

Cities in Socio-Ecological Transition: The Transformative Role of Urban Commons

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"Cities are where the opportunities and threats to sustainable development come together" (European Commission 2014).

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. What is at stake here is the role of common-pool resources in the urban sustainability transition. This paper provides key results of an EU wide research project (Thomas Sauer, Susanne Elsen, and Cristina Garzillo 2016) concerning the question raised: "For which urban spaces and resources can commons be a viable alternative governance model?" Yet many field studies could find local groups of users managing common-pool resources cooperatively in rural or maritime areas. But what kind common-pool resources (and services) could be conceived as genuinely "urban commons"? In urban contexts 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 organizations intervening into the management of water or other ecological resource systems, or non-profit organizations managing urban farming initiatives. Hence, does it make sense to consider these resource systems - energy, green spaces, water - as "urban commons"? We selected one hybrid (energy) and two natural resource systems (green spaces and water) for our inquiry into the role of the third sector in these sustainability transitions (Ralf Schüle 2007; Michael McGinnis and Elinor Ostrom 2010; Oran R. Young 2012).

Considering the urban energy systems, we assume that the decarbonisation of the energy system could have significant spatial implications. Such kind of energy transition in urban areas, decentralising the production of renewable energy as well, could reunite 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 recoupling of energy transformation and energy consumption. If the proportion 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 recoupling of energy transformation and energy consumption on the local level could be an opportunity to increase the role of non-profit activities in the third sector. If new actors were to appear in this civil society sector, this could be seen as a Great Transformation underway (Karl Polanyi 1944; WBGU 2011). 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': i.e. 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).

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 castle-gardens for the public. Later, the idea of urban allotment gardens arose out of serious food supply problems during the rapid urbanisation processes as well as at war times in Europe and the US. Nowadays we find a worldwide movement for urban agriculture, in countries of different level of market income all the like (Elke Krasny 2012; Stephan Barthel, John Parker, and Henrik Ernstson 2015).

Access to clean drinking water plays a key role in any human settlement decisions, especially regarding urbanisation processes (Elinor Ostrom, Roger B. Parks, and Gordon P. Whitaker 1978; 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). 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 (Elinor Ostrom 1990). Only in some research on common-pool resources is water already considered as urban commons (Geeta Lakshmi 2011). Despite this, at least since the European Citizen Initiative, water could also be considered an urban common-pool resource (Ostrom, Parks, and Whitaker 1978; European Environment Agency 2014; Louisa 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, and in this sense they are really services of general economic interest.

In a first step an institutional approach for analysing for sustainability transitions analysis will be developed. The hope is to contribute to a better understanding of such transitions. Sustainability transition is defined here as the pursued process of an accelerated changeover towards strong sustainability and therefore goes beyond incremental sustainable development. The aim is to develop an approach enabling the analysis and understanding of the institutional dynamics of such transitions in whichever direction they are heading. 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 (Tim Jackson 2009). This might be a short-sighted view if these market instruments do not abandon striving for economic growth and respect the planetary boundaries of the Anthropocene instead (Johan Rockström et al. 2009). 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 significant spill-over effects (externalities) to other resource systems and the entire economic and social system as well; we therefore also 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, and (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 inevitably directs the analytical focus on the determinants of these harvesting rules. These rules are the key interfaces between societal and ecological systems. 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 the same time.

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

For the development of such a framework or model of socio-ecological transition, that is capable of assessing the transformative potential of diverse institutional settings concerning their sustainability characteristics, an outstanding starting point exists: this is the *tragedy of the commons* (Garrett Hardin 1968), 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 a metaphor for 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 the ecological systems surrounding us. Solving 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 (Ostrom 1990; Amy R. Poteete, Marco A. Janssen, and Elinor Ostrom 2010; Thomas Sauer 2012). 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 reselected 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.

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).

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 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 a protest movement against political or administrative action. Self-organisation does not necessarily have to follow the ‘rules of the game’, namely be organised via established formal institutions; activities can instead happen in a more spontaneous, self-managed way.

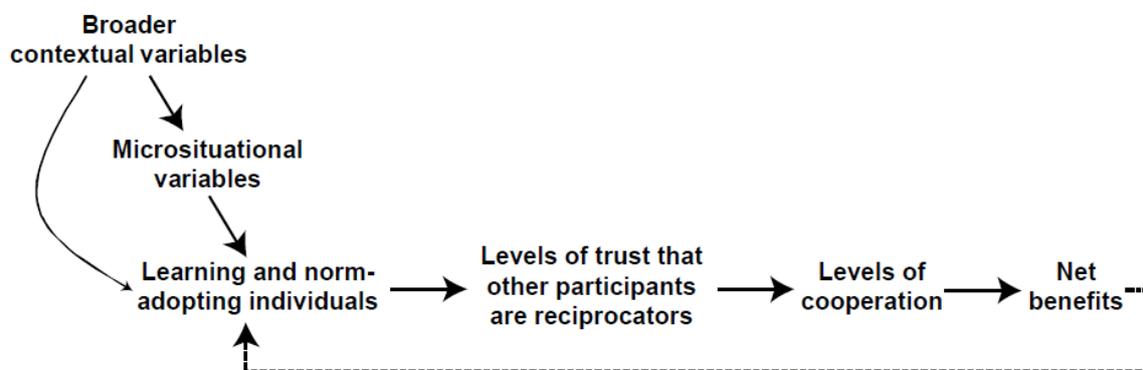
Another perspective might be introduced by the seminal Ladder of Citizen Participation of Sherry R. Arnstein (1969). It is interesting, how Arnstein divided the degrees of citizen participation into three major categories. *Nonparticipation*, characterised by manipulation and therapy, where the citizens 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” (Arnstein 1969, 217). In 1969, as Sherry Arnstein published her article, as “have-not citizens” she 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 in this research, it might be an issue whether delegated power and citizen control are really a sequence of increasing citizen power, or equally 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 (Anna Davies and Julie Simon 2013). Maybe the newer spectra of public participation are not as judgemental as the seminal Arnstein ladder, but they miss her reasonable distinction between citizen control and delegated power.

