5.2.2). Local authorities can encourage and facilitate participation and self-organisation, for example by coordinating volunteers' involvement and by supporting emerging initiatives financially or by providing space, material, and soil. Actions across sectors help to mitigate *public poverty*. Civil society and sometimes business actors contribute voluntarily to public green spaces management (Milan, a3, 36–37 and a4, 101–102; Naples, a3, 71–76 and a4, 31–32, 46–47, 56–57; Thessaloniki, a3, 20–21, 41–44, 85 and a4, 13). Cooperation takes different forms, for example *spontaneous self-organised initiatives* from the bottom or actions proposed by the city, such as the *adoption of public green spaces* by associations and private companies to take care of them. This new collaboration is in most places not yet anchored institutionally. It often still misses clear rules, so that responsibilities are not clearly assigned to stakeholders, as the following examples show:

- Accessibility of green spaces was reduced by assigning their management to a golf association that restricted access to its members (Milan, a3, 54–55).
- Two civil society groups together with a business actor, providing material, volunteers, as well as financial means started an initiative of park renovation. The only thing they requested from the local administration was to provide them with soil, which would have cost around 500 EUR, which did not happen (Thessaloniki, a3, 73–76).
- Across European cities, urban commons are increasingly used for *food production*. In some cases these movements start as small spontaneous bottom-up initiatives, evolving into growing social movements in which sometimes associations join or out of which in some cases new associations or cooperatives are formed. For example, an *urban garden network* was created by individuals/neighbourhood associations without any support from the city council, operating on public abandoned space (Madrid, a3, 58–59).

Urban food production can be a means of *combatting private poverty* by providing fresh local food to contribute to food security: Examples come from Greece where the ongoing transformation of a former military camp into a composting site done by city employees was suddenly stopped by the 'crisis' and concomitant budget problems. The staff was dismissed, and the place turned into an illegal dumping ground (Thessaloniki, a3, 84–85). Citizens reacted to the city's difficulty in providing sufficient management of public green spaces by self-organising in a large *urban agriculture initiative*. They have created gardens for vegetables and fruits in several sections of the city on abandoned military camps, cleaning, embellishing, and making the spaces available for food production designated for self-consumption (Thessaloniki, a3, 78, 85). In Larissa, the administration initiated a *municipal vegetable garden*, which gives citizens with a low or no income the possibility to grow their own food. The garden is a success project and has already been expanded (Larissa, a3, 49–50 and a4, 41–42).

The quantitative data illustrates three points. Firstly, the availability of green spaces is influenced by several **factors** amongst which the national regulatory framework is not important, while *local regulations* tend to be important. Secondly, the most often named factors improving

green spaces are the *availability of un-built land*, *local building codes and sectoral plans*, *local political commitment*, the *capacity of the local government* and *citizen empowerment*. Thirdly, most actors see more *support for sustainable management of green spaces* coming from European and national policies than from local ones. This tendency is most distinct amongst civil society actors. Only in the North, local policy plays a bigger role than the national one, which could be ascribed to municipalities' high level of autonomy there. This third statement seems at first sight contradicting to the preceding two from which it can be discerned that the green spaces resource system is mostly influenced by local factors. Possibly, actors associate political support more with funding options than with the legal framework. Apart from that, looking at the various benefits of local green spaces (cf. also section 5.1), their positive influence on the microclimate is rated highest. Probably, the importance of ecological effects depends on the specific conditions of each city since there are little regional differences but many between the countries within a region. Apart from ecological benefits, the social ones, for example the possibility for citizens to relax, are also of a high value for actors.

The qualitative data provides a detailed insight into **transition success factors** across the cities. In cities most advanced in the transition, a process of *collaboration* and *compromise-finding* can be detected (Bilbao, a3, 39–44; Innsbruck, a3, 44–45; Linz, a3, 36–37; Rome, a1, 30–31). It is coordinated by proactive local authorities that jointly elaborate a *long-term strategy* for sustainability with all stakeholders, comprising a high degree of *citizen participation* from the beginning of the process. Concrete options for citizen participation exist and are pointed out (Cracow, a3, 50). The basis for this is *political will* (Bilbao, a3, 37–38; Leeds, a4, 58; Linz, a4, 36; Saarbrücken, a4, 28–29; Sibiu, a2, 52–55). Political actors can even be transition drivers, then interacting with other actors from a proactive administration, business, and civil society to "carry it through" (Aalborg, a4, 42–45). Not surprisingly, the lack of political willingness "to make sustainable development principle number one" (Lodz, a4, 28–30) is mentioned as *failure factor* (Leeds, a3, 38–41; Potsdam, a3, 101; Thessaloniki, a3, 32–33). *Networking* between stakeholders is facilitated by an *innovative committed administration* which then carries the political decisions out (Larissa, a3, 39–41; Potsdam, a4, 116; Rome, a1, 30–31; Timisoara, a3, 59).

Local authorities along with business should invest into the potential, the activities, and ideas coming from civil society actors by creating a social dialogue. It should take place regularly in institutionalised form, creating *communication channels* between citizens and local authorities. Media has to communicate ongoing activities and sensitise citizens for the necessity of the socio-ecological transition. Now it does not sufficiently support the sustainability topic. Awareness must be raised via *information* and *education* campaigns (Larissa, a4, 41–42).

This comes along with existing *funding options* of which European Union funds are a major part (Milan, a4, 97–98; Sibiu, a4, 88; Timisoara, a3, 69). Individuals and institutions with the *knowledge* of how to successfully apply for funding (for example from the European Union) are of key importance here.

Generally, a high degree of **local autonomy** is seen everywhere as a transition factor apart from Switzerland where some actors regard the high local autonomy as hindering (cf. section 5.4.2). Though non-Swiss actors do not explicitly describe local autonomy as hindering, actors from all regions stress the importance of a *strong national and European Union legal framework*, for example in the field of nature protection or building development, which forces the local level to abide by it (Copenhagen, a3, 80; St. Gallen, a4, 77). For example, if the city has to comply with federal law in the field of nature protection and building development (Saarbrücken, a4, 30–31), if the national environmental law prescribes the amount of surface of green spaces according to the number of inhabitants (Sibiu, a2, 56), or if a clear regional environmental framework exists (Bilbao, a3, 39–44), this can foster the transition. Primarily, in the East, a too permissive European Union's legal framework, not sufficiently forcing the national and local level to reach sustainability goals in the field of green spaces, is deplored (Lodz, a4, 57; Lugano, a4, 100; Timisoara, a4, 73–76).

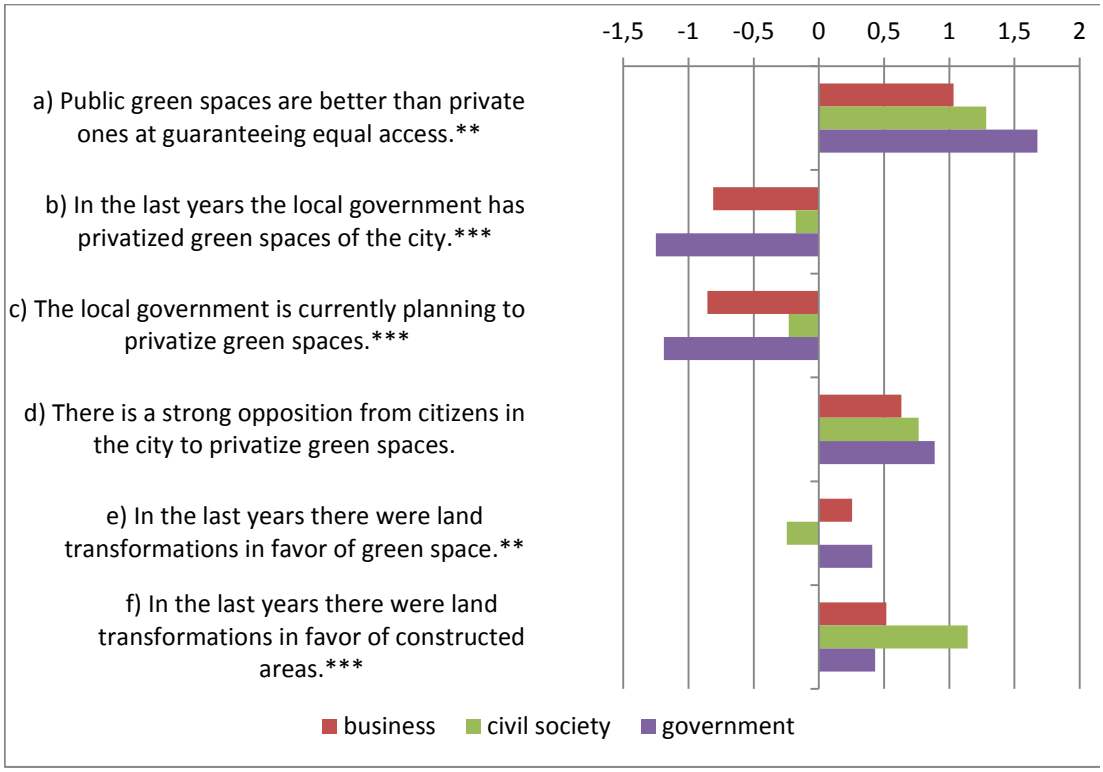

Figure 27: Sector differences on statements on privatisation (scaled from -2: strong disagreement to 2: strong agreement)

5.3.2 Lessons learnt

The socio-ecological transition is "driven by learning and norm-adoption individuals, who are capable […] to develop critical levels of trust, […] to develop levels of cooperation […] [and] to realize the net benefits of this cooperation" (Poteete, Janssen, and Ostrom 2010, 240). In the interviews, the majority of actors are quite specific about what they have learnt and what should be improved regarding sustainability issues in the city; in general and the resource system green spaces in particular. The quantitative results particularly gain insight into **lessons learnt** on green spaces governance.

While the *amount of green spaces and greenery*, their *quality* and the *access* to them has increased on average moderately over the last ten years, *biodiversity* has stayed more or less the same. This should not lead to the assumption that the level of biodiversity is satisfying everywhere. The qualitative and quantitative findings displayed in section 5.2.1 draw a differentiated picture, showing that especially in the South biodiversity is threatened. In the last ten years the availability and quality of green spaces has been improved mainly by reclaiming land or by opening new spaces either by the local government or by residents or community groups, by investments or new regulations by the local government and by community actions with or without changing the function of existing open green spaces. The impact of new spaces by residents or community groups is stronger in the South and North than in the East and West. Community actions which do not change green spaces' function are relevant especially in the North and South, and community actions that change the function of the green spaces are not common in the East.

Altogether, no privatisation trend can be seen. The majority of respondents from all regions believe that public green spaces better guarantee equal access than private ones. Also, that there

is a strong opposition from citizens in the city to privatise green spaces and that in the last years there were land transformations in favour of constructed areas, with civil society being most critical and government most affirmative (cf. Figure 27).

If a future **joint strategy** exists, there is also a *culture of sustainability*, meaning that the need for it is clear to everyone and that everyone identifies with it as a goal. The transition is seen as a mutual *continuous learning process* in the day-to-day work of all participating stakeholders, often leading to new innovative solutions (Madrid, a3, 62–63). These emerging solutions have then to be tested if they work locally with all stakeholders participating before being scaled up. Local good practice examples should be made visible and then be spread (Paris, a3, 60–62; Timisoara, a4, 156–157). This is helped by *networking* via participation in European Union's projects, which promotes the learning process across cities, groups and individuals (Potsdam, a4, 116).

Knowing that the path to sustainability is arduous, it requires a lot of *stamina* (Copenhagen, a3, 65–66 and a4, 54–55). Predominantly civil society actors, when asked for their motivation, name strong will, self-confidence, positive thinking, patience and dedication instead of being in a hurry or despair (Leeds, a4, 107–108; Thessaloniki, a4, 61–62). The work is done, though knowing that in the end perhaps only a small step is achieved and no quick results are produced (Bilbao, a4, 76–79; Istanbul, a4, 51).

Concerning *participation* and *self-organisation*, citizens are motivated to participate, if they can engage in a concrete aspect, a practical issue. In order to involve different groups of citizens, they must be addressed with activities that appeal to them. Citizen participation helps to achieve sustainability aims, since "an informed and aware citizen is always the best ally for an administration that wants to pursue certain objectives such as sustainability" (Rome, a1, 54–55). If citizens are faced with a fait accompli, they react with resistance. What is known is more easily accepted and appreciated. The co-management of common goods fosters civic environmental education, underlines their value and benefits as well as their costs and the need to protect them (Rome, a1, 54–55). Civil society actors suggest the monitoring and the evaluation of policy making by citizens, asking for a combination of a top-down organisation plan for sustainability with an interactive bottom-up citizen-led control system, so that local authorities take the citizens' needs into account (Thessaloniki, a4, 86). This must be embedded into a *multi-disciplinary approach* to avoid missing out important aspects.

For reaching a fruitful collaboration between civil society, business, and local authorities, rights and duties of each party, for example of public authorities, citizens or associations, need to be clearly defined. This means that *rules* have to be established (cf. section 5.3.1). Otherwise, civil society actors do not understand which tasks are delegated to them. These defined rules need to be controlled because there is always the risks of someone taking advantage of his power (Rome, a1, 48–49). *Conflicts* emerge because of actors' stakes whose power position might be threatened by newly incoming actors. Thus, in a first step existing local power structures need to be analysed and understood. In a second step, ways of involving potential stakeholders in rule finding without bypassing present stakeholders must be found. In this process, the local government's task is to offer an institutionalised transparent meeting and discussion platform and to coordinate this process.

Concerning **European transition factors**, the European Union's *funding schemes* seem to be, in spite of their complexity, a functioning instrument to drive the transition on the local level. In order to receive European Union's funds, sustainability criteria must be met. This can be the trigger to elaborate a local sustainability strategy. European funds, accessible also for local civil society actors, for example small associations, help to raise people's sustainability awareness, since they enable networking, learning form others and the sharing and spreading of good practices. European directives, which have to be implemented down to the local level, are equally helpful, for example in forcing the local level to introduce a register for green spaces. Therefore,

according to many actors, a fiercer environmental *legislation* on the national/European Union's level with more solid and clearer rules is needed, whose non-compliance on the local level is also consequently sanctioned (e. g. Lugano, a4, 98–99; Madrid, a3, 91–92,95–96; Timisoara, a3, 167–171 and a4, 183–185). Furthermore, the national and European Union's level can set financial and fiscal incentives to force local authorities to act more sustainably, for example by predetermining the goals concerning land consumption, land taxes, etc. (Madrid, a4, 39–40; Paris, a4, 18–19; Saarbrücken, a4, 90–91; Timisoara, a4, 72). In this regard, civil society regrets the halt in Turkey's EU accession process, since working towards European Union's accession would have meant working towards compliance with the European Union's legal framework, which would have advanced sustainability (Istanbul, a4, 100–103).

5.4 Norm adoption and local decision making autonomy

According to Poteete, Janssen, and Ostrom (2010, 226–27), successful norm-adoption by participants in an action situation leading to shared norms rises the level of trust between participants and is thus decisive for a higher degree of cooperation (cf. also Chapter 2). The underlying question is whether and how values change, which could be observed in a transitional socio-ecological norm-adoption towards trust and cooperation. Thus, this section investigates the evolution of norms in the governance of local resources and tries to answer the question whether local decision-making autonomy matters in the socio-ecological transition.

5.4.1 Norm adoption

Respondents agree that the following **statements on norms** govern the local green space poli-

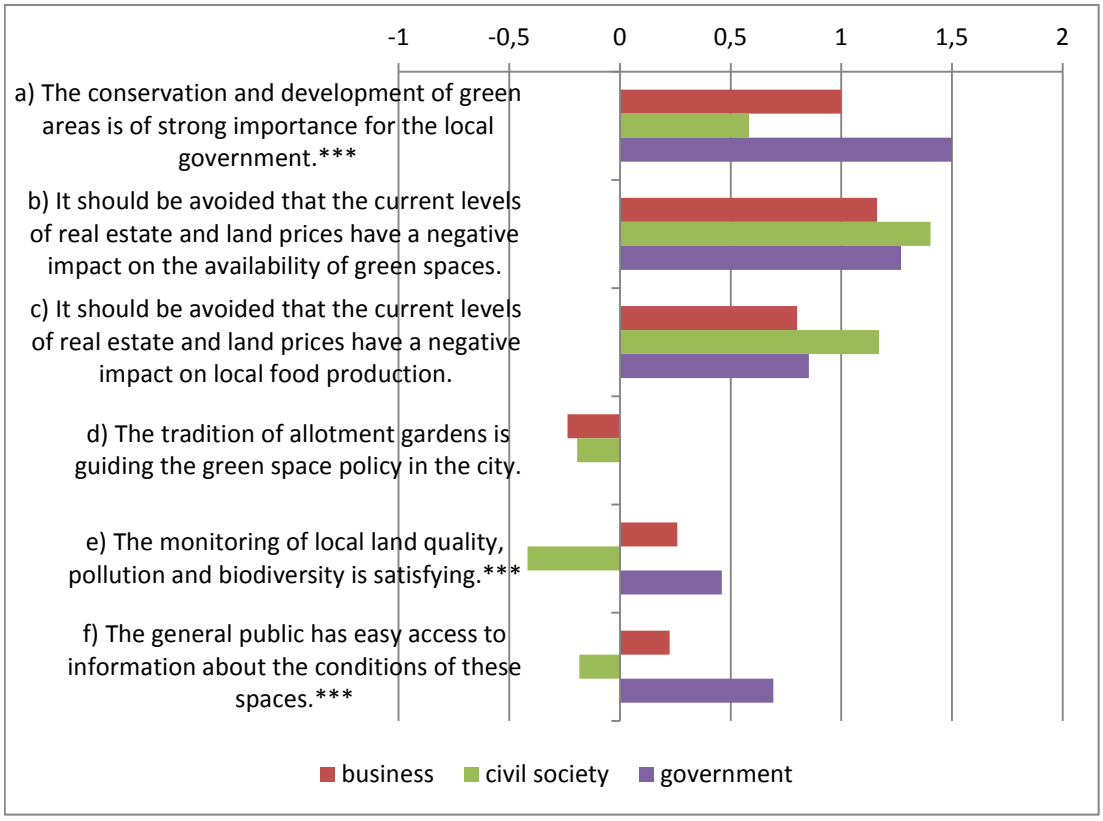

Figure 28: Sector differences in agreeing with statements on norms governing the local green space policy (scaled from -2: strong disagreement to 2: strong agreement)

cy: ‘The conservation and development of green areas is of strong importance for the local government.’ ‘It should be avoided that the current levels of real estate and land prices have a negative impact on the current and future availability of green spaces.’ ‘It should be avoided that the current levels of real estate and land prices have a negative impact on local food production.’ Sectors’ differences can be detected for the importance of the conservation and the development of green areas, the monitoring of local land quality and access of information. Government representatives’ opinion is most positive, civil society’ is most negative and the business respondents’ statements lie between these (cf. Figure 28).

Three **governance principles** that can be derived from these norms are also agreed on across cities: ‘The amount and location of green spaces are known.’ ‘External actors do not undermine the local governance of green spaces.’ ‘The local green space system can be identified as relatively autonomous.’ The last statement means that the boundaries of the resource system are clear-cut in green spaces, and that green spaces are a relatively autonomous subunit of a larger system.

When asked specifically about **rules and policy instruments** that are supporting, missing, or need to be changed in order to reach a socio-ecological transition, interviewees named the existing *legal framework* as obstructing. This can be due to its *complexity* and *complicatedness*. It can be bureaucratic and even chaotic. With the lately decentralised administration or the national ministry, it is often not clear, which government level is responsible for a specific action (cf. chapter 4). It hinders for example the transformation of former military camps into green spaces (Thessaloniki, a3, 32–33, 36–38), or European Union’s regulations are interpreted differently on the national level than intended in Brussels and thus the final national law is complicated (Jihlava, a3, 66).

A *too flexible or even missing—or not enforced*—legal framework can equally be hindering. For example, the local legal framework for tree-cutting and replacement might not be strict enough without a local law protecting trees, meaning that tree-cutting—also in private areas—is possible without replacing them elsewhere (Linz, a4, 76). The national legal framework concerning construction can be too permissive, making it difficult to protect green spaces (Cracow, a2, 32–33). If the value of nature is further disregarded in legal texts, green spaces will continuously be considered as relatively insignificant. This is for example the case where penalties for the removal of trees were removed in an amendment to the national Environmental Act and where the green spaces category has not been incorporated as public purpose into the law on spatial planning (Lodz, a4, 55–59). An example from the past comes from Romania, where in the 1990s there was no legislation on construction, leading to uncontrolled building activity (Sibiu, a2, 57–63).

A *too inflexible* framework can be hindering as well. It can be too general and abstract (Timisoara, a4, 123–124). An inflexible public procurement law setting as primary criterion the price can hinder project implementation (Lublin, a1, 54). Innovative bottom-up solutions might meet legal obstacles, for example by the interdiction to sell food produced in urban gardens in schools (Gothenburg, a4, 87–92). The European Union’s legal framework might not be flexible enough to be adapted to local conditions. For example, the European Union’s rules on organic farming need to be adjusted or local exceptions have to be made, since in some Northern European countries organic farming is not possible without additional lighting (Gothenburg, a4, 103–107).

Missing or obstructing policy instruments are named. Ongoing land consumption is not sufficiently countered because of the lack of applying appropriate policy instruments. Bringing local authorities and universities closer together is missing in most cities but would be very important also for green spaces planning (Rome, a1, 73–78). Insufficient steering tools are often the reason for only single strategies followed by piecemeal actions without a sustainability drive and an overarching sustainability vision for the city behind (Leeds, a3, 38–41; Lodz, a3, 47; Potsdam,

a3, 87–88; Thessaloniki, a4, 21, 35). Yet, an overall concept can only emerge with a clear political will behind. A lack of urban planning can also stem from a desolate financial situation as it is the case in cities having suffered severe mismanagement, sometimes linked to the misappropriation of public funds in the past (Larissa, a3, 32, 45, 78–79). Creating a local developing strategy is even more important in times of crisis when overarching national strategies on sustainability development are often missing and financial resources are very much limited. The 'crisis' has aggravated the tendency of always awarding public project tenders to the lowest bidder, going along with decreased quality and sustainability criteria (Thessaloniki, a3, 49–53). Investing into oversize expensive prestige projects, mostly in the field of building and traffic infrastructure construction is seen as counter-productive to sustainability, also in an intergenerational sense, leaving the next generations with high debts (Saarbrücken , a4, 76).

Supporting policy instruments are equally stated: Strategies at the local and the regional level are a good starting point (Aalborg, a4, 107–112), such as a master plan on biodiversity (Paris, a3, 58–59). Citizens need to be involved in the planning process from the beginning—in consultations, dialogue meetings, coordination groups (Umea, a3, 125). Yet, making plans is relatively easy, compared to implementing them afterwards, due to diverging interests and arising conflicts (Aalborg, a4, 28–32). An existing *implementation gap* is reported from every region (Lodz, a4, 25–27; Bilbao, a4, 79; Istanbul, a4, 96; Timisoara, a4, 32,169), yet can be tackled by policy tools adapted to the respective local context. Different examples for such successful tools are given: Political decisions can be liable to a 'sustainability check,' which asks politicians to expose sustainability impacts of the planned measures (Saarbrücken, a4, 83). The 'Environmental Diploma', an environmental management system for small and medium enterprises and municipalities was invented on the local level and was so successful that it is now enshrined in the national law (Gothenburg, a4, 43–44). Furthermore, the 'no net loss' tool can be applied in land use planning, demanding ecological compensation measures in case of building on green areas. Yet, the principle has not become obligatory via entering the national Environmental Code (Umea, a3, 69–72). The last three examples show how "rules [can be] used as tools to change the structure of action situations" (Ostrom 2005, 68) by actors on the local level to drive the socio-ecological transition. If all these tools became part of legislation, entering the legal system of the respective country, compliance with them could be claimed by actors and could be enforced via sanctions.

Moreover, interviewees suggest *additional policy instruments that could be developed*. They stress the necessity of policy instruments underlying more the link between today's investments and their positive effects in the future (St. Gallen, a4, 10) to reveal their superiority to cheaper versions on the long run by also uncovering the latters' social and ecological externalities. Instead of going into oversize prestige projects, funding should be invested into key lighthouse projects that upgrade the city as a whole, promoting ecological, economic, and social aspects (Saarbrücken, a3, 65).

To achieve **real participative urban planning**, powerful citizen participation tools should be applied (Bilbao, a4, 97; Istanbul, a1, 80; Lugano, a3, Madrid, a4, 95–103). This means for example to shift from consultation to citizens budgets, referenda and civic audits to reach all citizens—apart from those organized in associations (Naples, a3, 87–91 and a4, 86–93). Advanced technology development facilitates these steps (Lodz, a3, 58–59). This is necessary, since progress in the socio-ecological transition can only be made with a citizen perspective, certainly not with a sector perspective. Local authorities need to know what is important to citizens and need to have them as well as the business sector on their side (Copenhagen, a2, 100).

City administrations are often large institutions with *insufficient interdisciplinary cross-sector* **communication and cooperation** (Strasbourg, a4, 51–52, 74–75), sometimes due to being headed by different political parties, weakening the whole city (Copenhagen, a2, 103–106). This can produce contradictory sector policies (Glasgow, a4, 45–48). For example, environmental

protection and municipal policies can be consistent with the general strategy in terms of environmental protection, yet the urban development policy by the City Planning Office might not contain a reference to green spaces. Equally, the responsibility for trees might be split between three different departments, yet there is no collaboration between them, even if officials are fully aware of this (Lodz, a4, 25, 30, 59). According to the cited actors, a uniform structure of administration with one resource being handled by one department could be a concrete solution here. However, additional cross-sector strategies need to be developed. This is the case where policy strategy on sustainability is coordinated and promoted by the specially created sustainability departments. They give input into the sector plans to keep them as cross-sectoral as possible (Aalborg, a4, 15). Innovative integral thinking is needed instead of not looking across the boundaries of one's own profession (Copenhagen, a4, 22).

Observed norm-adoption by increased self-organisation and participation has in some places shifted **boundary rules** of local action arenas (cf. chapter 2.2), for example where citizens have founded an association to fight against construction development in the outer city districts (Lugano, a4, 17–20, 23–24, 57–60), having achieved an institutionalised hearing process (cf. section 5.3.1).

5.4.2 Local decision-making autonomy

According to both, qualitative and quantitative data, across cities the local level is perceived as best suited for governing the resource system of green spaces. Furthermore, it has a high level of autonomy compared to the resource system water and especially energy (cf. chapters 4 and 6). The level of **local decision-making autonomy** in investing, planning, and regulating green spaces is high but not very high on average according to respondents from all sectors. There are no differences between the regions as a whole, but between the countries of the regions, showing that the degree of autonomy granted to the local level differs across countries (cf. chapter 4).

According to all sectors, the local government is the most important actor in *defining rules on use and access to public green spaces* in green spaces governance. Local associations and civil society groups as well as local users have medium influence, whereas the existing local cooperative initiatives are of low importance. For *ensuring the availability of high quality green spaces*, according to all sectors, the local level of the city is most relevant, followed by the district level, and the subnational, national and European Union level are of medium to low importance.

In addition, the interviews support the conclusion that local decision-making autonomy matters for the socio-ecological transition in the resource system green spaces. Most actors estimate local autonomy as *conducive* to the transition, considering it to be necessary to *formulate own local policies according to local goals, needs and interests* for reaching sustainability (Copenhagen, a2, 89–92; Istanbul, a1, 81 and a4, 67–72; Sibiu, a2, 185–188; Thessaloniki, a4, 86). This is because local authorities are *most aware of the city's existing problems*. In lots of places, it is stressed that local autonomy is essential since local authorities know best the citizens' needs in order to develop a corresponding policy (Bilbao, a3, 122–125; Larissa, a3, 78–79; Thessaloniki, a4, 86). This underlines the importance of the local level in a system of polycentric governance for the socio-ecological transition.

In Istanbul, **missing local autonomy**[20] is seen as a major obstacle to reaching sustainability. Due to a highly centralised system, the central government has to approve of all projects on the city level. This responsibility is not shared with the regional or the local level, leading to *minimal*

[20] Some respondents from big cities refer the term "local autonomy" to the city level but also use it for the lower district level, wishing this level to receive more power from the city level (respondents from Istanbul, Rome, Naples).

local autonomy (Istanbul, a1, 40–41, 76–77). Thus, sustainability plans conceived on the local level can be easily thwarted by the national level (Istanbul, a1, 12–13, 16–17). The district level is the politically and financially weakest unit of all government levels, also for decisions directly concerning green spaces governance in the respective city district— "They tie your hands with laws and regulations" (Istanbul, a1, 60–61). Yet, due to the small size of many green spaces in cities, this resource system especially lends itself to being governed also on the lowest level. For example, the district level could organise maintenance in collaboration with civil society actors, for example volunteers, associations, schools, while responsibility for bigger green spaces as well as for street greening and other general issues would remain with the city level. Indeed, the option of involving civil society actors in the maintenance of green spaces to save costs is already practised in several cities (cf. section 5.3.1).

According to the cited interviewees in this paragraph, Danish local authorities were granted a very high responsibility in relation to management and economics from higher government levels. Therefore, the commitments local authorities have towards the national government and the European Union are also bigger than elsewhere. They are submitted to strict rules, which leave however a wide scope for *autonomous management*. Municipalities showed little interest in experiments of running an even more autonomous local management, proving their satisfaction with the current quite flexible framework which allows them to "produce a form of self-government within the framework" (Copenhagen, a2, 86–88). Municipalities are the counterpart of the national parliament, forming a good division of power and a control mechanism (Copenhagen, a3, 69–70). The municipality manages green areas and can take important decisions independently, setting priorities in agenda and budget (Copenhagen, a4, 58–61). In Copenhagen, the administration is with 45,000 employees the city´s largest employer, with as much as 180 people working exclusively on the environment, bundling expert knowledge from many different disciplines. Thus, having the authority and the human and financial resources to be innovative, the economy follows up (Copenhagen, a2, 89–92).

Local autonomy is also understood in the sense of disposing of a *direct communication channel from the city to the European Union's institutions* for not wasting time and opportunities due to an intermediary body for European project planning (Rome, a1, 80).

The 'crisis' and subsequent austerity politics have aggravated cities' *financial situation* and intensified their dependency on European Union's funds (Naples, a4, 18–20,58–64). There is a great need in building up knowledge of writing European Union's project proposals to attract funds (Naples, a4, 78–79). Local green spaces investments often highly depend on external funds (Lublin, a1, 34–37; Sibiu, a2, 129 and a3, 98–103). It is tried to match each green spaces projects with national or EU's funding programmes (Larissa, a4, 74–75). The findings about the higher dependence on European Union's financial resources in the East and South are supported by the quantitative data, which show only one regional difference in the relevance of different government levels in ensuring the availability of green spaces. The East and the South attribute a medium relevance to the European Union's level, whereas the West and the North only see a low relevance (cf. Figure 29).

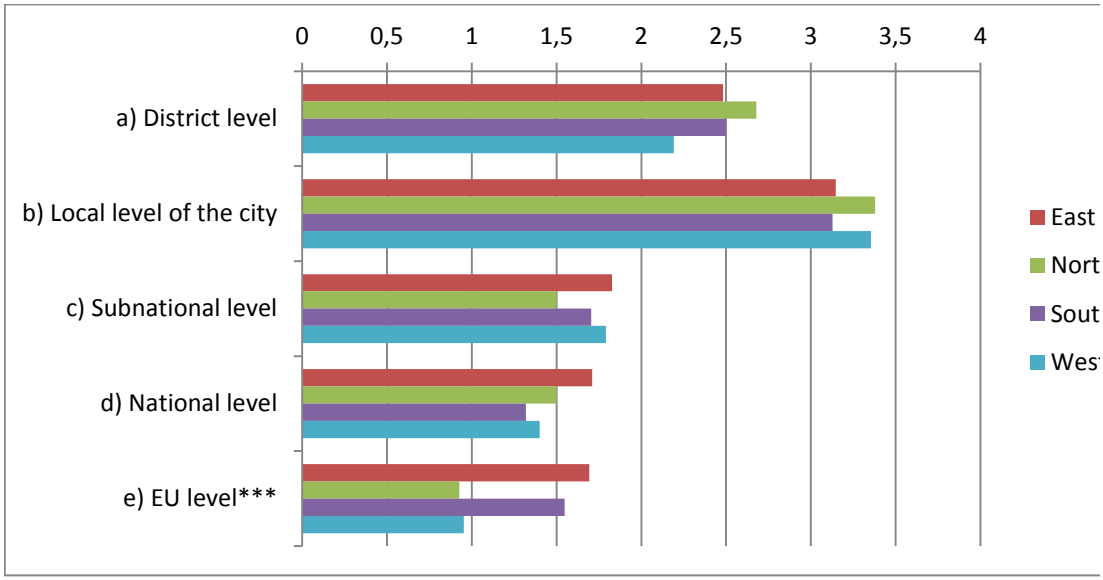

Figure 29: Regional differences in the relevance of different government levels in ensuring the availability of green spaces (scaled from 0: none to 4: very high)

A minority of actors depict **local autonomy** as being **hindering** to the socio-ecological transition. They deplore a too big autonomy of the local government in green spaces governance that can also be *misused* by local actors or lead to a too piecemeal planning when regional coordination might be required. For example, if the national and regional urban planning laws leave big room for manoeuvre for local governments, this can be misused to the detriment of sustainability, opting for profit, thus turning green spaces into construction sites (Milan, a3, 63–64). In Switzerland, federalism with a high degree of local autonomy concedes much power to the local government with each municipality levying its own taxes and making its own rules. Planning and collaboration on the regional (canton) level is deemed necessary by some actors to avoid a *fragmentation* of the territory (Lugano, a3, 20, 26–27, 135 and a4, 77–82).

Apart from the legal framework limiting local autonomy by prescribing a more centralised system, local autonomy is influenced and can be limited by specific interest groups and private investors. Due to a desolate budget situation, cities often depend on such investments (Linz, a3, 72–73; Potsdam, a3, 181). This displays the situation reported from cities in all regions, claiming that political local autonomy, in the sense of being legally authorised to decide independently in the field of green spaces is given in theory. However, in practice it is highly limited by the *lack of financial means* needed to implement policies (e. g. Leeds, a3, 79–86; Naples, a4, 58–64; Saarbrücken, a3, 51–54; Sibiu, a2, 129, a3, 55–57, 98 and a4, 175).

According to Greek interviewees, the crisis has reduced local governments' room for manoeuvre (Thessaloniki, a3, 84 and a4 67–72). This virtual decrease in local autonomy stems from extremely tight local budgets and after-'crisis' European Union's austerity policies pushing the central government to financially control municipalities even more. Cities face problems of covering even the operating expenses for maintenance, and often are not even able to support civil society and business initiatives (cf. section 5.3.1). A comparative situation is reported from Italy and Romania, where the legal framework allows for local autonomy, yet in Italy the threat "to be thrown out of the stability pact" (Naples, a4, 18) reduces public spending to a minimum, not leaving room for action on the local level. In Sibiu, despite of being chronically understaffed in the administration, the city cannot hire due to its current budgetary position (Sibiu, a2, 129). Cash-strapped cities have to find ways of economical maintenance, new funding sources or have to create income at all costs (Leeds, a3, 79). Thus, cities opt for building on the last inner-

city green zones, being offered to wealthy private persons (Saarbrücken, a4, 62) or sell big sections of their agricultural land to foreign investors, often without the public even noticing (Potsdam, a3, 191).

In Madrid, within the last five years the budget for green spaces maintenance has been cut by almost 40 percent and quality could only have been upheld because of the knowledge and creativity of the city's employees caring for green spaces. If the budget further decreases, quality will suffer (Madrid, a3, 26–29, 44–45, 61, 68–69). In Poland, less than 20 percent of the cities' budget stems from direct local taxes. The rest comes from national taxes being redistributed to the regions and cities. Already stretched city budgets have additionally been burdened by tasks shifted from the national to the local level—for example on education—without providing the equivalent funding (Cracow, a1, 86–87). This disregards the *principle of connexity* according to which "legally described functions (duties) should correlate with the resources allocated" (World Bank, United Cities and Local Governments 2009, 145). The situation is not only severe in Eastern Europe. An insufficient implementation of the connexity principle is also criticised by Katja Rietzler (2014, 1–2). She states that municipalities report a clear depletion stemming from a sinking public investment ratio that leads to an investment bottleneck[21]. In order to avoid future follow-up costs, higher tax revenues are suggested. They could be generated on the one hand by the taxation of high incomes and assets, with municipalities receiving an adequate share of them and on the other hand by a better financial support for municipalities, especially for financially weak ones.

5.5 Discussion of the findings

Findings from the empirical data were displayed around the six guiding research questions (cf. chapter 2.2.7) to understand the role of self-organisation in the governance of green spaces. The conditions conducive to the emergence and the unfolding of bottom-up initiatives in the design and the preservation of common green spaces were depicted. Reasons for failure or success of local transition processes were identified and analysed by looking both at the green spaces ecological system and connected social structures to better understand how they interact.

The resource system green spaces is, more than the energy and water system, determined by local factors, yet not exclusively, as the influence of European Union's and national environmental regulations on local green spaces governance shows. Self-organisation and participation emerges more easily and occurs more often in the field of green spaces than in other resource systems. This is due to a comparatively high degree of local autonomy in this field and to the tangibility of green spaces. They are visibly situated in the citizens' living environment, and trials to reduce them immediately affect their daily quality of life. It is also easier for citizens' associations to gather support for concrete issues, such as the protection of a green space, than for lobbying the more complicated logic of self-sufficiency in the energy system or the introduction of an integrated water cycle. Thus, *self-organised and co-operative forms of management of green spaces emerge*, highly differing in terms of numbers, shares, duration, and growth rates according to different urban contexts.

They are accelerated by *advantageous framework conditions*, for example highly motivated innovative experts working as civil servants in the local government who are little bound by bureaucracy and dispose of a sufficient budget. Cities advanced in the transition run innovative projects with citizens' involvement that are then carried on, on a voluntary basis, or they take up and support ideas emerging from self-organised citizens' groups. These successful examples have emerged out of *collective learning processes* in which changing and new rules have been

[21] Rietzler's analysis focuses on Germany, yet other countries of the European Union face equal problems.

internalised. These processes are very often driven by committed key persons from all sectors that have first adopted changing and newly evolving norms and significantly pushed for their manifestation in rules. Here, successful norm-adoption has led to higher levels of trust and co-operation between stakeholders and to vivid institutionalised interaction processes with the joint goal of a socio-ecological transition.

The examples of participation and self-organisation from cities across Europe show that people are able to cooperate, to organise themselves, and to take over responsibility for green spaces, while also introducing new practices that support sustainability transitions. They contribute to the maintenance of existing green spaces, which are available and accessible for all and possibly being expanded whilst assuring biodiversity, and allowing diverse use for local needs at the same time. In some cities, civil society actors have fought for their influence, whereas in others it has been granted them by local authorities. Whereas in the majority of cities these are still *niche projects*, in a minority they have become important players in green space governance, meeting public authorities *at eye level* and cooperating with a wide range of actors. Yet, in all cities responsibility for local green space governance remains with local authorities on whose cooperation will self-organised actors are highly dependent to scale up successful bottom-up actions.

It cannot be judged yet whether local self-organised and cooperative management of green spaces yields better results in terms of a better internalisation of related social and ecological externalities, meaning higher levels of equity, sustainability, and efficiency, than market or government based provisions. This is because on the one hand, many bottom-up activities have only started recently, and some more time is needed to evaluate their impact. On the other hand, it is sometimes difficult to attribute successful outcomes to a specific sector. *Social innovation* is not bound to the civil society sector but can equally emerge in the state and market sector. Very often, it is collaboration across sectors letting initiatives succeed. In addition, numerous actors on the local level take double or even triple roles, being present and active in more than one sector[22], thus complying with Ostrom's thoughts on the benefits of *institutional diversity*.

The data features that the *logic of economic growth*, accepting its social and ecological externalities, still determines the legal framework as well as most local actors' decisions. Rules—expressed in the legal framework from local to European Union level—are still not sufficiently modelled around sustainability outcomes, meaning to take into consideration long-term social and ecological externalities with a concomitant shift in incentives. The persistence of the economic growth logic manifests itself in ongoing *city over-mineralisation* and continuing *urban sprawl* due to infrastructure and building development pressure. Swimming against this tight is possible, as numerous examples from across Europe show, yet requires not only awareness and stamina on the individual level but also a joint vision, political will, a supporting legal framework setting the right financial and fiscal incentives, as well as a certain degree of local autonomy. Otherwise, short-term profit interests will continuously determine actors' choices, be it for the mere need of closing holes in strapped public budgets or for securing jobs.

This situation shows that mere state and market solutions for the problems of ecological resilience and further ecological and social outcomes of the resource system green spaces are not sufficient and meet high obstacles in times of scarce public resources. Here, diverse forms of local self-organised and cooperative management of green spaces, which voluntarily take over important functions, become important. *Solutions counting on the innovation force of bottom-up actors* in interaction with open-minded representatives of the state and market sector are spreading across Europe. In this sense a counter power from below emerges with the potential

[22] For example, the head of the green spaces department of a German city, who also writes scientific articles, holds lectures and is an active member of the NGO Friends of the Earth Germany.

to surpass its current niche status. Most often it originates in civil society but is then carried also into the business and government sector, thus being institutionalised, depending on whether political, social and economic framework conditions are conducive or hindering.

Especially in the field of green spaces, a resource system in which high profit rates are expected from the privatisation of public land, a strong legal framework is necessary to prevent these tendencies, allowing to exit the growth logic and to provide for a *growth-neutral land use* within European cities. It seems that this ultimate goal can only be reached with the strengthening of participation and self-organised capabilities in order to create a counterweight from below to a binary state and market logic of commodification.

6. Socio-ecological transitions in the water system

6.1 The role of the resource system water in sustainability transition

Water covers more than 70 % of Earth's surface. However, only 2.5 % of the total volume is freshwater. The water system is in many regards special, as natural and cultural functions of the resource are diverse and strongly influence each other. Human activity can affect water quantity and quality. Natural functions of water are life-sustainment, habitat, and regulation like energy balance, the hydrological cycle, and matter balance (self-purification of nature, solvent and transport medium, hydromorphology). The cultural functions of water are consumption and withdrawal for food and drinking, cleansing and agricultural as well as industrial production. Withdrawal of water minimises water resource's quantity and may as well change water quality, as some original characteristics of the water can get lost. Likewise, water is used, but not withdrawn, for transportation, energy production, fisheries, aesthetics, recreational or spiritual purposes. These types of use can as well lead to pollution and the habitat functions of the water can be impaired (cf. WBGU 1997, 45–48). Moreover, climatic changes can affect the hydrologic cycle (Richard G. Taylor 2013), since the main water inflow happens by atmospheric deposition. Regional surface and groundwater resources are often interconnected.

In contrast to the energy system, the geographical boundaries of the urban water system are well defined. However, it is strongly linked to the environmental compartments of air and soil and, due to its mobility and solvent properties, functions as a transport system for all types of pollutants (Malin Falkenmark and Johan Rockström 2004, 22–24). As result of pollution and withdrawal, the natural functions of streams, lakes and groundwater are impaired, which has negative impacts on the environment. A sustainable and environmentally healthy water resource management is necessary to ensure drinking water quality and quantity in the future (cf. David R. Marlow et al. 2013). 'Integrated urban water cycle management' is one catchword connected. The elements of the urban water cycle—water supply, sewage and storm water—are managed as interlinked components of an institutionally and organisationally integrated water basin system. Water resource sustainability should be improved by the connection of human and ecosystem requirements. Nevertheless, practical evidence of the benefits is ambivalent (Wietske Medema, Brian S. McIntosh, and Paul J. Jeffrey 2008). The institutional context to enable a shift from a traditional, centralised water infrastructure towards a more decentralised one was for instance analysed in Briony C. Ferguson et al. (2013).

The management of the resource water is influenced by the values to be found in the particular sociocultural context of the society using the water (cf. WBGU 1997, 47). Protection and sustainable use of freshwater can often be attained efficiently on the local level, i. e. in the corresponding water catchment areas (cf. WBGU 2011, 42). The research on the transition towards a sustainable water management on the city level in 14 European countries ties up to these declarations.

The loss of drinking water always refers to an insufficient infrastructure, either through leaking water pipes, or through malfunctions in facilities of the waterworks, which lead to water pollution. Missing resources, i. e. through losses, pollution, or high consumption levels can cause scarcity of drinking water. Climatic phenomena like droughts and floods may also cause scarcity, the latter because of its polluting impact. In addition, sealed surfaces in urban areas can lead to water scarcity, since they prevent the refilling of groundwater reservoirs by natural infiltration.

Any kind of pollution negatively affects the quality of the drinking water. It can thus be improved by establishing water protection areas. Drinking water is usually extracted from surface water (lakes, springs and rivers)—replenishing rather fast—or groundwater reservoirs that take about eight years to replenish. For instance, nitrates and pesticides through intensive agricultural land usage, contamination due to industrial production practices, pollution based on dense settlement in urban areas, and new types of contamination by antibiotics and hormones as well as hydraulic fracturing[23] directly threaten these water sources (John-Karl Böhlke 2002; Thomas Heberer 2002; Marta Carballa et al. 2004; P. K. Goel 2006, 1–3). Overconsumption of drinking water (e. g. by irrigation of green spaces) puts additional pressure on the availability of water. Thus, the endeavour to prevent the pollution and loss of drinkable water is crucial for a sustainable management of water reserves and for ensuring the good quality and broad availability of drinking water in the future.

Wastewater needs to be cleaned before it can be re-fed into the hydrological cycle. Wastewater treatment plants consume a high amount of energy for operation if they are run by an aerobic process. Modern technologies furthermore allow the production of electric energy out of effluent sludge as well as the provision of heating for nearby residential areas (Perry L. McCarty, Jaeho Bae, and Jeonghwan Kim 2011). After using the effluent sludge, there are still substances like phosphorus and nitrogen in the digestate that could be re-used (H. M. van Veldhuizen, M.C.M. van Loosdrecht, and J. J. Heijnen 1999; Xinchao Wei, Viadero, Roger C. Jr., and Shilpa Bhojappa 2008). Infrastructural modernisation is therefore a chance for local water suppliers to take a step towards a more sustainable water management. The tight interconnection between the resource system water and the energy system is visible here as well.

Summing up the findings from the case study reports on the topic water shows that the status of the water and sewage system is very different throughout the four researched European regions, thus the perceived challenges and urgencies are quite heterogeneous, too. In general, there is a trend to an overall decreasing water consumption; only some growing cities face an increase. Particularly in Eastern Europe, the awareness of (potential) problems by public authorities is low. There are some water quality problems and the still high per capita water consumption should be restricted more efficiently. Development plans most often affect modernisation of the water infrastructure. In the South, problems are already present and the most serious in Europe. There are high water losses due to bad infrastructure and as well high water consumption. Water scarcity and poor quality can be observed at times. Approaches for solutions refer to infrastructural measures, awareness raising campaigns addressing users, and pricing policy. In the North of Europe, problems refer to the pollution of water reserves and negative climatic influences. Proceeded solutions are environmental protection, education, and innovative wastewater treatment technologies. Problems addressed in Western European cities are rising water prices, required conformations to EU regulations, water pollution and decreasing consumption levels. Approaches to the problems are monitoring, increasing efficiency of sanctions, or campaigns promoting the drinking of tap water. Citizens' initiatives contradicting the privatisation of water utilities came up especially in Italy. Groups dealing with seawater protection formed in some Western coastal cities. Civil society action can be observed where apparent problems occur (Cristina Garzillo and Peter Ulrich 2015).

The potential of civil society involvement in sustainable water management exists, but local citizens' initiatives dealing with drinking water quality and availability are confronted with a very different scope of action compared to the green spaces or energy system. Characteristics of the water network (including its indivisibility and invisibility of large parts of it), legal framework, and

[23] Hydraulic fracturing (also fracking) is a technique, where fluid (containing chemicals and sand) is injected with high-pressure into a borehole. It can be applied for shale gas extraction. The economically attractive technique is highly controversial, as contamination and pollution of ground/surface water, air and ground up to the triggering of earthquakes with the associated negative impacts for health and environment cannot be excluded. Detailed information can be found in Mark Broomfield (2012, 4) and in Thomas Spencer, Oliver Sartor, and Mathilde Mathieu (2014).

time-horizon of investment allow for instance new institutional arrangements with the aim to influence decision-making processes, to inform and raise awareness, or to set up frames for co-operation of all stakeholders. It is usually neither reasonable nor possible to act separately from governmental bodies and/or the water utility providers, as these decision makers have to implement or at least support sustainable solutions. In addition to local civil society action, there is a European movement against the privatisation of the resource water. The first successful European Citizens' Initiative Right2water collected more than 1.8 million signatures and called on the European Commission "to implement the human right to water and sanitation in European law" (Human right to water 2014).

The analysed qualitative data (one to three interviews per city) originate from 18 cities covering all regions and 12 of the participating countries except Denmark and Greece, where no interviews on the water topic were conducted. Interviews from Barcelona, Birmingham, Freiburg, Giurgiu, Innsbruck, Istanbul, Kiel, Lodz, London, Lublin, Nice, Prague, Rennes, Rome, St. Gallen, Trieste, Umea, and Valencia will be analysed. Two interviews stem from political actors (a1), one from an administrative actor (a2), 14 from business actors (a3), and 14 from civil society actors (a4). Findings about the characteristics, challenges, and solutions concerning the resource system water from 40 case study reports one per city in the whole sample supplement the data (Garzillo and Ulrich 2015). The analysed quantitative data stems from 135 questionnaires on 'sustainable water use with regards to quality and availability'; 37 questionnaires were filled by government actors (from administration, cf. chapter 3), 49 from business actors and 49 from civil society actors. Most actors from qualitative research are included into the quantitative sample, as actors a2, a3 and a4 gave an interview and afterwards filled in a questionnaire.

6.2 Self-organisation capabilities and sustainability transition

Following the logic of the socio-ecological system (SES) approach's transition model (cf. chapter 2) the focus of the following sections is set on the resource system water and the underlying governance system, as well as interactions within and outcomes from the system. First, the two research questions, whether a common understanding of sustainability transition can be observed and if self-organisation is a transition driver, will be answered. Alongside the understanding of transition, the cities' initial positions in the process as well as present and future challenges will be observed.

6.2.1 Socio-ecological transitions

Definitions of sustainability have already been discussed in earlier chapters. There is a consensus, that human activities should not harm the natural environment (Prague, a4, 11) or expressed differently "Don't steal from your grandkids" (Birmingham, a3, 10–13). Also the three pillars economy, society, and ecology are brought up, with different foci on the one or the other element (e. g. Rennes, a4, 9; Rome a4, 9; Giurgiu, a4, 14–15; Lublin, a3, 19). It is agreed on that sustainability is a complex matter and that it must be seen in a greater context than in just one resource system, i. e. sustainability is important in all fields of action (Giurgiu, a3, 16). That might be the reason why most respondents would not give an isolated view on sustainability in the water system, but gave rather generalised definitions. More precise definitions of sustainability in the water system are that the water chain must be kept in balance, including fish, insects, quality, etc. (Birmingham, a4, 14) and also that the networks must be modernized and rivers re-naturalized (Lodz, a2, 12).

The actors involved with the water system assessed the socio-ecological transition (**SET)** differently depending on the regarded cities. An approach to sustainability needs to be tailor-made, as every city has different characteristics (London, a3, 15–16). Some actors see the expansion of new energies as the main system to be developed and regard water, mobility and other fields

as additional (e. g. Nice, a4, 25–32; Innsbruck, a1, 15; St. Gallen, a3, 10). In some cities, political will and interests lead the road to transition, which goes from the local level to the EU (e. g. Rennes, a4, 139–142). In others, civil society enables transition paths by opposing to profit-driven private organisations (e. g. Prague, a4, 29, 41). It is a widespread belief that a successful transition is driven by awareness, personal experience, and individual behaviour. Awareness allows for behaviour change and willingness to invest in sustainable solutions. Additionally, if sustainable solutions also maximise economic profit, the general support of these solutions will intensify (e. g. Istanbul, a3, 60; Valencia, a3, 22). Sustainability can as well be limited and used as an alibi for profit and economic development, especially when water supply is privatised fully or partly. Privatisation is assessed as contradictory to the understanding of sustainability that profit is not the first priority (Freiburg, a3, 19–20).

The **status of the resource water** can be assessed by regarding the quality and availability of drinking water and the frequency of complaints about several aspects regarding the drinking water system. Water quality is on average very good in the North and West of Europe and good in the East and South. Water availability is worse in the South compared with the rest of Europe. Anyway, currently no bigger problems are recorded through the questionnaires. In general, complaints are rarely made, especially in the North and West of Europe. If so, most often citizens complain about the pricing of tap water, and about surface water quality. Bad taste or smell of tap water, for example through high chlorine content, are brought up occasionally in the South and East, but close to never in the other regions. Users complaining about being forced to buy bottled water due to bad tap water quality can be seen occasionally in Southern Europe, but never in Western countries. The shares of bottled water and tap water used for nutrition differ in the four regions. In the North, East and West people use 80 to 90 % tap water and equally less bottled water. In some countries like Austria, Denmark, and Sweden, it is very unusual to drink bottled water and the share of tap water is even higher. In the South, the share of tap water is only about 70 % on average and the people use more bottled water than in any other region, reaching up to over 80 % bottled water in some cities with rather bad tap water quality.

Most cities withdraw drinking water from surface water and replenishable groundwater reservoirs. Fossil groundwater reservoirs and long-distance water sources (over 100 km) are only of low or medium importance. Desalinated seawater and rainwater play a minor role. Most commonly, cities do not rely on only one source but combine different water sources (e. g. Freiburg, a4, 46–47; Nice, a4, 73; Prague, a3, 101–103). Long-distance water sources are nevertheless relevant for cities with insufficient own reserves (e. g. a4, 57; Istanbul, a3, 49; Rennes, a3, 40). Depending on the **size of the water system**, consumption levels, and climatic conditions, the present and future availability of drinking water according to EU quality standards is very different in the cities. Some actors assume that water availability will “always be sufficient” for their cities (Innsbruck, a1, 63; e. g. Birmingham, a3, 45; Kiel, a4, 41–43; Valencia, a3, 60), whilst others think they will face serious problems in the future or already experience occasional water scarcity (e. g. Barcelona, a4, 57; London, a3, 36; Lublin, a3, 35; Rennes, a3, 31–32). Many actors state that presently water availability is no issue, but that this could change, if the use of water resources does not become more sustainable (e. g. Prague, a4, 15; Umea, a4, 57; Valencia, a4, 42). There is general sensitivity for the need of sustainability concerning water.

The **productivity of the drinking water system** can be assessed by relating the produced output (drinking water) to the input into the system. The cleaner and easier to access water resources are, the higher the productivity, as only little further processing is necessary to meet quality standards for drinking water. As illustrated in section 6.1, the quality and quantity of ground and surface water also depend on the condition of the wastewater released back into the natural water system and on the quantity of rainwater that can be absorbed by the soil. Especially in the South and parts of the East of Europe, high loss rates up to 50 % due to outdated infrastructure are reported (e. g. Giurgiu, a1, 28–34; Prague, a4, 15–17; Rome, a4, 47; Trieste, a3, 46–48). In combination with high consumption patterns losses can cause an over-exploitation of natural resources (Rome, a4, 47). If the quantity of rainwater replenishing the wa-

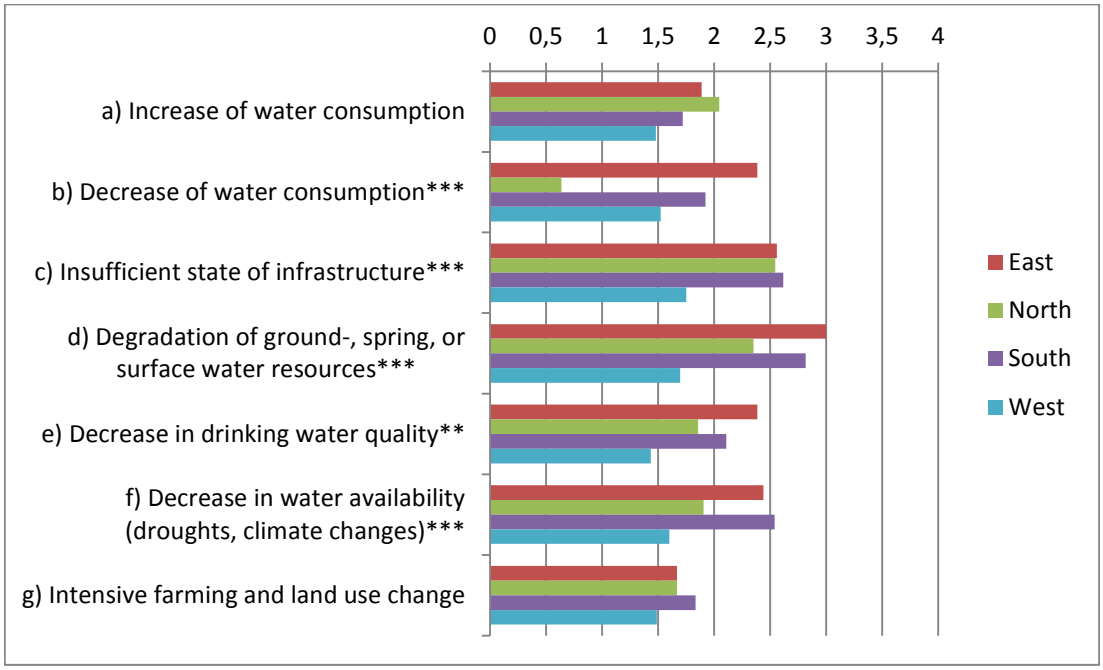

Figure 30: Challenges for the water provision until 2030 (scaled from 0: no relevance to 4: very high relevance)

ter reservoirs is much bigger than the quantity of water lost through leaking pipes, these losses cause no severe problems (Trieste, a3, 48). Water that cannot get back into the water cycle not only endangers the groundwater reservoirs' replenish, but also the ground, where soil and debris are carried away (Innsbruck, a4, 31).

The reuse of **wastewater** with appropriate methods helps to safeguard water quantity and quality and to reduce the pressure on the ecosystem, but it is not yet implemented in all cities. In many cities most of the water requires purification (Barcelona, a4, 59; Kiel, a3, 149–152; Lublin, a3, 31; Valencia, a4, 40). Sometimes the capacity of the system is too low or too big (Prague, a3, 113; Giurgiu, a1, 28–34). Investments in infrastructure and especially in modern technologies are instruments to increase productivity. Technology is getting cheaper and more efficient (e. g. Kiel, a3, 24–26; Valencia, a3, 62), thus, "you can make drinking water out of every puddle water […]. You have to be willing to invest in this know-how in case of need" (Freiburg, a3, 42). Technology offers opportunities, but can also increase water's costs (Valencia, a3, 62). For example, desalination plants require a huge amount of energy, but the gained amount of water is quite low (London, a4, 76). The transport of water over long distances is energy intensive, too (Istanbul, a3, 80). Also wastewater treatment consumes a lot of energy, but energy can also be produced by using sewer sludge in bio gas digesters, reducing the overall energy consumption of the treatment plants or even providing surplus energy to be sold (Freiburg, a4, 72; Nice, a3, 25–35; Rennes, a3, 69). The questionnaires showed that the impact of investments in water infrastructure has been high for the cities and the impact of the adoption of new technologies has been medium on average. These aspects of productivity ensure the availability of drinking water according to EU quality standards. Especially in the East, investment into infrastructure has had a very high influence. In the West, the impact has been below average. This reflects the different states of the water systems in these regions described in section 6.1 and the case study reports (cf. chapter 3; Garzillo and Ulrich 2015).

The cities experience or expect a variety of **challenges** concerning their drinking water systems. Faced challenges are the increase or decrease of water consumption, an insufficient state

of infrastructure, the degradation of ground-, spring-, or surface water resources, the decrease in drinking water quality and a decrease in water availability due to droughts and climate changes (cf. Figure 30). These challenges are rated as between low and medium relevant in the West of Europe, which faces relatively small challenges overall, especially in Austria. The Eastern and Southern countries rated these challenges as medium to highly relevant. The state of infrastructure and decrease in drinking water quality is yet less challenging in Polish cities than in the Czech and Romanian cities. The pressure on the resource system water seems to be strongest in the South. The Northern countries mainly face challenges of degradation of water resources, though the UK also reports an insufficient state of infrastructure, an increase of water consumption and a decrease in water availability.

An increasing number of built-up areas and a decreasing number of green areas hinder storm water to be soaked in and to access groundwater, thus systems for discharging these waters must be built and “sewer systems must be sufficiently expanded”, being expensive and sometimes technically challenging (Lublin, a3, 37; Prague, a4, 45). For instance, in pedestrian redevelopment the drainage of paved areas can be constructed in a way that “water would not run on the streets but would soak in the grass next to it” (Prague, a4, 29). Many cities still use drinking water for irrigation. In several places, drinking water is also used for the cleaning of urban spaces. In some cities, systems were developed to use water from other sources; e. g. reused sanitation water or reclaimed rain water to irrigate green spaces or to clean the streets (Barcelona, a4, 99). Especially already big and growing cities tend to overuse their groundwater resources, which cannot be renewed to the extent necessary (Prague, a4, 45).

The lack of awareness for water related issues concerning consumption patterns and sustainable water and sewage treatment amongst citizens and politicians is reported from various cities throughout Europe (e. g. Barcelona, a4, 33; Freiburg, a4, 73; Giurgiu, a4, 45–46; Rennes, a3, 25 and a4, 103–109). Information about the exploitation of resources and on sustainable feed-in is rarely available (Kiel, a3, 68; Trieste, a3, 25). The fact that environmental education has to start in kindergarten and that cultural imprints can only be changed slowly is mentioned as well (Barcelona, a4, 33; Giurgiu, a3, 31; Nice, a4, 113 and a4, 34–49; Rennes, a4, 113). Communication patterns to educate and inform people must be thought about. People being bored about environmental action plans will not listen and change their behaviour, but if the potential benefits for them are pointed out in a clear language, they will be interested (London, a4, 38).

The size of the city is a factor concerning water issues. Especially integrated, holistic solutions must take into account the **uniqueness of cities** and even neighbourhoods, being quite challenging. The developments in different areas like green spaces, tourism, buildings, or commuting should be harmonised through smart solutions (Kiel, a4, 21; London, a3, 26). Big cities with high population density and many governance levels controlling the planning processes of their borough face special problems. These structures antagonise superior sustainability plans. Furthermore, environmental aspects are sometimes poorly integrated into the rest of urban policy (e. g. Barcelona, a4, 34; London, a4, 16; Valencia, a4, 19). On the contrary, some actors stated that their cities developed plans, taking into account environmental and social parameters (Rome, a4, 27; St. Gallen, a3, 10). Long-term sustainability of water supply can only be achieved by finding a balance between supply and demand. A lack of long-term thinking in planning in general has sometimes been stated (e. g. Giurgiu, a1, 47 and a3, 39; Kiel, a3, 42; London, a4, 70; Rennes, a4, 13).

Pollution as result of human activities is an issue in some cities (e. g. Nice, a3, 29; Trieste, a4, 41; Valencia, a3, 54). Regulations force cities to reduce pollutants in order to catch up with EU quality standards or old infrastructure has to be modernized for technical reasons. Investments must be made regularly, since infrastructure needs to be maintained as well (Barcelona, a4, 59; Giurgiu, a3, 40). However, many cities face problems in funding necessary water infrastructure projects (e. g. Giurgiu, a3, 29; Kiel, a4, 113; Prague, a4, 59; Trieste, a3, 9). In some regions, the European Regional Development Fund supports these investments, but not all kinds of projects

can be financed that way. In addition, bureaucratic hurdles or failures in acquiring funding can play a role (Lodz, a2, 18–22; Nice, a3, 38–39; Trieste, a4, 47). Some municipalities feel the pressure by citizens' referenda to keep water supply public, but lack the necessary financial means to invest in the maintenance of the water system (Trieste, a3, 58; cf. section 6.3.2). The liberalisation of the water market creates additional fear and uncertainty for the future (Freiburg, a3, 26; Innsbruck, a1, 9). Background is the increasing private sector involvement in the water system over the past decades. The main drivers in the liberalisation process are financial and ideological factors. Forms span from private sector participation to full privatisation, which is rather exceptional. Alongside with liberalisation in the network industries go significant changes in the mode of market regulation. However, the properties of the water systems impede the liberalisation of the water market—which is a kind of 'natural monopoly' and essential to human existence—by requiring institutions to guarantee the coherence of organisational and technical as well as human needs. Thus, the water market stayed rather strongly regulated, regardless of implemented reforms (Claude Ménard and Aleksandra Peeroo 2011, 310–16).

Ecological and social objectives sometimes collide. When industries disappear from the cities, pollution vanishes too, being positive from an environmental point of view but disastrous from a social position, thus likewise not being sustainable. It is also argued that, if social problems and poverty are central, there is no room and no interest to think about sustainability for the people (Birmingham, a3, 28; Giurgiu, a4, 38). Also social incentives like free water provision for schools and public organisations instead of—for instance—water-recycling incentives contradict environmental sustainability objectives (Istanbul, a3, 78).

Goals and their time-horizon depend on the **transition urgency perceived** by the cities. Meteorological conditions play the main role here. Rain is crucial to refill water sources; if rain stays away, problems occur. Additionally, new water sources need to be found (Nice, a3, 89; Rennes, a3, 34 and a4, 57). "Either we continue until there is a catastrophic drought, […] or we do large scale water efficiency programs, or […] build desalination plants" (London, a4, 74). In addition, different climatic changes worry many cities. In the Alps, glacial retreat, defrosting of the Permafrost, and resulting mudslides as well as heavy rainfalls already show impacts (Innsbruck, a1, 65).

Goals exist on different dimensions and across resource systems and topics. Some cities are looking for a collaborative way to manage resources and social targets, hence coordination and communication between different levels of government (local, regional and national) is necessary. Trans-regional sustainability should focus more on the local than on the national level, whilst local development must be harmonized with EU policies (Freiburg, a3, 69; Kiel, a4, 39; Rennes, a3, 76 and a4, 143; Trieste, a4, 71, 81). It was also claimed that information on planning of projects reaches the citizens and a focus on participation by empowering citizens and by promoting collective decision-making (Kiel, a3, 188 and a4, 73; Prague, a4, 70). The appropriate value of common goods should be added and taken into account when implementing actions and allocating funds (Trieste, a4, 69). Investment in human capital together with a modernisation of company structures and adequate salaries for families to afford a good life are further important economic and social goals (Innsbruck, a4, 104; Kiel, a3, 122, 132; Rennes, a4, 135). The ecologic goals are interwoven and affect all resource systems, e. g. renewable energy development, energy efficiency, district heating, sewage plant modernisation or mobility management (Freiburg, a4, 21; Innsbruck, a1, 15 and a4, 102; Kiel, a3, 155–156, 264 and a4, 71; Prague, a4, 62; Trieste, a4, 59). Especially relevant for the water system are

- the focus on ecological farming and sustainable agricultural development,
- the protection and conservation of flora and fauna,
- an appropriate water resource management,
- the regulation of consumption patterns,
- recycling of the substances contained in sewage water,
- water network renovation and

- eco-friendly practices instead of hazardous substance used in industry and households.

The **time horizon** to achieve sustainability goals varies between 10 to 35 years (Innsbruck, a1, 9 and a4, 102; Prague, a3, 104–105; Kiel, a3, 187–190; Trieste, a3, 86). Some see a pessimistic scenario, where sustainability will never be achieved (Prague, a2, 15). Some assess that sustainability will be difficult to achieve, especially in short or medium term (Barcelona, a4, 111; Istanbul, a3, 100). Furthermore, "[i]nfrastructure in the form of canalisation and sewage plants is very very enduring. To transmogrify this, you inherently need two generations" (Freiburg, a4, 69).

Many cities experience that a **transition** in the field of water already began. "During the last 15 years very significant efforts have been made" (Rennes, a3, 38). Contamination has been reduced in many water bodies by better sanitation technology, better monitoring, rehabilitation, ecological landfills, or regulation of farming activities (e. g. Barcelona, a4, 54, 59, 64, 75; Birmingham, a4, 16; Giurgiu, a3, 74, 95; Rennes, a3, 36–38 and a4, 54–55). Freiburg began as early as in the 1980s to cooperate with farmers on eye level. Pollution with pesticides and nitrates could be reduced significantly and the "trend could be reversed" (Freiburg, a4, 42; 56). Some cities already use modern integrated methods on mixing water, rainwater treatment, and desalination (Barcelona, a4, 86). Initiatives exist to drink tap water instead of buying bottled water in cooperation with local councils, citizens, and community organisations (e. g. London, a4, 45–50, 60). There are also examples where action is taken, but can be seen as insufficient or ambivalent or where projects were never implemented (Innsbruck, a4, 25; Istanbul, a3, 49–51; London, a4, 14).

6.2.2 Self-organisation capabilities

Whether citizens (can) participate and self-organised initiatives (can) emerge, depends on a variety of factors. There is a difference between mere participation and self-organisation, as described in chapter 2. In many cities, some form of **participation** exists, but the citizens' influence on the decision-making process is very different. The impetus to participation can derive from the citizens themselves (Innsbruck, a4, 45). There are few cities with a strong history of participation dating back to the seventies or eighties, but not necessarily on water issues (Freiburg, a4, 40, 48). In other cities, associations, cooperatives, and initiatives are recently flourishing. Their fields of action are the cleaning of water streams and seawater protection or the monitoring of projects on water including consulting and the provision of operational support (e. g. Barcelona, a4, 51; Innsbruck, a4, 51; Nice, a3, 62; Prague, a4, 47; Valencia, a3, 46).

Criticism focuses on a lack of interest by citizens to get involved in water issues regardless of participation possibilities. The reasons are a lack of awareness of problems and motivation, and the general opinion that water will always come out of the tap (e. g. Kiel, a4, 53–57; London, a3, 42–46 and a4, 57–58, 77–86; Rome, a4, 45; Trieste, a3, 69–74; Umea, a4, 62–67; Valencia, a3, 97–99). Sometimes it was stated that citizens got only involved in water issues in the case of privatisation plans, pricing issues and on the question whether water was a common good (London, a4, 77–86, Rennes, a3, 48; Rome, a4, 45; Trieste, a3, 69–74). It is also quite difficult for a public without subject-specific background to engage in technically complex topics like drinking water, limiting participation capabilities. "Basically, this is a problem of time. […] As a private person, I would not have the time for it […]. To my mind, this is the main reason why it does not work. […] The subject matter is way too complex for everyone being able to give a qualified opinion on it." (Freiburg, a3, 48)

Local NGOs and other civil society organisations show on average only little **leadership** on water issues. Government and business actors consider their reputation and capability as especially low. This assessment could point to a lacking perception of existing civil society initiatives by official bodies and business actors involved in water management (cf. Figure 31). Interviewees also stated that some voluntary initiatives and civil society groups lack in scientific or spe-

cialist human capital or are considered as naïve or unimportant by decision-makers (Istanbul, a3, 31–34; Trieste, a3, 42).

Participation can be **misunderstood** as monitoring on the household level or change of personal habits. Real participation does not only mean to send complaint letters or comment on urban challenges, but to find ways of interaction between administration and civil society in terms of problem solving and decision-making (Birmingham, a3, 71–72; Trieste, a4, 35–37 and a3, 42; cf. chapter 4.2.2). Providing information and consultation is an important part of civil society participation in water management, but it should not be limited to this (Trieste, a3, 40–42). Individual behavioural changes in water use, the sharing of information on water quality and availability, reporting and monitoring are commonly possible (e. g. Barcelona, a4, 93–95; Rome, a4, 71).

Political support is crucial for **successful participation** of civil society initiatives. There are possibilities for administration to be close to the citizens and provide open communication and cooperation channels (St. Gallen, a3, 10). In some cities, committees or councils exist, through which civil society members can participate in deciding on local projects and plans. Sometimes limited financial resources are allocated through these councils. Usually, these are not constrained to water issues but deal with different local matters (e. g. Barcelona, a4, 76–77; Birmingham, a4, 73–81; Giurgiu, a1, 82–89; Lublin, a3, 40–44; Rome, a4, 39). The possibility to be heard by decision-makers through petitions, proposals, consulting, and consumers' consultation bodies, and through participating in debates and discussions is given in some cities (Rennes, a3, 52; St. Gallen, a3, 10; Valencia, a4, 34). In few cities, civil society organisations have the chance to participate via formalised 'round tables' or in advisory boards, where their opinion on drinking water topics is heard and discussed. The quality or efficiency of cooperation depends on its actual conditions and contents, though (Rennes, a3, 46; Rome, a4, 53). Transparency initiatives by public administrations exist (e. g. Lodz, a2, 47). Nevertheless, performance indicators on water services are still not everywhere efficiently compiled and published (Rennes, a3, 76–77).

Yet, the cases in which no or only very **little participation** regarding water is possible outweigh these examples. Low citizens' empowerment and weak NGOs in combination with a local government not paying attention to citizens' opinions cause situations in which political proceedings leave no room for participation (e. g. Birmingham, a3, 48–49; Istanbul, a3, 52–56; Rome, a3, 73). Even when the formal frame for participation is provided, there can be hindrances, aiming to avoid influence of civil society actors in decision-making processes. Once-open participation channels can be cut off by not calling meetings anymore, for instance. Some local and central governments consider participation to cause a variety of 'troubles', amongst them the need for increased transparency and the necessity of considering citizens' proposals. In these cases, only the most motivated citizens find ways to participate (Giurgiu, a4, 68–74; Valencia, a4, 34, 44–50). Local governments need to reach out and be reachable at the same time. Participation and involvement do not occur by themselves, the authorities should approach the citizens. "The feeling of the population is: no matter what we say, they will do what they want anyway. […] Over-

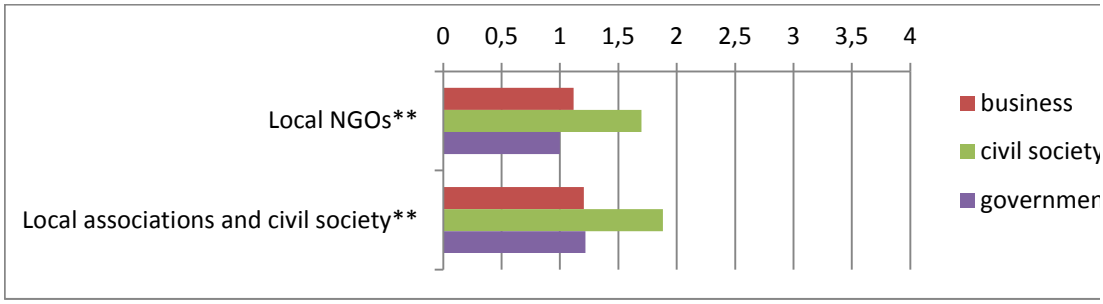

Figure 31: Leadership of civil society organisations (in terms of reputation and capability) in ensuring the quality and availability of drinking water (scaled from 0: none to 4: very high)

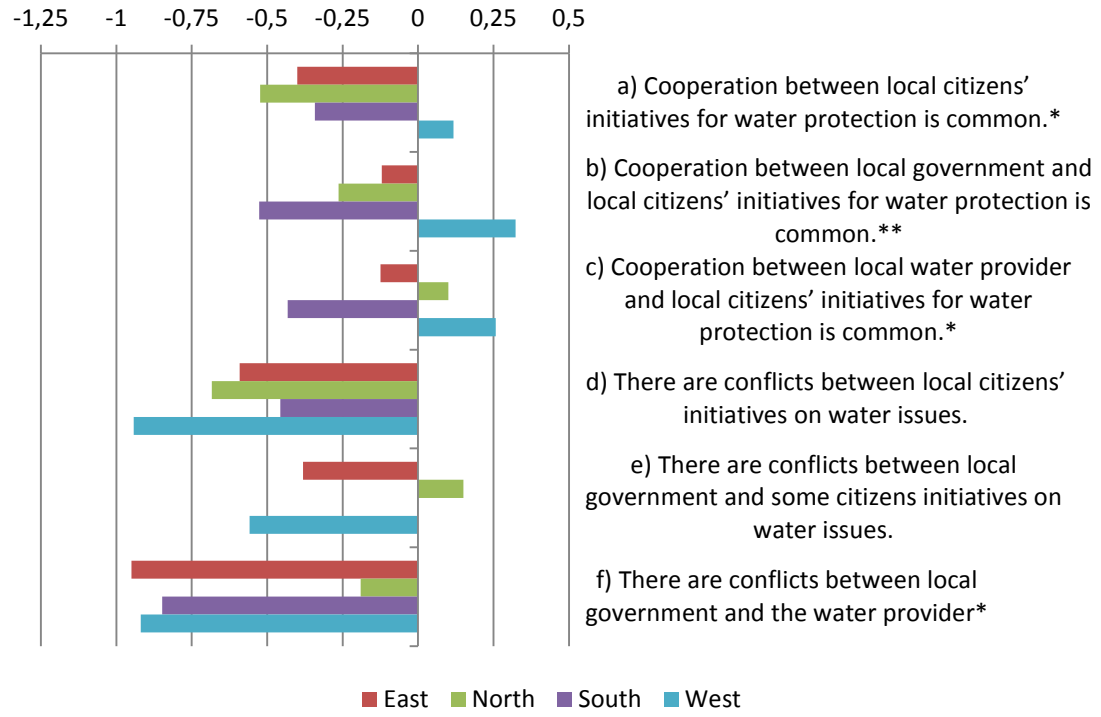

Figure 32: Statements on norms of trust (scaled from-2: strongly disagree to 2: strongly agree)

exposure of negative cases and bad models of practice made people have this type of feeling" (Giurgiu, a4, 106).

The **formation of self-organisation** might gather momentum in the case of very restrictive participation possibilities as well as in the case of open participation channels. On the one hand, civil society movements could emerge when local decision-makers are considered not to act in accordance with the wishes of the citizens. On the other hand, a fertile ground in terms of administrations inviting citizens to participate can support new institutional arrangements. Various cities' interviewees state an active civil society and self-organised citizens. Their tasks are diverse, from protesting against particular projects to broader activities like the promotion of sustainable living or the empowerment of citizens (e. g. Barcelona, a4, 52; Prague, a4, 29, 57; Rome, a4, 17, 39; Trieste, a4, 77). Self-organisation concerning water resource management is nevertheless rare and still in the early stages (e. g. Freiburg, a4, 68). Existing organisations mainly inform and educate citizens and officials about sustainable water use. There would be room for many more issues of water availability and quality like mixing of grey water or wastewater treatment (Istanbul, a3, 71–78; Kiel, a4, 25; Nice, a4, 84; Rome, a4, 17). Funding is sometimes a problem, as initiatives have expenses, but are not financed by the municipality. Instead of direct funding of initiatives, also the infrastructure needed for their activities could be provided (Trieste, a3, 58, 92).

Networking becomes important in many cases for cities (e. g. Barcelona, a4, 57; Giurgiu, a4, 57–58; Valencia, a3, 46–50). Anyway, **cooperation** with citizens' initiatives for water issues is still quite uncommon. Partnerships between civil society and local government on projects for water protection and on water resource management exist in few cities (Rennes, a4, 33, 46–48). Sometimes utility providers cooperate with universities (Rennes, a3, 17). As there is hardly any cooperation, few conflicts emerge. There seems to be more cooperation and even fewer conflicts between the three sectors in Western Europe (cf.

Table 18: Influences on the leadership of civil society organisations in the water system

Leadership of NGOs, civil society, associations	Coef.	Std. Err.
Drinking water quality***	3.473	0.841
Impact of technology adoption on water availability**	1.146	0.499
Impact of infrastructure investment on water availability***	-2.785	0.867
Intensity of water consumption dependence on cubic meter price of water***	1.456	0.561
Challenge of decreasing water consumption***	-1.560	0.566
Insufficient infrastructure as challenge	0.952	0.629
Degradation of water resources as challenge**	1.156	0.469
Cooperation between the local water provider and local citizens' initiatives**	1.260	0.503
The local government plays an important role on local water issues*	-0.934	0.494
Support from public authorities to store and use rainwater is satisfying***	1.654	0.574
Action from public authorities to prevent over-abstraction of water resource**	-1.577	0.747
Action from public authorities to prevent infiltration of pollutants	0.624	0.510

Notes: Ordered logistic regression, 74 observations, p-value = 0.000, Pseudo R^2 = 0.5294, Log likelihood = -50.42752 (control variables: city and sector).

Figure 32). Interviewees from different sectors stated several times the affected groups' willingness to cooperate. Even small projects can enhance networking and create good relationships between initiatives, NGOs, water utility, and politics. Sometimes problems arise when funding from higher levels of government ends (Barcelona, a4, 78–80, 93–95; Birmingham, a4, 51–53, 89; London, a4, 53–56).

Conflicts can emerge between all kinds of interest groups, such as industries and civil society (e. g. Barcelona, a4, 59; Umea, a4, 61), utility provider and municipality and/or civil society (e. g. Giurgiu, a1, 80; Prague, a3, 107) or business/civil society and government (e. g. Istanbul, a3, 53). Subjects of these conflicts are varying: price developments of the cubic metre water, pollution of resources by industries or agriculture, building projects endangering resources, legal obstacles for interest groups to participate in decision processes or territory conflicts. Civil society respondents see more conflicts and less cooperation between citizens' initiatives on the one side and water provider or government on the other side, compared to government or business respondents. A lack of consensus within civil society is yet obstructive (Giurgiu, a1, 82–89; Rome, a4, 13). Remarkably, conflicts between the local government and the water provider were stated only in Greece.

Some **factors influencing the emergence of civil society movement** can be identified from the data. A positive impact of technology adoption on water availability in the past, the challenge of an overall decreasing water consumption, a strong local government concerning water issues, and sufficient action from public authorities to prevent over-abstraction of water resource tend to negatively influence leadership in terms of reputation and capability in ensuring water quality and availability of civil society organisations. These factors represent capability and action of local authorities. A decently performing authority makes self-organisation less likely. Factors that tend to have a positive influence on the evolvement of civil society organisations' leadership are the observed positive impact of technology adaption on water availability, the existing local challenge of degraded water resources and the price elasticity of demand for drinking water as an aspect of social conflict. These factors stand for the environmental and social challenges and the local technological standards. A good cooperation between utility provider and civil society initiatives, sufficient support by authorities to install sustainable water technologies and sufficient action from authorities to prevent infiltration also effect self-organisation positive. The first two variables work as indicators for the relationship of public authorities and civil socie-

ty. A good contact and communication between these encourage self-organisation. The prevention of infiltration of pollutants is in contrast to the prevention of over-abstraction a complementary task of civil society, public authorities and utility providers and can be a vantage point for cooperation with civil society (e. g. farmers), explaining the different signs of the coefficients (cf. Table 18). It must be taken into consideration that civil society respondents on average assessed the leadership of civil society organisations as stronger than business and especially government respondents. This shows throughout the complete quantitative research and reflects different interests, information, and objectives of the three sectors.

It is not possible to talk about a water transition process through active participation or even strong self-organisation, as participation options, civil society's motivation, and the current state of self-organisation are still relatively modest in this resource systems' management. The possibility of self-organised monitoring of the water quality and availability and sanctioning is nevertheless used in some cities (Birmingham, a3, 73–76; Giurgiu, a3, 97–98; Rome, a3, 89). Some respondents yet stated that their cities have highly motivated, very pro-active citizens despite the unfavourable regulatory frameworks (e. g. London, a4, 117–128). Several influences on the development of self-organisation could be identified in qualitative and quantitative research. Potentials are far from being fully exploited and self-organisation is no strong transition driver in drinking water management. Action can be observed especially in 'visible' parts of the system, like the contradiction to privatisation—connected with pricing issues—and surface water protection.

6.3 Actors, factors and lessons learned

In section 6.3, the following questions will be answered: What are the actors and factors driving the local water transition? What lessons could be learned and reputation be gained from leadership in local water management?

6.3.1 Actors, actions and factors

Concerning **actors** driving the local water transition, in the majority of cases the local water provider plays the key role. In addition, the local administration is quite important. The political majority, higher government representatives as well as local universities and research institutions show medium leadership. Political minority, local NGOs, local associations, civil society, and private companies show only little leadership (cf. Figure 33). Interviewees most frequently named the local water provider and local administration or government as actors involved in sustainability transition of water management (e. g. Freiburg, a4, 56; Giurgiu, a3, 60–63; Prague, a3, 37; Umea, a4, 36–37; Valencia, a3, 79–86). NGOs and civil society initiatives were frequently named by representatives of the civil society sector but only once by a business actor (e. g. Freiburg, a4, 36; Kiel, a4, 43; Nice, a4, 92; Rome, a4, 39; Trieste, a3, 40 and a4, 49).

The regional comparison reveals that the local water provider shows the greatest leadership and the ranks of actors are almost alike for all regions. The ratings of the Southern countries are quite low in comparison with the other regions, perhaps representing a lack of capability concerning the solution of pressing problems in some countries earlier mentioned. In the West, the distance between the leadership of the political majority, the local government administration, and the local water provider on the one side and the rest of the actors on the other side is larger than in the other regions. The local universities as well as research and educational institutions, standing for the latest developments in research, have high influence in the North and show only medium leadership in ensuring the quality and availability of drinking water in the other regions.

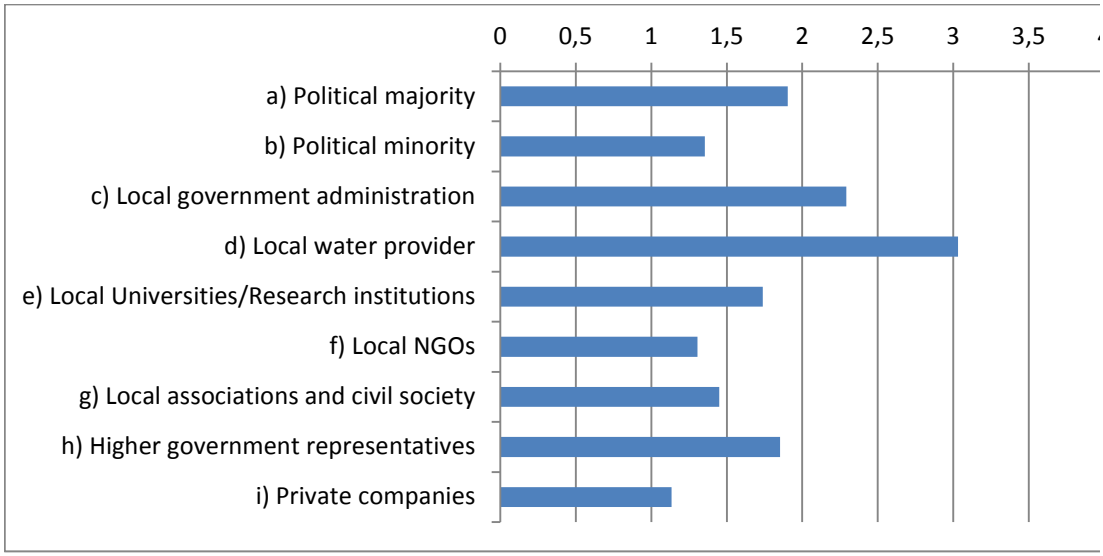

Figure 33: Leadership (in terms of reputation and capability) in ensuring the quality and availability of drinking water (scaled from 0: none to 4: very high).

Factors encouraging the local water transition are interwoven with the particular challenges the cities experience. From the challenges described in section 6.2, objectives and concepts for the future can be developed. Droughts and floods were rated as more risky for the drinking water system until 2030 than changes in population. Droughts are more relevant for Eastern and Southern European countries; floods are equally relevant in the four regions. The particular risk depends on the geographical characteristics of the city. Interestingly, cities with different population growth rates, except very fast growing mega-cities, did not rate the risk of an increasing population to the city's water supply significantly different. Interviewees at times mentioned problems arising from densification and population accumulation in growing cities (e. g. Istanbul, a3, 30; Rennes, a4, 57; Umea, a4, 30–31). A shrinking population is significantly more challenging for shrinking cities. Nevertheless, these population risks are assessed as low on average.

Frequently mentioned was the factor of **awareness** creation for sustainable deployment of resources. Amongst others, civil society, non-profit organisations, and private businesses promote sustainability. Results are the creation of environmental consciousness and an increased awareness for the pollution of water resources as well as social responsibility. Consumers are thereby enabled to protest against high water prices and bad water quality. A city can only be sustainable when its citizens support sustainability issues and get involved. Thus, administration alone cannot actually impose sustainability, but needs to address the people (Barcelona, a4, 106–107; London, a4, 129–130; Prague, a4, 36–41; Rennes, a4, 42). The EU is influential in creating environmental sensibility. In addition, some policy makers recognise that projects and issues related to water and sustainability can win votes (Umea, a4, 62–67; Valencia, a3, 41–44). Conversely, it was argued that city people are alienated from agriculture and show less awareness on issues like water pollution than people from the countryside. Their habits and established thinking patterns prevent sustainable action, and economic arguments dominate environmental ones. If consumers do not care about sustainable or 'green' markets, transition is slowed down significantly (Innsbruck, a1, 15; Istanbul, a3, 26, 41; Trieste, a4, 24–29; Umea, a4, 29). The level of citizens' awareness and willingness to act sustainably is very different in the observed cities. The impression of a North-South disparity arises.

Policy factors were frequently reported. There is a need for increased transparency, integration and cooperation between all stakeholders, including the monitoring of water quality and technology management (Barcelona, a4, 45–47; Innsbruck, a1, 15; Rennes, a3, 56). Citizen partici-

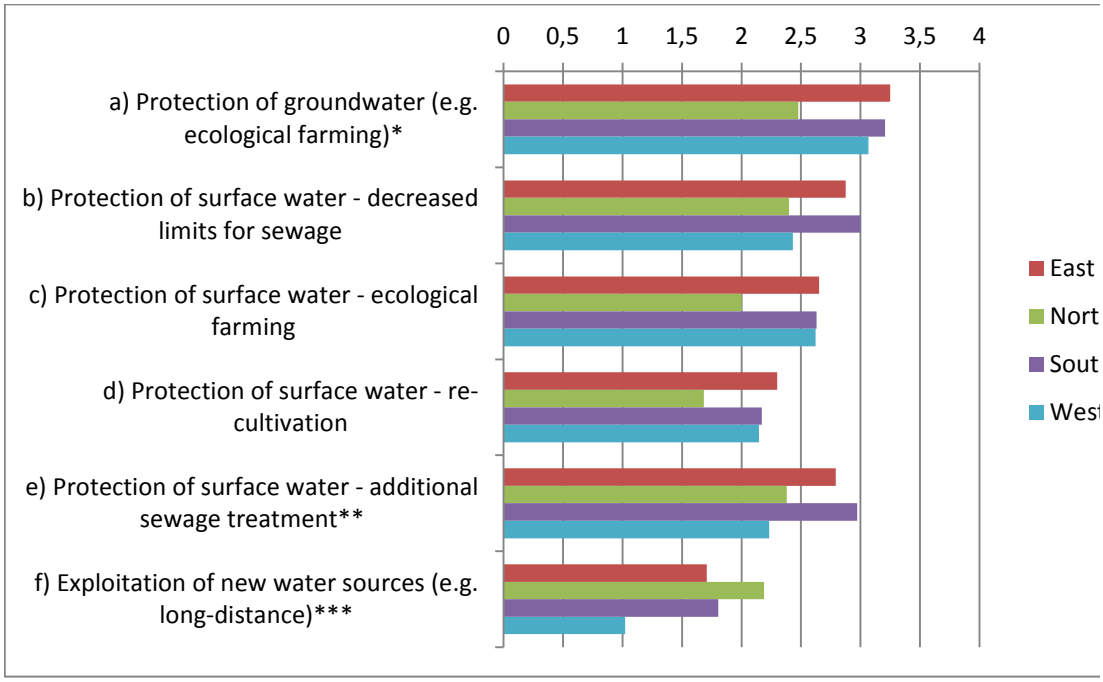

Figure 34: Priorities for ensuring or improving the quality of drinking water until 2030 (scaled from 0: none to 4: very high).

pation depends on the information citizens receive from local government and media (Rome, a3, 75). Politicians set different foci; a 'green mayor' will focus more on sustainability issues (Freiburg, a3, 36). Political problems and corruption among public administration and politicians are likely to lead to citizens' mistrust and inefficient allocation of funds (Barcelona, a4, 42–44; Kiel, a4, 35–37; Rome, a3, 75, Valencia, a4, 24). The situation is usually complicated when stakeholders and decision-makers with different background work together. Collaboration and trust are especially challenging for parties viewing each other with scepticism (Giurgiu, a1, 74, and a3, 82–83; Istanbul, a3, 36; Rennes, a4, 65–72). Apart from these local policy factors, also non-local factors play a role. Some regions participate in numerous EU funded projects improving the living conditions for example through urban microclimate projects, sewage system modernisation, flood protection, or riverbed cleaning (Lodz, a2, 12, 28). Control and monitoring of water quality is frequently exercised by higher levels of government as well, for instance by the national and the EU level. These also determine the success of projects and the allocation of funds. Thus, projects are typically implemented according to national criteria and not to local ones (Innsbruck, a4, 60–63; Rennes, a3, 35; Rome, a4, 93–94).

Cities have diverse objectives for ensuring or improving the **quality** of drinking water until 2030. The protection of groundwater, for example by ecological farming, is of high priority for many cities. The protection of surface water due to decreased limit values for sewage of households and industry, ecological farming and due to additional levels of sewage treatment have also high priority. The protection of surface water due to re-cultivation and the exploitation of new water sources (e. g. through long-distance water systems) are of medium priority. Added were objectives important to some cities concerning technological improvements, recycling of water, collaboration with users and protection of surface water from hydraulic fracturing.

In the North, most of the objectives are less prioritized than in the rest of Europe, but the exploitation of new water sources is of a higher priority than in the other regions. The protection of surface water due to additional levels of sewage treatment is of especially high priority in the East and the South (cf. Figure 34).

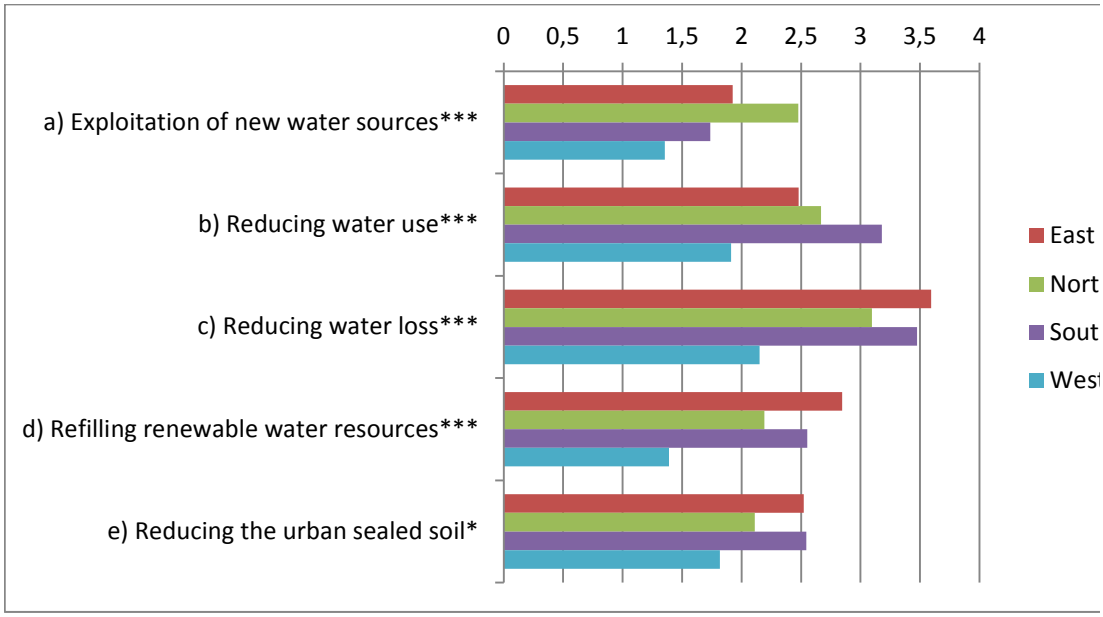

Figure 35: Priorities for ensuring the availability of drinking water until 2030 (scaled from 0: none to 4: very high).

Water **availability** is an important challenge and transition factor. The priorities for ensuring the availability of drinking water until 2030 were requested. Some objectives both ensure quality and availability, as these aspects cannot be separated. The objective of reducing water loss (e. g. through investments in drinking water infrastructure) is of high priority on average. The priority of reducing water use (e. g. through intelligent water irrigation systems) is medium to high. The exploitation of new water sources, the refilling of renewable water resources and the reduction of the urban sealed soil are prioritized as medium on average by the cities. Additionally mentioned were the installation of rainwater management systems and the use of reclaimed water for industries, the renewal of infrastructure including an effective well management, and the collaboration with and education in communes (q. v. Birmingham, a3, 34; Umea, a4, 62–63). Civil society respondents assess the objectives of reducing water use and the amount of urban sealed soil as of higher priority for drinking water availability in contrast to business and government respondents.

The objectives for water availability are seen differently in the four regions. The Western countries rated all objectives as less prioritized compared to the other regions, reflecting the image of fewer challenges and an already higher technological standard stated in section 6.2. The reduction of water use and water loss, the refilling of renewable water resources and the reduction of the urban sealed soil are especially relevant for the South and East of Europe (cf. Figure 35). The exploitation of new water sources is, similar to the same objective for water quality, more important for the Northern countries than for the other three regions. There is a high correlation between the priorities of the exploitation of new water sources concerning quality (cf. Figure 34) and availability (cf. Figure 35) of drinking water.

In the questionnaire most cities state that it will be rather easy, though not very easy, to deliver good water quality and enough water. It seems difficult to guarantee stable **prices** at the same time. The regional differences show that there are again more problems to be expected in the East and South of Europe. Sometimes, the countries of one region assess these difficulties very differently. Stable prices are supposed to be difficult to guarantee in all Southern countries except Italy and much easier in Austria than in the other Western countries. Water quality and availability are regarded as easy to guarantee in Romania but as neutral in the Czech Republic

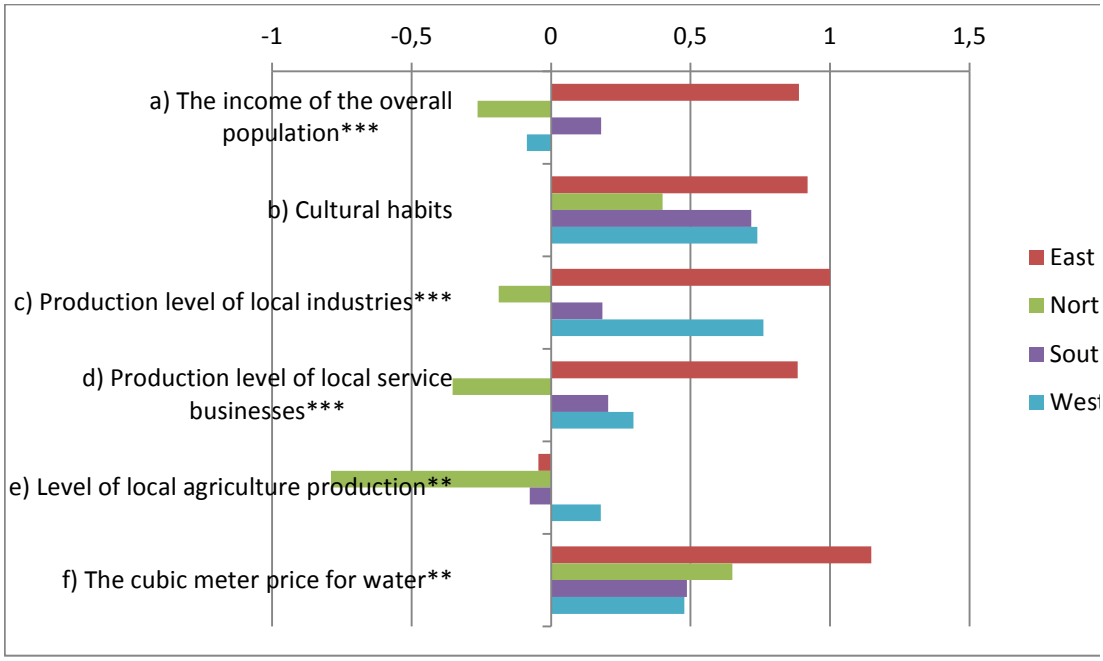

Figure 36: Aspects that determine the level of water consumption (scaled from -2: strong disagreement to 2: strong agreement).

and Poland. There is also a visible mechanism of large water savings leading to increasing prices, as fixed costs are apportioned to the cubic metre price of drinking water (Prague, a4, 41). In few regions, poorer people dig wells in their yards, because groundwater is easily accessible. High water prices support these actions, while not every house is connected to the local drinking water system (Giurgiu, a4, 85–87).

The maintenance and renewal of existing infrastructure is the strongest **cost driver** of drinking water services. The investment in additional infrastructure to cope with degraded water resources, for instance through nitrate pollution, and other operational expenses are of medium importance. The least important factor is the investment in additional infrastructure to cope with scarce water resources, such as long distance provision. This priority is the same for all regions. The degree of importance differs between the regions. It is lowest in the West for all items. For maintenance and renewal of existing infrastructure, for investment in additional infrastructure to cope with degraded water resources and for other operational expenses, the importance is highest in the East and parts of the North; for investment in additional infrastructure to cope with scarce water resources, it is highest in the South and North. As local government's budgets and EU funding tend to shrink, investments are difficult for some cities (e. g. Lodz, a2, 27–28; Rome, a4, 36–37; Trieste, a3, 58).

It is generally agreed with cultural habits[24] and pricing determining **the level of water consumption** in the cities. There is weak agreement on the influence of the production level of the industries within the municipal boundaries. Concerning the income of the overall population, the production level of the service businesses within the municipal boundaries and the level of agricultural production within the municipal boundaries, the respondents are neutral on average.

[24] The term 'cultural habit' was not defined or explained in the questionnaire. It thus refers to the common perception of habits of use, depending on factors like customs, education, climatic conditions, and society's social structure. Cultural diversity within the EU countries probably contributes to a diversity of habits too, but as we only broadly talk about patterns of use, these aspects are not considered further here.

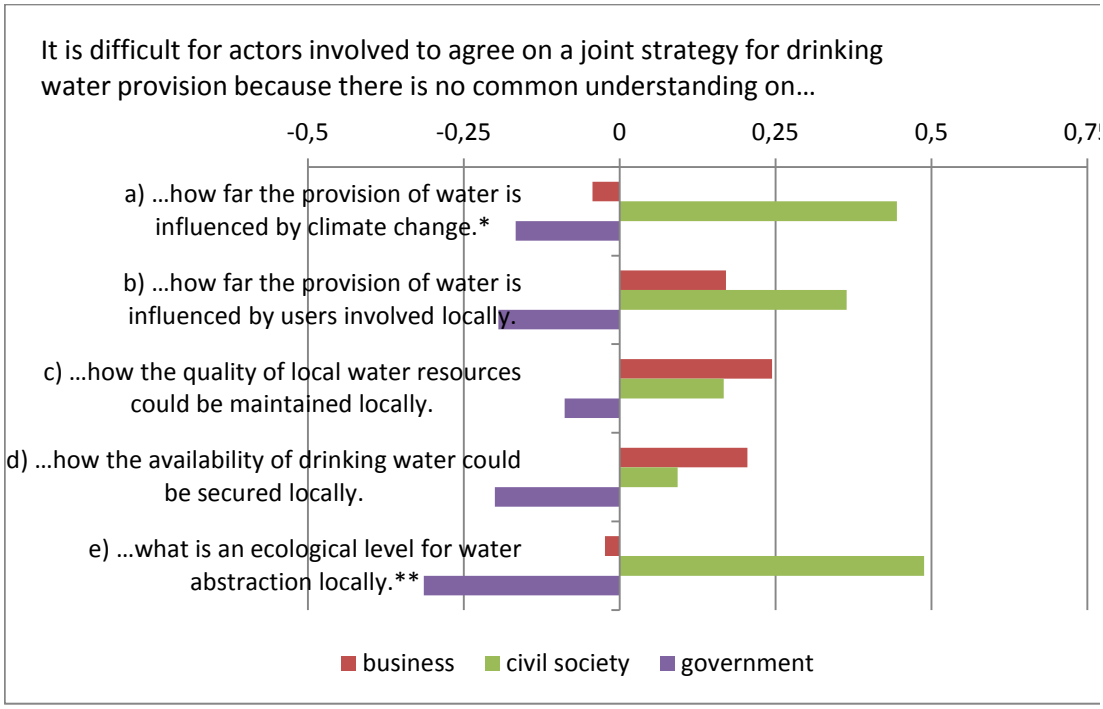

Figure 37: Common understanding regarding a joint strategy for drinking water provision (scaled from -2: strong disagreement to 2: strong agreement).

The regional differences are huge on this question. In the North and South of Europe, only the cubic meter price for water and cultural habits determine water consumption. In the West, the production level of the industries within the municipal boundaries is a further determination factor for water consumption. In the East, all aspects except the level of agriculture production within the municipal boundaries play a role (cf. Figure 36).

6.3.2 Lessons learnt

During the more or less intense transition process of the last ten or more years, important **lessons** could be learnt and the actors involved could gain reputations. Energy efficiency programs already showed that same results could be achieved with less consumption. This knowledge can be transferred to the water system. For the resource system water, consumption patterns can change through innovative political frameworks, structural change and efficient monitoring and sanctioning (Giurgiu, a1, 90–93; Istanbul, a3, 59–60). Water availability and quality depend on the way the resource system is treated. Water management, reuse, storage, and ecological agriculture are thus important. Investments in clean technology can facilitate sustainability transition, but need to be supported by different levels of government. Local characteristics have to be respected in the innovation (Barcelona, a4, 85–86, 114–116; Giurgiu, a4, 75–78; Istanbul, a3, 99–102; Valencia, a4, 68–69). Many things have to be revised to provide attractive, economic solutions for sustainability. If resources are limited, the rules of growth need to be defined differently. Taxation, incentives, and regulatory frameworks need to be reflected in that context (Istanbul, a3, 57–58; Umea, a4, 108–111).

Lessons learnt on actors and their actions concern for example conflicts and divergent opinions between water industry, suppliers, and bottled water companies (Freiburg, a3, 50). Asked for difficulties in developing a common understanding regarding a **joint strategy** for drinking water provision, respondents were rather neutral on average. In general, a common understanding

seems to be present, but awareness of the issues still seems low. Civil society obviously sees possible conflicts that government does not see, but the means are all very small and close to neutral. Nonetheless, the sectors' tendencies are clearly diverging (cf. Figure 37). There are no significant regional differences on this question and few between the countries of one region. The common understanding of how the quality of local water resources could be maintained locally causes conflicts only in the Czech Republic, Greece, and the UK. The questions of what an ecological level for local water abstraction is and how far users involved locally influence the provision of water are not at all issues of conflict in Austria and assessed as neutral in all other countries except Greece, where they are issues of conflict. Conflicts about scarce resources used up by neighbouring municipalities can emerge between local communities (London, a3, 60; Rennes, a3, 49; Valencia, a4, 41–42).

Other lessons learnt concern the relationship of **top-down to bottom-up** approaches. Transparency and citizens' commitment can improve current problematical situations, and public discussion can make project definitions more successful (Prague, a4, 55; London, a4, 101–106; Rome, a4, 59–61, 85–87). Monitoring and control of the allocation of funds and the implementation of projects are crucial. For projects, political and financial support is needed, as scientific relevance and sustainability reasons are not sufficient for their success (London, a4, 89–92; Rome, a4, 96–100). The success of projects cannot always be expressed adequate 'on a piece of paper'; the emotive component can be rather shown on-site, where the projects were realized. Unfortunately, politicians rarely show up there (Birmingham, a4, 111). Taking over 'best practice' solutions is not necessarily successful when institutional arrangements are unfavourable (Giurgiu, a3, 144–146). Some actors request changes in decision-making processes and water policy. Change has to come from all sides and all levels; consumption patterns need to be changed and companies should take over responsibility (Istanbul, a3, 63–64; Valencia, a4, 51–54).

Experiences on **information and awareness** or the lack of it are important in the transition process. Consumers and citizens often do not understand the subjects of discussion about sustainable development; the terminology used on water directives repels people. A better comprehensible language would help to create awareness and stimulate commitment (London, a4, 38, 94-96; Rennes, a4, 25; Trieste, a3, 53). Governments often only care about issues the public is actually interested in. Furthermore, personal interests sometimes interfere with sustainable development. The promotion of water issues by the media is biased towards pricing and consumption patterns (Giurgiu, a3, 107–108; London, a4, 148; Rennes, a4, 121–122). These aspects are connected with the need for a good educational system, including collaborations between schools and actors involved in sustainability issues (Birmingham, a3, 86–90; Giurgiu, a4, 35; Nice, a4, 74). "If you give people a choice between a sustainable and a non-sustainable option, they will go for the sustainable option" (London, a4, 38).

As already mentioned, many cities face **funding** problems. Indebted municipalities have a serious problem on the local level, since sustainability objectives are postponed due to lacking resources. Hence, their needs for external or EU funding increase. Especially, infrastructure deterioration causes difficulties. Low water prices, used as political instrument in some cities, intensify this effect (Giurgiu, a3, 99–102, 111–112; Kiel, a4, 117–121; Trieste, a3, 76). Private companies benefit from political decisions on the privatisation of water supply (Barcelona, a4, 85–86). Short-term profit and quick success is often put before sustainability, but sustainability can provide long-term financial stability. Long-term plans should be prevented from influences by changes in the political scene and short-term problems should be less focused on in favour of the common good water and long-term plans (Birmingham, a4, 150–157; London, a4, 34; Prague, a3, 125; Valencia, a3, 79–86).

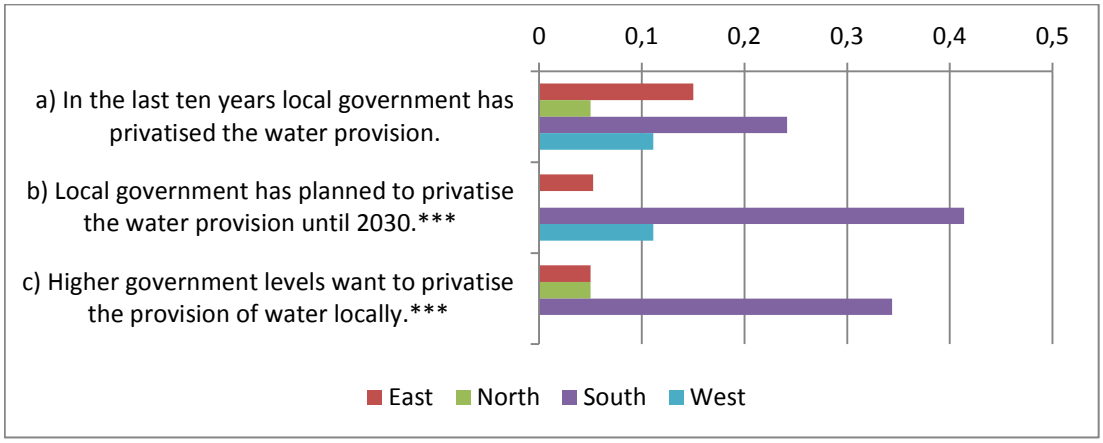

Figure 38: Status of privatisation (statements applicability coded as 0: no or 1: yes)

The **privatisation** of the water supply is an aspect frequently brought up in the interviews. The initial situation is different, as in some countries, private water supply has a comparably long tradition, for example in France[25] and the UK[26]. In some of these cities, the private water utility has recently been or will be re-communalised in the next years. These developments are widely approved, because citizens expect considerably reduced water bills and improved water quality from municipal water providers (Nice, a3, 97–101; Rennes, a3, 23, 59). In most countries water supply has traditionally been a municipal task. Yet there is a current trend towards privatisation of public services and the deregulation of markets. "[P]rivate profit and externalizing costs towards society are the rules of operation" (Valencia, a4, 27). Many local politicians follow this mainstream. When profit comes into play, sustainability can become difficult (Freiburg, a3, 79). In some countries citizens' referenda or protests prevented the cities from privatising water supply (Rome, a4, 59; Trieste, a3, 92). A nationwide referendum with more than 55 % of citizens voting was held in Italy in June 2011 regarding the privatisation of water services. Over 95 % of voters rejected private water suppliers (EPSU 2011). Other cities have recently privatised water supply (Barcelona, a4, 92). Less than one fifth of the respondents stated that water provision has been privatised or will be privatised between 2003 and 2030. Privatisation is an issue especially in the Southern European states (cf. Figure 38). In most cities, no changes are expected within the next 15 years, but anyway the topic is present in many interviews and in various contexts.

Overall, the economic crisis has facilitated awareness and helped people to understand that community spirit and participation are very important. This shows in different fields of action, which are interconnected. The different needs of actors and resource systems need to be taken into account in progress (Birmingham, a3, 64; Prague, a4, 59). Nevertheless, there are **drawbacks**. Citizens fight over specific issues and thus create more tension than solving problems (Nice, a4, 43–48). A lack of self-criticism and courage of politicians on all levels and the manipu-

[25] The private company Veolia Eau is managing drinking water in Nice since 1864 through a public service delegation contract. Water service will become entirely public in 2015. The case of Rennes is very similar. In Paris, the water distribution was privatised in 1985. Veolia and Suez shared the market, with delegation contracts for 25 years. Eau de Paris (an autonomous branch of Paris' administration) took over the management of water in 2010. Detailed information can be found in Cristina Garzillo and Peter Ulrich (2015) for Nice, Paris, Rennes and Strasbourg under the heading 'Water'.

[26] There are ten regional water providers in England. These were privatised in 1989 along with other former public assets during the era of Margaret Thatcher. Scottish Water, unlike the rest of the UK water companies, is a public company that serves the whole of Scotland and is responsible for delivering water and wastewater services. Detailed information can be found in Garzillo and Ulrich (2015) for Birmingham, Glasgow, Leeds and London under the heading 'Water'.

lation of citizens by politicians are also criticised. There is always opposition on sustainability projects, even if they are favourable for the region (Barcelona, a4, 51; Innsbruck, a1, 15, Lodz, a2, 38; Rennes, a4, 90–93; Rome, a3, 27). Changes take time in local and national administration, but a change of the system in favour of participation and self-organisation can be found. Young people as major motivators of society need to be involved (Barcelona, a4, 51–54; Giurgiu, a3, 147–152; Trieste, a4, 46–59). Political decisions and bureaucracy as well as the interference of higher government levels like the EU often slow down processes. The European Commission sometimes fails to ensure compliance with community law due to a lack of work force (Prague, a3, 129; Valencia, a3, 79–86 and a4, 68–75).

Individual learnings of the respondents concern an increased collective responsibility to maintain public common goods and the consideration of health aspects in water management as well as the fight against a still predominant perception of looking at growth only through economic benefit and the maximisation of profit (Istanbul, a3, 57–58; Lublin, a3, 45–46; Rome, a4, 53). **Networking** and collaboration of public and private actors is supposed to make the resource system water function better (Birmingham, a3, 68–70; Giurgiu, a3, 99–102; Lodz, a2, 41–44; Rome, a4, 59–61). In the opinion of some interviewees, the European Union provides the framework in which all stakeholders should join hands and create a network based on ethics and environmental values, involving different areas of economy and society. Citizens can benefit from legislation and 'best practices' applied in other cities and implement previously tested solutions (Giurgiu, a1, 106; St. Gallen, a3, 10; Trieste, a4, 77–81).

6.4 Norm adoption and local decision making autonomy

The questions whether we could observe transitional socio-ecological norm-adoption towards trust and cooperation and if local decision-making autonomy matters in socio-ecological transition processes are to be answered next.

6.4.1 Norm adoption

Most respondents clearly agreed that an access to drinking **water is a human right** that should be guaranteed by public authorities. Only two business representatives and one government respondent answered neutrally. No respondents disagreed on this statement.

Inquiring the **value of clean drinking water,** and whether subsidies have a positive or negative effect on sustainability, can be achieved by asking whether water should be free. The unanimous opinion of interviewees is that "water has to have its real price" (Giurgiu, a3, 105). Otherwise, the users will not value the resource. "People complain a lot about [costs for] water, […]. No one complains about paying for their mobile phone" (Barcelona, a4, 71). People should understand that the water prices relate not only to the water currently taken from streams and other sources, but also to the provision of clean water for many people over a long period. The purification of water and construction and maintenance of canals create high costs. These are included in the tariffs. The water providers then reinvest the money to ensure the operation of the cycle. Water for free would mislead the behaviour of people (Birmingham, a3, 112; Giurgiu, a3, 61–63, 104; Lodz, a2, 48–49). If water is too cheap, it leads to a serious depletion of the resource. Respondents expressed several ideas for efficient water pricing. Rising block tariffs could be incentives to reduce water use. Less than 100 litres per inhabitant and day could be free or in a low price category; beyond that the tariffs would rise by volume. Instead of providing cheap drinking water, there could be encouragement to use recycled water or rainwater. If a low water price—followed by intense consumption stressing the resource system—is a political instrument, even privatisation of water supply could help to reflect the costs of water in its price (Barcelona, a4, 71–73; Birmingham, a3, 45; Istanbul, a3, 78, 90).

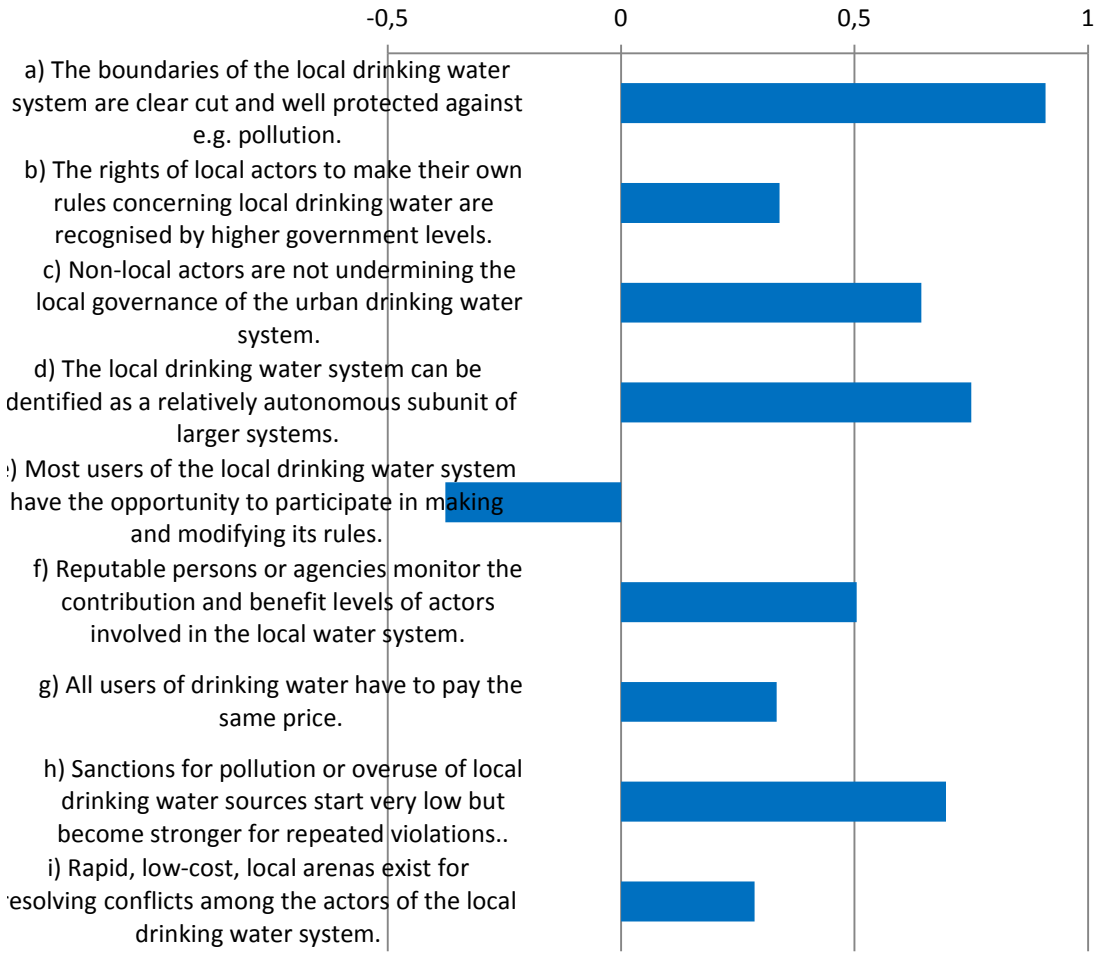

Figure 39: Agreement on governance principles regarding the local water provision system (scaled from -2: strong disagreement to 2: strong agreement).

The clarity of the **system boundaries** is one aspect defining the local scope of action and the need of cooperation. In all cities, the sources of the local water supply are well known. The availability of adequate local resources and the overall consumption level, depending for instance on population size, local industry and agricultural use, determine whether cities are able to cover the needed quantity of drinking water. The availability of water resources and associated challenges were discussed in section 6.2. Most cities use more than one source for freshwater abstraction and discharge their wastewater after treatment into their local streams. The treated wastewater, especially of coastal cities, eventually ends up in the sea, thus the preservation of the coastline and marine ecosystems are as well relevant. In many interviews, awareness for the finiteness of water resources becomes apparent. There are only few cities with households not connected to the sewage system in the sample (e. g. Giurgiu, a4, 85–89; Nice, a3, 28–29; Prague, a3, 101–103 and a4, 86). Many cities are using the water of neighbouring municipalities. Sometimes conflicts emerge from that, as external resources are used up by these cities. There can also be cooperation between neighbouring municipalities in wastewater management, in the coordination of actions, the protection of groundwater and the mitigation of threats. The statement ‘The boundaries of the local drinking water system are clear cut and well protected against e. g. pollution’ is agreed on by most respondents of the questionnaire (cf. Figure 39).

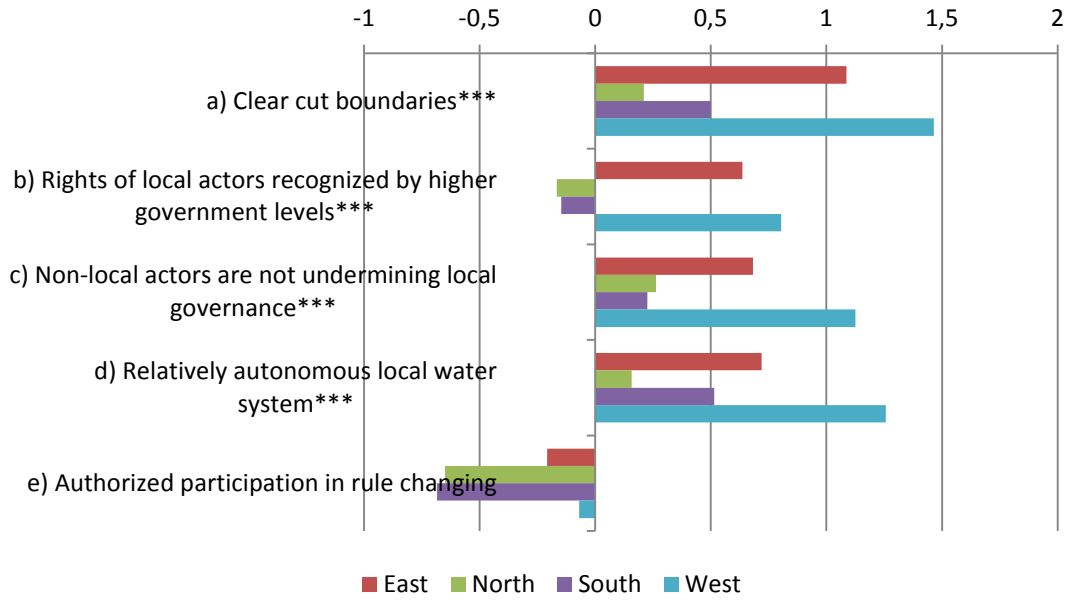

Figure 40: Agreement on governance principles regarding the local water provision system (regional differences I)

An effective water basin management takes into account the regional needs. Depending on organisational structures and legal frameworks, various actors can be involved in the operation and control of water supply, for instance the public or (partially) private utility provider, the local or national administration or various other businesses, boards and committees (e. g. Kiel, a4, 51, 77; Rennes, a3, 49; Valencia, a4, 43). The statements 'The local drinking water system can be identified as a relatively autonomous subunit of larger systems' and 'Non-local actors are not undermining the local governance of the urban drinking water system' are commonly agreed on. The statement 'The rights of local actors to make their own rules concerning the local drinking water system are recognized by higher levels of government' is rated neutrally on average, but with a positive tendency. Only on the statement 'Most users of the local drinking water system have the opportunity to participate in making and modifying its rules' respondents tend to disagree (cf. Figure 39).

In the majority of cities '**Sanctions** for pollution or overuse of local drinking water sources start very low but become stronger if an actor repeatedly violates a rule', and 'Reputable persons or agencies monitor the contribution and benefit levels of actors involved in the local water system'. The statements 'All users of drinking water have to pay the same price' and 'Rapid, low-cost, local arenas exist for resolving conflicts among the actors of the local drinking water system' are rated as neutral with a positive tendency (cf. Figure 39).

For some of the requested governance principles, the regional differences are huge. The Western respondents agree on all principles except that 'Most users of the local drinking water system have the opportunity to participate in making and modifying its rules'. The Northern and Southern respondents disagree on the statement and the Western and Eastern respondents are neutral. In no region, users can participate in changing the rules of the local drinking water system, which corresponds with the findings about participation and self-organisation from section 6.2.2. Referring to the water system's boundaries, the recognition of local actor's rights, the absence of non-local actors undermining the local governance, and the autonomy of the local water system, these principles are agreed on in Eastern and Western Europe and are rated as neutral in the North and South (cf. Figure 40).

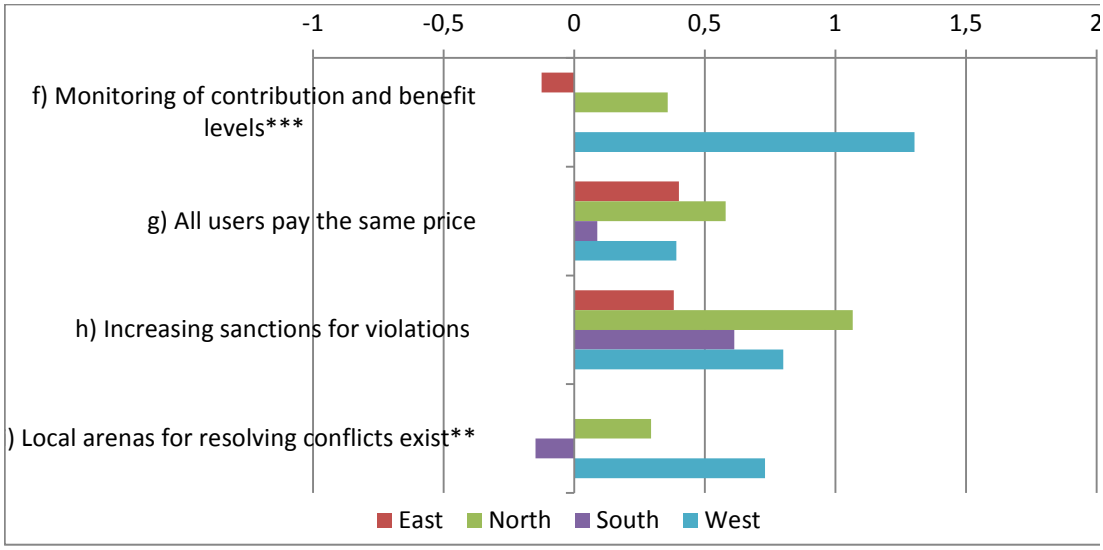

Figure 41: Agreement on governance principles regarding the local water provision system (regional differences II)

Concerning the principles of monitoring the contribution and benefit levels of involved actors, equity of water prices for all users, increasing sanctions for repeated pollution or overuse of water sources, and the existence of local arenas for resolving conflicts among the actors, the agreement from the Western and Northern countries is stronger than from the Southern and Eastern countries (cf. Figure 41). This confirms again the impression formulated earlier in this chapter and derived from the case studies, that Western and Northern cities are further advanced in regards to water management and protection.

A public authority that assures a strong **monitoring** achieves good quality of water and services (Rennes, a3, 50). The monitoring of water use can be implemented by individual metering on household level. In some cities water metering is not mandatory, thus, the volume of water used has no impact on the individual water bill. As the installations of water meters create high costs, administration and water provider are ambivalent on the issue. It would create extra costs, but in medium term, households would save money, as they have an incentive to save water. Saving hot water also reduces fuel or energy costs (Birmingham, a3, 72, 112–115). The questionnaire revealed that the quality of the drinking water is monitored very effectively. The effectiveness of the monitoring of groundwater protection, surface water protection, water use and water loss (e. g. through leaks) is high on average. There are differences between the answers of the actors from the three sectors. Government actors perceive the effectiveness of monitoring for quality, use, and loss of water as higher than actors from business and civil society. Regional differences exist as well. In the Southern countries, some shortcomings exist for all objectives compared with the other regions.

The effectiveness of **sanctions** is an important objective, as the compliance with rules must not only be monitored, but violations of these rules must be sanctioned. If these rules exist only on paper, their virtue is low. If there is no shift in environmental awareness, only sanctions can make companies involved in the production process and consumers change their habits and consumption patterns. The construction of the sanctioning system is crucial for its effectiveness. Failures as the dependency of the penalty on volume of polluted water instead of the intensity of pollution can impair the success of sanctions (Barcelona, a4, 84; Istanbul, a3, 41, 60–64). The pollution of water sources is sanctioned medium effectively on average. The overuse or overconsumption of water is sanctioned little effectively. Other interventions sanctioned are the illegal use and theft of water. The sanctioning of the pollution of water sources is effective in the

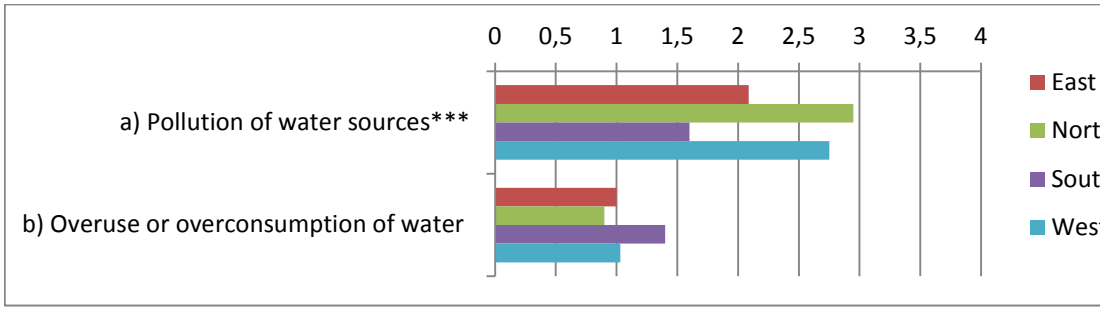

Figure 42: Effectiveness of sanctions (scaled from 0: not effective to 4: very effective).

North and West, but medium effective in the East and South of Europe (cf. Figure 42). Civil society respondents assess the sanctions on the pollution of water resources as less effective than government respondents do.

Contributions of actors to sanctioning a misuse and/or the pollution of water are unequal. The local water provider, local government's administration, and higher government representatives contribute most. The local environmental NGOs play the next most important role. The contributions of the political majority, political minority, local associations, and users themselves are low. There are some regional differences to be found. The superior government levels' representatives' contribution to sanctioning a misuse and/or pollution of water is above-average in the West, where it is as intense as the local governments, the local administration's, and the local water provider's contribution, indicating a shared control in these issues. In general, the contribution levels are assessed as higher in the West and North compared with the East and South.

Formal norms in form of **legal frameworks** as well as informal norms are important bases for sustainability transition. Water companies primarily need to meet directives and distribute returns to their owners, yet an overreaching sustainability directive is missing in many cities. There are calls for changes in the regulation of those companies. Also the need for a more general change in legal frameworks to enable participation and sustainable actions in general was stated (Istanbul, a3, 60; London, a4, 18; Valencia, a4, 67). Water supply almost is a protected market, making it difficult and time-consuming to open it (St. Gallen, a3, 10). Clear rules help the economy, the enterprises, the cities, and municipalities to take action (Innsbruck, a1, 111). Discrepancies between laws, concepts and strategies and their implementation practice can be observed. In several cities, sustainability concepts exist only on paper and are poorly executed or not at all. Thus, no difference can be made. Also the control mechanisms do not always take effects, for instance due to financial saving measures (Giurgiu, a3, 146; Innsbruck, a1, 109; Kiel, a3, 41–42; London, a4, 146; Prague, a4, 64; Valencia, a4, 18, 71).

Regional, national and supra-national policies interdigitate and are linked hierarchically. These different level policies are supposed to be coherent, but problems and inconsistencies occur frequently (Barcelona, a4, 41; Giurgiu, a3, 137; Nice, a3, 43). As transition is difficult to manage, experience is needed and environmental matters cannot be limited to the regional scope. Various respondents demand a less complex institutional landscape and more national or European responsibility for these tasks. Examples are regulations for the usage of wastewater sludge or water treatment technologies that should be made by higher government levels. Rule changes from 'above' can initiate change on the regional level (e. g. Barcelona, a4, 86; Istanbul, a3, 84; Lublin, a3, 23; Nice, a3, 43, 80; Prague, a3, 124–125; Rennes, a3, 61, 70; St. Gallen, a3, 10). Other respondents said that the EU can merely create framing conditions or that they are not sure whether the EU policy can have a real impulse on local policies. There is also doubt on the intensity of interference of the European legislation on local policies (Kiel, a3,

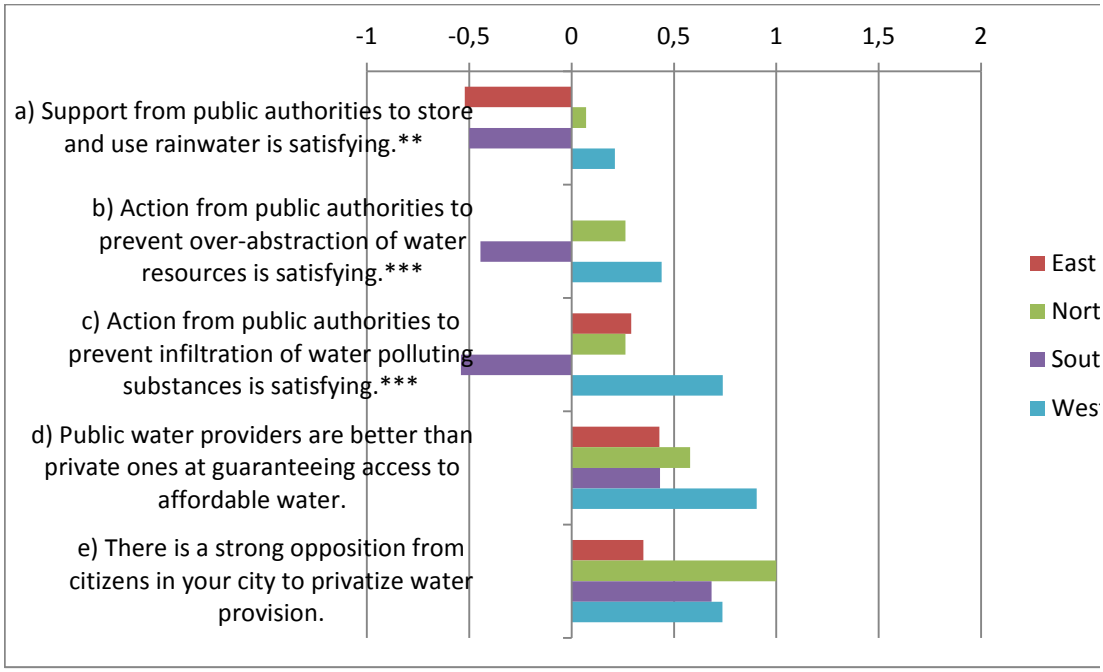

Figure 43: Statements on public support and the issue of privatisation (scaled from 0: none to 4: very high).

278; Prague, a3, 123; Rennes, a4, 138). Another aspect is that politicians believe that elections are not won on sustainability or wastewater issues. Investments thus lose political priority, being an obstacle for long lasting solutions. In times of crisis politicians feel they have to leave behind these aspects, as social stability is more important (Barcelona, a4, 111; Nice, a4, 46–47; Rennes, a4, 97; Umea, a4, 79).

Cooperation between institutions is not always satisfying. It might sometimes be difficult for financial reasons, as people, even from the non-governmental sector, compete over grants and are not willing to involve others, as they would lose part of their endowments (Prague, a4, 37). For instance, important advances in sustainable agriculture would imply cooperation between national and federal governments. In addition, farmers and food industry have to be involved. Another example is the comprehensive control and modernisation of the sewer system on private ground, where the municipality needs to consider funding and organisation together with other stakeholders like the association of house owners and skilled crafts and trades (Innsbruck, a1, 103; Kiel, a4, 59). Engines for success are “a transparent policy where citizens know what the state of the affairs is – that we know all the governmental actions in a transparent manner. A second step would be the participation where citizens and collectives can enhance their voice effectively. The third one would be accountability, where decisions are justified and at the same time are personalized. Thus, we can know who is taking the decisions and why these are being taken” (Valencia, a4, 64).

Funding—again—is an issue in norm adoption and decision-making autonomy. NGOs and other citizens’ organisations cannot compete against large investment companies with vast funding options. Lobbying is also a problem, as many exceptions from rules are made being beneficial for economic interests. Many municipalities are exceeding debt limits and cancel projects that would help to meet environmental goals. The austerity policy associated with the current economic crisis is further slowing down the implementation of sustainability objectives (Barcelona, a4, 111; Innsbruck, a1, 111; Kiel, a4, 113; London, a4, 144). There are possibilities of funding from higher government levels. Municipalities have to meet special requirements and handle the

related bureaucracy. Apart from economic resources, also political ideas and good political practice are needed to drive these projects successfully and benefit from the advices of experts of the European legislation (Barcelona, a4, 109; Lodz, a2, 51–52). There are also voices saying the goal in many projects is to spend available EU funds without giving enough thought on the aptitude of the projects (Lublin, a3, 57–58).

On average respondents agree that **public water providers** are better than private ones at guaranteeing access to affordable water and that there is a strong opposition from citizens in the city to privatise water provision. These findings correspond with the argumentations of sections 6.2.1 and 6.3.2. Respondents are on average neutral concerning the questions whether the support from public authorities to store and use rainwater is satisfying as well as if action from public authorities to prevent over-abstraction of water resources and infiltration of water polluting substances is satisfying. This support could indicate the authority's attitude towards sustainable water management. There are various sectorial differences in the answers. Civil society and by tendency government agrees that public water providers are better than private ones. Business respondents are on average neutral on this question. Civil society is also more critical about the support from public authorities to store and use rainwater. Government finds action from public authorities to prevent infiltration of water polluting substances satisfying, business and civil society are neutral. Again, every sector plays its part in assessing the relationship between public authorities and civil society. Once more, especially the Western but also the Northern countries are more advanced in the implementation of sustainability principles (cf. Figure 43). Anyway, there are huge intra-regional differences in the West and North. Scandinavian respondents find these actions dissatisfying in contrast to British respondents. Likewise, Austrian and Swiss respondents are more satisfied than German and French respondents are.

6.4.2 Local decision-making autonomy

It is challenging to answer the question about the state of local **decision-making autonomy** regarding water issues. The interviews show many inconsistencies in the statements of different actors from one city. Hence, it could be concluded that there is a lack of transparency in decision processes. Some cities report a high independence of decision within the legal framework (Innsbruck, a1, 81; Prague, a4, 57; St. Gallen, a3, 10). Many city councils share decision-making autonomy with other governmental agencies on the regional or national level or private companies operating the water supply. The influence of the local government can vary —from simple approval of the water supplier's plans up to deciding about defined tasks within a multi-level system of governance (Freiburg, a4, 58; Giurgiu, a3, 116 and a4, 82; Kiel, a4, 67; Rennes, a3, 56–57; Trieste, a3, 59–64; Valencia, a3, 92 and a4, 56). Some cities stated that the municipalities have very little to do with water issues. Reasons for municipalities' limited power often concern budgeting. Financial dependency on private business or other government levels implies also a certain amount of political dependency (Giurgiu, a1, 104; Barcelona, a4, 92; Birmingham, a4, 85–86; London, a3, 54–56; Rome, a3, 85). Especially cities with private water supply companies are constrained regarding decisions on water issues. "It's not their mandate. Water is private in England, […] it´s not up to them" (London, a3, 56).

Financial autonomy is sometimes described as "real autonomy" (Nice, a3, 101). As presented above, many cities lack financial resources. Formal competences without financial means are regarded as pointless. Especially in big projects decision-making autonomy is thus constrained by other partners co-financing these (e. g. Giurgiu, a3, 118; Kiel, a4, 67; Rome, a3, 85; Valencia, a4, 58). Typically, most of the money available for reinvestment in water infrastructure has to be earned by selling water. Therefore, no scope for financial gains exists for the cities (Trieste, a3, 66 and a4, 65; Valencia, a3, 94). The lack of financial autonomy can lead to further privatisations (Rome, a4, 69). Only financially autonomous cities are assessed as autonomous in decisions as well (Nice, a3, 101 and a4, 82; St. Gallen, a3, 10).

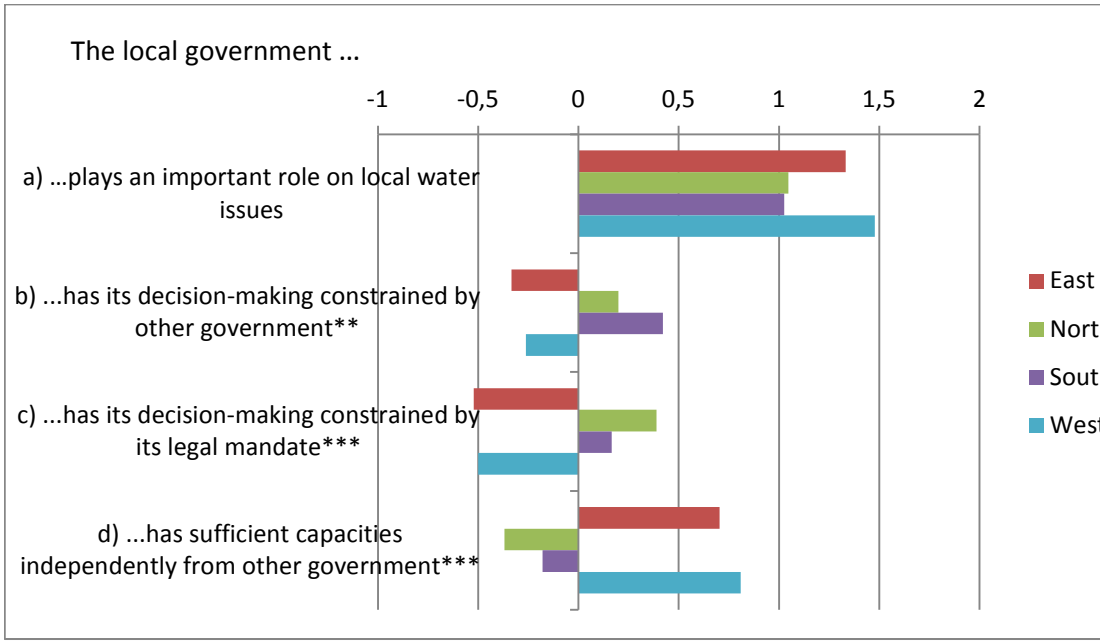

Figure 44: Statements on local decision-making autonomy (Scaled from -2: strong disagreement to 2: strong agreement)

In general, the local government plays an important role in local water issues. It does not have its decision-making on local water issues significantly constrained by other government authorities or by its legal mandate defined in constitutional texts. The local government has own capacities on infrastructures and disposes of financial and human resources to ensure the availability and quality of drinking water independently from other government authorities. Yet the statements on decision-making constraints and capacities are rated as neutral on average. There is no clear picture of autonomous local governments, as also visible from the interviews. In the East and West, local governments tend to have less autonomy than in the North and South of Europe (cf. Figure 44).

The **appropriateness of government levels** to secure a stable supply of drinking water according to high quality standards is assessed differently. The local (i. e. municipal) level and the sub-national level are assessed as most appropriate. The national level is also rated to be appropriate, but ranges behind these two. The EU level is seen as neutral and the neighbourhood or district level is considered as inappropriate to secure a stable supply of drinking water. Except from the neighbourhood or district level, which is found to be inappropriate in all regions, the respondents from the East find the government levels much more appropriate as they get lower. This effect is not that obvious in the other regions. Concerning the neighbourhood or district level, the opinions of government and civil society diverge. Government respondents find the district level clearly inappropriate and civil society is neutral.

Many respondents view decision-making autonomy critically. Total autonomy seems not to be desirable for several reasons. Elected representatives are not capable to become water experts during their term of possibly only four years. Also for the reason that the water system is geographically dependent on neighbouring municipalities and regions, full independency is assessed as inappropriate. A joint treatment by national and local powers is more suitable for the water and sewage system. Furthermore, not all cities are supplied by waterworks on their own municipal area, thus these are also outside of the area of responsibility of the city administration (Freiburg, a4, 62; Giurgiu, a3, 114, 120). Not every city's local authorities engage in the issue of water management, regardless of duties and responsibilities (London, a4, 108). More generally,

the management of small projects should and can be local, but for larger plans such as the transition to renewable energies or sustainable urban water systems, a central coordination is preferable (St. Gallen, a3, 10).

6.5 Discussion of the findings

In section 6.1 the general potential of civil society involvement in sustainable water management was considered and the possible **scope of action by new institutional arrangements** was assumed different from civil society's scope of action in green spaces and the energy system. The interviews as well as the questionnaires showed that this assessment was right, as local civil society action can hardly be observed on drinking water issues. More generally, NGOs and citizens' initiatives exist on the protection of lake, stream, or seawater and the opposition of water supply's privatisation. The local activities of those organisations depend on apparent local challenges.

For a public, technical aspects are quite difficult to understand and thus participation is difficult due to the complex character of many decisions connected with the drinking water system. Nonetheless, social aspects like pricing of drinking water and privatisation frequently bring people to action. The European citizens' initiative 'right to water' as well as the Italian referendum against the privatisation of water services were rather successful. The citizens predominantly view **privatisation** plans of local governments as disadvantageous. There is the impression that good quality, socially acceptable tariffs for water, and the maintenance of infrastructure will be sacrificed for the companies' benefits. In contrast, some financially weak municipalities see privatisation as a (good) option to catch up to technological standards and exonerate the city treasury. Private as well as public water suppliers are subject to the same rules and standards, thus the scope for profit is limited. Expected private profits endanger the sustainability aspects in water management, as these might obstruct investments.

Many cities' **financial problems** are reasons for sustainability drawbacks in the water system. Their scope of action is very narrow without considerable financial means, being no singular case in times of economic crisis and austerity policy. Sustainable solutions frequently create higher costs at present and help reduce future costs. A need for current investments combined with tight budgets can hinder sustainable developments, as higher costs are avoided and thus transferred to the future.

Numerous actors are to be involved into a sustainable water management. Water conservation cannot be thought without sustainable agriculture and industry. The system is very complex. **Cooperation** between these stakeholders on content and funding of water transition are thus favourable, if not necessary. The main actors influencing the system and the ones concerned by these actions need to be brought *around one table* to seek solutions. Anyway, the roles of the market and the state are quite strong here, and apart from the creation of transition pressure, the role of civil society is limited. The economic crisis and discussions on climate change might have increased the general awareness for the need of new institutional arrangements apart from the state and the growth dynamic of the market, but the impact on the management of water is small. It is difficult to get people involved with water issues, as the system is in a way 'invisible' and the long time horizon connected as well as the slow results are demotivating self-organisation. People more likely understand and are interested in **tangible topics** like urban food production, green spaces maintenance or solar energy installations that can work as an 'entrance door' into the topic of sustainability and self-organisation.

One key issue in water transition identified by Yvette Bettini et al. (2014, 8) is the access to **information**, knowledge and expertise. From this perspective and the research presented here, it can be concluded that local governments, administrations, and water businesses hold the strings to invite citizens and other stakeholders to participate. Information can likewise be used

to mislead decision-makers and the public, giving experts a powerful position. Transparency, proper information, and favourable institutional frames are necessary to bring people together and reach an interested public with water issues. Self-organisation and participation is, due to the complexity of the drinking water system, not likely to emerge from the bottom but can be encouraged from the top. In a **supportive political environment**, new institutional arrangements could add value.

As discussed in chapter 2, civil society **participation and self-organisation** must be appraised separately. Participation is often misunderstood by local authorities. The option of consumers to monitor their own water use and get information about water quality should not be called participation. Nevertheless, civil society can put pressure on decision-makers through actions emerging from collective awareness. A general citizens' awareness for environmental issues, not necessarily focused on water, is still expedient for the water system. Consumption patterns and habits concerning water and energy use, food production, waste disposal or transportation preferences can be influenced by this general awareness. Citizens with a higher environmental consciousness expect their local government to act more sustainable. This influences elections and investment priorities. As discussed before, the water system is interwoven with many resource systems and thus gains from a generally sustainable resource management. Corruption and/or ignorance by politicians as well as by citizens act in the opposite way.

One aspect frequently underlined in the research was the diversity of cities and the need for individualised solutions. A holistic or **integrated approach** is important for the water system, as water resource problems implicate the involvement of ecological, economic, technical, social, and legal sides. Urban water systems are moreover connected with riverbed management and rural ecosystems for example. These factors can be established quite differently in the cities. Water utility providers have to guarantee for quality standards. Often, different actors (e. g. other departments in the city administration or of other locations) monitor for instance groundwater renewal rates or are responsible for water protection areas. Integrated water management has been intensely researched and evaluated. Numerous approaches exist and applicability appears to be difficult, at least for some standard approaches (Asit K. Biswas 2004; Medema, McIntosh, and Jeffrey 2008). An individualised approach, integrating the different aspects and spatial dimensions, and the specifics of the region, seems necessary for sustainable water management. Oliver M. Brandes (2005) postulates the need for an "institutional shift towards ecosystem-based water allocation and management that promotes innovative urban water management and fundamentally embraces conservation and demand management." His research shows that new, adaptable institutional arrangements that can handle these new requirements need to be formed.

Water is already assessed as a **commodity**[27], referring to water resources being subject to market prices. There is a consensus amongst the interviewees that drinking water should have an appropriate price. Otherwise, users will not value it and water use will not be sustainable. In addition, the treatment of water resources to meet drinking water quality standards, the distribution via aqueducts and the treatment of sewage water create costs. In an extreme scenario, where water is viewed as an economic good only, lower classes might not be able to pay water bills and are cut off the drinking water supply. Among other things, no access to clean water is a serious health risk. At the same time, the agreement that water should be a **human right** is very high. Something being a human right would exclude the option of being an economic good. Theoretically, commodification can be explained by the 'tragedy of the commons' (cf. chapter 2). It puts an economic value on an ecological resource, thus internalising the costs of using it. In this logic, a resource being valued correctly can be protected. Hubert H. Savenije (2002) argues that water is no normal economic good due to its special characteristics. Water is essential for life, economy, and environment, it is scarce, it cannot be transported well in larger quantities,

[27] Privatisation commonly relates to water infrastructure, commodification to water resources.

and it is non-substitutable. Thus, water is not freely tradable. Moreover water is complex, meaning it is a public good, bound to one location or system with high production and transaction costs for re-allocation. The water market is not homogeneous (the willingness to pay of different user groups like industry, agriculture or domestic users is very different), water markets tend to fail—leading to natural monopolies, and water has a high merit value. He concludes that only within the urban water supply sub-sector pricing is useful, but not on a larger scale. Adrian Walsh (2011, 90) discusses the “moral permissibility of commodifying water” and considers objections against it. We cannot lead a detailed discussion on the topic of the human right of water contra the commodification of water here, but we like to point out the paradox described, probably being impossible to dissolve as water is a unique resource.

7. Institutional Diversity

7.1 Comparison of the resource systems

In the preceding chapters on energy, green spaces and water the three urban resource systems were examined separately by answering the six research questions on the *transition observed*, *self-organisation*, *actors and factors*, *lessons learned*, *norm adoption*, and *local decision-making*. Preconditions and status of the transition differ between these resource systems and between the regions as well. Thus, the emergence of new institutional arrangements affects these resource systems to a different extent and in different ways. In this section, a short comparison of the resource systems will be presented. It is structured alongside these six research questions.

Scope rules, concerning the basic issues and time horizons, are the first rule set to be inquired. The energy system is generally perceived as the most important resource system for sustainability enhancement. Clean energy and public transport are the central leverages for the socio-ecological transition of the cities. For example, particulate matter reductions through alternative mobility concepts as well as renewable energies have been discussed intensely over the last years. This shows also in the questionnaire, where the government sector rated public transport as most important aspect for defining a future strategy on sustainability in the cities. Civil society representatives in general find diverse aspects—like climate change, clean energy, citizens' consumption behaviour, production patterns of local enterprises, or the management of land resources and green spaces—more relevant than business and government respondents do. However, all groups agree that these aspects are highly important. There are in general differences between the regions. Climate change and clean energy are assessed as less important in Eastern Europe, where 'less abstract' issues—like the management of local land and water resources, education and labour markets—are perceived as more relevant. The Northern and Western European regions seem to be a step ahead in many issues. Social objectives for sustainability most frequently named in the North were 'values and lifestyle' issues, such as more free time, respect of public goods, healthiness, and awareness for sustainability matters. 'Empowerment'—such as participation of citizens and 3rd sector in decision processes, encouragement of small entrepreneurship and the strengthening of the city`s autonomy—we frequently named in the East. 'Social care and integration' seems to be an important topic in the South and West. Examples are inter-generational fairness, social justice, public service accessibility, and equal conditions of participation. 'Youth employment' is furthermore an important issue in Southern Europe and 'affordable housing' in the West. The roles of social and ecological aspects are considered equally important. Even if sustainability issues are perceived differently depending on sector and region, they are important for all respondents. There is a common understanding on sustainability transition across all resource systems, sectors, and regions.

Information rules, affecting the level of information available to the different actors, are basic to self-organisation as a transition driver. Collaboration between government and civil society is generally poor, and since there is not much cooperation, there as well are only few conflicts. Still there are visible cases with good cooperation. The real level of cooperation is hard to assess, but participation is often misunderstood as the obtaining of acceptance and the assessment depends on the actor's view. Government actors on average consider the degree of cooperation higher than civil society respondents do.

Civil society groups are in general not common in the cities, especially not in the water and energy system. Nevertheless, in the energy system sometimes NGOs show medium leadership concerning energy efficiency and the development of renewable energy. There are various civil society activities in green spaces, differing in size and responsibilities. The green spaces sys-

tem is the only urban resource system observed where self-organisation has even become a transition driver in some cities.

Payoff rules concern the possible returns and motivation for the diverse actors. The **actors and factors** driving the transition of the local resource systems are quite different. Concerning the energy consumption, retrofitting of buildings had the strongest influence on the decrease in the past ten years. Behaviour and cultural habits influence both, the energy and water consumption. Education and life style factors strongly determine energy and water consumption, which is difficult to observe on the individual level—like the energy use for single electronic devices or for the heating of water for a bath—apart from the monitoring of the overall consumption of a household or building through water or energy meters. Thus, awareness is needed to reduce energy and water consumption. The price has stronger influence on water consumption and plays no big role on energy consumption, where also rebound effects (cf. chapter 4) play a role. Possibly the potential to save water is still higher than the potential to save energy, or habits of use could be changed faster—also as the replacement of equipment with a low energy-efficiency would demand higher investment—or more effectively there by rising costs. It is in some way more visible, if water runs out of the tap without being used than how much energy is lost by stand-by devices and there are no rebound effects. Energy and water poverty are very relevant phenomena in this context. Some social groups are not able to pay rising prices for water and energy. Sustainability transition, for example by introducing renewable energy production and new water technologies, is expected to create extra costs for the users. Economically weak people thus fear to be excluded from or harmed by the use of these 'clean' resources. Thus, sustainability can become a segregation attribute or a privilege of wealthier groups. A major issue for social sustainability in connection with the energy system therefore is energy poverty. A sincere effect is visible in Greece, where due to current socio-economic crisis the energy consumption patterns changed drastically. Illegal wood clearing and the burning of cheap and low quality oil created rising pollution and CO2 emissions.

Generally, there have been financial capabilities for the existence, maintenance, and use of green spaces, but in a scenario with ongoing urbanisation, further financial gaps of the municipalities, and privatisation, existing green spaces could be poorer maintained, reduced, or privatised, meaning that it could become a privilege of solvent citizens to use parks. To prevent these tendencies, an active civil society has started self-organising in this resource system (cf. chapter 5).

In some aspects, the three urban systems are likely to compete for scarce resources. The local stock of unbuilt land is one factor potentially relevant for all the three of them. Anyway, it has so far been no constraint for the availability of green spaces or the development of renewable energy in the last ten years. Conflicts over water-use concerning green spaces irrigation in times of draught have come up regularly. Grey water used for irrigation instead of drinkable water could be one solution to this conflict.

The national regulatory framework is very important for the development of renewable energies in the region. In contrast to that green spaces system are mostly governed on the local level. Local regulations tend to be important for both, renewable energy and green spaces.

In the energy and the green spaces system, many diverse actors play important roles. These are for example the mayor and politicians of the majority, government administration, and environmental NGOs. In the energy system universities and the utility provider as well take an important position. In contrast, in the water system only the two main actors water provider and government administration were named, whereas other potential actors play a minor role. The levels of participation and self-organisation are highest in green spaces management and some activities can be observed in the energy system. Thus, the assumption, that diverse actors could be obstructing self-organisation cannot be approved. More likely, technological characteristics of the urban resource system influence both, the number of actors and the level of self-

organisation. Expensive and complex technology with a long economic lifetime makes self-organisation unlikely—like in the water system—and limits the number of actors, whereas tangible, easily convertible topics that create manageable costs—like urban gardening—invite numerous actors to contribute. Renewable energy production takes an inclined position, as diverse actors are involved, but only few self-organised arrangements can be observed.

Green spaces systems are highly influenced by social movements that arise around the demands for emancipative and democratic participation and self-organisation in urban areas, like "right to the city" or "transition towns" (cf. chapter 1.2). The movement demands access to urban decision-making for several topics, including green spaces, housing, and sustainable economy, through creative forms of protest and disobedience like guerrilla gardening, squatting, alternative forms of close economy, etc. This can be seen as an emancipative formation of an active civil society that is interested in actively seizing opportunities to get involved in urban agendas—if only for subcultural niches of a rather politically leftist culture.

Position rules determine authorised actors, related to their reputation. The **lessons learned and reputations gained** from leadership in the management of the local resource systems are quite different in the three systems, but some groups are relevant for all. The political majority and the mayor are important leaders in all three systems. More or evenly important are utility providers for water and energy. In green spaces and energy management, NGOs, cooperatives, and civil society associations play an important role, too. In the water system, they could not build up some reputation. Local universities are quite important in the energy system, but—surprisingly—not much in water. Being very technical and facing many challenges, one could imagine research being of more importance to the water system, but perhaps some innovative challenges (or funding) for scientific inquiry. In green spaces management, local community groups play a major role compared to the other resource systems. Only minor difficulties can be observed for the actors in defining a joint strategy in green spaces and water management. Non-local factors and missing local capacities are yet a problem in the energy system.

The EU is perceived as an important external leader for water management, but not as the proper policy level for the energy system and green spaces. It can only be speculated why this assessment was made by many respondents. Possibly, the discussion about the privatisation of resources plays a role as well as the high dependence of many cities on EU funding in the water systems' modernisation. Privatisation rates are very different in the resource systems. About 40 % of the interviewed (local) energy providers are private or partially private companies. About 15 % of the interviewees in the water questionnaire stated that water had been or would be privatised within the last or next ten years. In green spaces, the quantitative data does not reveal a privatisation trend, whereas the qualitative data sheds light on examples of privatisation from several cities.

The question for transitional socio-ecological **norm-adoption** towards trust and cooperation concerns *boundary rules* defining entrance and exit of actors to the system.

1. The boundaries of the local water and green spaces systems are clear-cut and well understood. This does not apply to the energy system, where e.g. the share of primary energy supplied by local actors is not well known and no subject to local regulation.
2. The rights of local actors to make their own rules concerning all resource systems are rather *not* recognised by the higher levels of government.
3. Most actors affected by the local resource system are *not* authorised to participate in making and modifying the system's rules. This takes effect for all resource systems.
4. Non-local actors do not undermine local governance in the water and the green spaces systems, but they do undermine the energy system's governance.
5. The water system and urban green spaces are relatively autonomous subunits of larger resource systems. The energy system is in general not such autonomous subunit.

6. In general reputable persons or agencies monitor the contribution and benefit levels of actors involved in the local energy and water systems, but still not very intensely on average. Monitoring of the quality, use, and resource characteristics are generally good, yet better in the water system than for green spaces.
7. There are different prices or cross-subsidies amongst water and energy users, for example for households, administration, and industry.
8. Increasing sanctions for violations of the local resource regimes—starting very low but becoming stronger if an actor repeatedly violates a rule—exist for the water system and by tendency also for the energy and green spaces systems.
9. Rapid, low-cost local arenas for resolving conflicts among actors in the local resource system exist for water and green spaces, but do not exist for energy related conflicts.

Aggregation rules define the actors' degree of communication and depend on the level of local **decision-making autonomy**. How far local decision-making matters in socio-ecological transition processes, depends on the resource system observed. In green spaces, the local level is perceived as best suited for governing the resource system. For the urban water system, it is the local as well as the subnational level. In the energy system, the national level seems most appropriate. In green spaces and water management, the local government has high autonomy. In the energy system's governance, the local government is important but severely constrained by its mandate and human and financial capacities.

7.2 Delegated power and citizen control

Regarding *choice rules* it depends on the system's characteristics to what extend citizens have equal access to the governance of urban resource systems—in terms of delegated power and citizen control. Institutional diversification in the sense of an increasing third sector of self-organisation and citizens' participation grows with the tangibility and clarity of the subject.

In the energy system, the main topic is the decentralisation of energy production. New technology must be efficient, but no longer needs to be large-scale and centralised. This technological transition entails an institutional transition. Cooperative, decentralised, and small-scale organisational forms should be further supported and developed. Nevertheless, the urban spatial limitation makes the energy system's size larger than the urban expansion of one city, since for instance wind power or bio digesters need considerable space and are complex to install. Thus, an energy transition cannot be related alone to the urban system. Cities need to connect and collaborate at least with neighbouring rural regions—with larger spaces for energy production—to cover their energy demand. In other words, an urban-rural linkage is needed. Since the steering of the energy system is complex, a certain level of centrality is required. Smart grids and virtual power plants help to synchronise production of and demand for energy. Citizen control and delegated power can be complementary in this resource system. Still, the infrastructure needed for energy supply requires a certain amount of centralised control.

The urban green spaces system serves as a good example for emerging institutional arrangements based on self-organisation and citizen control. The high tangibility and the strong local context support citizen involvement. Projects can be realised within a relatively short time-horizon, without complex technological requirements and with low financial commitment. Local autonomy is essentially given, and the cities can create proper legal frameworks. Delegated power is not as important in this resource system, as citizens could make many operational decisions self-organised, as long as the legal framework is allowing them to do so and the quality of the space is retained. Nevertheless, the municipalities should still assume their responsibility, and privatisation and enclosure should be avoided. The related topic of *boundary rules* is quite visible here, as entrance to and the size of a group play a major role for the possibility to self-organise on the local level.

In the example of the urban water system, the impact of complex technology, long time horizons of investments and the system's indivisibility lead to strong technological and institutional constraints. Citizens value 'social aspects' of drinking water supply—like affordability and access—very high, but mostly lack the ability and scope to participate in planning processes. Thus, the governance of the resource system is typically delegated to the local, national, or European representatives, and citizen control plays a minor role. Nevertheless, citizens want their representatives to act in accordance to their needs and use their influence through public opinion formation. This probably explains the strength of the first European citizen Initiative, which was directed against the privatisation of water utilities that would have severely constrained the citizen control on this resource system.

7.3 The Role of institutional arrangements in socio ecological transition

The answer for our initial research question is a complex one and has to consider the variety of the different resource systems. Our empirical inquiry and our conducted interviews show that there are individual traits and differences in the several countries and cities as well as explicit convergences. However, a central role for changing institutional arrangements lies in degrees of local autonomy, coherent legal frameworks, and activities of civil society.

The energy system is affected especially by the degree of local autonomy and the influence of other governmental levels, like regional, national, or European governments. In the process of a socio-ecological transition, the spatial attributes of the resource systems are changing as well. This means that another dimension of complexity lies in the spatial recoupling of energy production and consumption. For this step a shift in regional or national decision-making, towards local decision-making autonomy is necessary, since local energy production has to be installed, maintained, and handled by the local users. Therefore, a central point to support socio-ecological transitions towards sustainability in the energy sector lies in the empowerment of the local level, directly influenced by the resource system. In the progress of norm adaption, several actors from different cities have stated that the most productive way to achieve this lies in legal frameworks that make certain sustainability standards mandatory but allow the local level the individual implementation. These frames and rules have to *enable* people and politics alike, rather than imply punitive measures. High levels of national administrative centralisation interfere with the possibilities of such an approach and need to be considered in coherent legislations. In addition, several actors stated that the sole legislative power for sustainability issues should lie with the European Commission and thus relieve the national levels, especially concerning emissions and legal standards. This also affects national decision-making in energy questions like in Germany or France and has to be restructured accordingly. In the end, the overall framework has to be open for participation and self-organising capabilities, since decisions come from and affect the local level. If institutionalised participatory processes in common political proceedings are anchored, the possibility to take control over issues in close vicinity is tangible. This also applies, to alternatives *outside* of these common political structures; both under the premise that sustainability criteria are met.

The green spaces sector is the most vivid example of an active civil society and attempts to introduce alternative institutional arrangements. The approach to self-organise local urban green spaces for a manifold use in recreational aspects, to increase biodiversity, or producing food, is growing in several European cities. A reason is the close relationship this movement shares with a broader politically motivated movement about urban social problems. Issues addressed by this (heterogeneous) movement are perceived especially urgent by a younger generation. The dynamics of social conflicts and conflicts evolving around political rights in taking part in decision processes that relate to urban spaces are considerable driving forces. However, this does not come without considerable potential for conflicts. In general the questions, "how do we

want to live?", "in what kind of city do we want to live?" are deeply connected, and one major factor for civil activism. For the question about the role that new institutional arrangements can play, the insights are fruitful. The example of green spaces indicates that one chance lies in an emancipatory aspect of civil society to create an urban space compatible with diverse aspects of social and ecological sustainability. This view is tempting, since our assumption has been from the beginning that any socio-ecological transition is a movement that concerns society as a whole.

The urban water system is an individual and interesting case that shows distinct differences to the energy systems. Here, the complexity of the resource system shows itself in several aspects. In contrast to the energy system, nearly no cooperatives were found in our empirical research. This can be traced to the diverse features that influence the face of the resource system. It is sensitive to biological, technological, ecological, and economic aspects and it is an indivisible natural monopoly; all of which make a participatory or self-organised approach difficult. To be organised, for example in a cooperative form, requires substantial understandings of the resource system—expert knowledge. Empirically we find this in the fact that we could not find any cooperative forms dealing with urban drinking water. However, the common approach lies in city owned public utility providers that are socialised and assemble the necessary experts' knowledge. Civil society can participate in decisions on the resource system to an extent that does not need in-depth knowledge of the resource system. For example was the citizens' response to initiatives to privatise the European water suppliers overwhelming. In addition, self-organisation does exist when it comes to the preservation of natural water basins like lakes or rivers. However, our research only focused on human-made water infrastructure. Concerning infrastructure another factor becomes visible. Water systems are organised in long timespans: concession rights easily last 70 years. While this factor also hinders the possibility to participate or to self-organise in the resource system, it provides a long-term planning horizon with adequate room for long time strategies for sustainable developments. Where complex in-depth participation is nearly impossible, the integration of citizenry must remain on a more superficial level and concern the local handling of the water suppliers. However, a critical awareness of the importance of the resource system is present and evolving.

To conclude our research at this point: new institutional arrangements do play a significant role for socio-ecological transitions. However, their part in different resource systems has to be evaluated separately. The individual features of a resource system have different results on the reach of new these new forms. An in-depth evaluation of the distinct traits of these systems has to consider the several unique dimensions that are entangled with the structural aspects of the resources as well as with the degree, civil society can be and is informed about. Where a socio-ecological transition heavily relies on expert knowledge and professionalism, the interventions of civil society face difficult hindrances. However, this must not hide the fact that professionalism and expertism can be misused to restrict access to influential positions in the resource system.

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Project Information

Welfare, Wealth and Work for Europe

A European research consortium is working on the analytical foundations for a socio-ecological transition

Abstract

Europe needs change. The financial crisis has exposed long-neglected deficiencies in the present growth path, most visibly in the areas of unemployment and public debt. At the same time, Europe has to cope with new challenges, ranging from globalisation and demographic shifts to new technologies and ecological challenges. Under the title of Welfare, Wealth and Work for Europe – WWWforEurope – a European research consortium is laying the analytical foundation for a new development strategy that will enable a socio-ecological transition to high levels of employment, social inclusion, gender equity and environmental sustainability. The four-year research project within the 7th Framework Programme funded by the European Commission was launched in April 2012. The consortium brings together researchers from 34 scientific institutions in 12 European countries and is coordinated by the Austrian Institute of Economic Research (WIFO). The project coordinator is Karl Aiginger, director of WIFO.

For details on WWWforEurope see: www.foreurope.eu

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