Hence, we develop here an extended socio-ecological system (SES) approach to the ongoing sustainability debate on sustainability transition theory, by focusing 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 or by state laws or are self-organising their interactions (Ostrom 1990). On a bottom level, our interest is focused 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” (Elinor Ostrom 2005, 55-56), where the social exchange takes place and is guided by three major sets of variables: institutions and rules, characteristics of the community, and attributes of the physical environment (Ostrom 2005, 15). Mainly by analysing action arenas, the sets of rules, community attributes, and the several distinct rule sets that determine positions and 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.

Figure 1: Effects on cooperation of micro-situational and socio-ecological context variables



Source: Poteete, Janssen, and Ostrom 2010, 227

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 1). 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.

Norms Ruling Socio-Ecological Systems

In our research, we focus on the interactions of the three different dimensions of resource system governance. Rules and 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. *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 3-5 presents the influence of the seven different sets 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 context variables. On the basis of Ostrom (2005, 186–215) and Poteete, Janssen, and Ostrom (2010, 215–45) an own approach was developed in Thomas Sauer (2016) which is summarised in Table 1.

Table 1: 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)

Regarding these interactions between rules as exogenous variables directly affecting the elements of an action situation and the micro-situational and broader socio-ecological context variables the following synthesis could be derived:

(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 also 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). So, we should investigate here the focus and the time horizon of a common understanding of sustainability transitions.

(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 and which kinds of actors may appear accordingly. 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 collaboration 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 hand, the water system in dense urban agglomerations does need high and long-term investments in fixed capital – probably hard to handle by self-organised interventions of civil society.
2. The information made available about the average contributions (S8) of all resource users appears 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), such 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.

(4) Position rules are connecting participants and authorised actions in the action situation under consideration (Ostrom 2005, 193–194). 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: “[...] [K]nowing 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 the sense of Arnstein’s ladder (Arnstein 1969) or the TEPsIE spectrum of public participation (Davies and Simon 2013, 13). 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)

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 on what to plant, how to nurture, how to distribute the harvest. This could be an example of full citizen control in the sense of Arnstein’s ladder (Arnstein 1969). On the other end of the scale we have the urban water systems, where one-time investments in the fixed infrastructure determine the form of water provision for perhaps 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 is 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 now many options how to organise the decision rules in the energy sector. 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.

Building on this synthesis of the interactions between the set of rules and the two layers of context variables we could derive the research questions of our investigation:

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?

Departing from this view on the socio-ecological structure of the field, its institutional settings, and the interactions between its elements, the research follows an abductive understanding rather than a deductive or inductive approach: this means that the research goal lies in confronting the assumptions in the field with empirical evidence to create a picture of the empirical reality. These assumptions narrow down the research perspective and allow a focus on the elements that are having the greatest influence.

2. Methods and research design

This study relies on triangulation (Alan Bryman and Emma Bell, 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 getting a fix on the research objective from several positions (Uwe Flick 2011, 179-195). 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 realised by 'adding' the one to the other, so 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, undertaken in the field phase, supplemented with secondary data. The qualitative data analysis bases on primary data in the form of expert interviews. The research methods used have to be deducted from the methodology of the study to fit the research interest and the research questions accordingly and are described in detail by Yannick Kalff and Thomas Sauer (2016).

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. Thus, the research design here provides the insights into the transition processes of three single resource systems and above that for differential diagnosis of certain individual and contextualised aspects. Although Poteete, Janssen, and Ostrom (2010) for example base their inquiry 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. Forty 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.

The sample was generated in two steps. In a first approach, forty cities in fourteen countries were selected. 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 results in about 14 countries for selection. 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, who had a special overview of the city's relations and relevant characters.

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 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). Thus the sampling process is not randomised nor is it comparable to a theoretical sampling that emerges from the research process (e.g. in grounded theory).

The empirical data was mainly collected through expert interviews and questionnaires in 40 European cities (cf. for the details of this selection process Kalff and Sauer 2016). 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 2-10). 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 a 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)

3. Discussion of the findings

3.1 The urban energy system

Starting with the state of transition of urban energy systems shows the different local features of the cities but also the underlying frames of thought visible in the definitions of sustainability (the entire results of the research on the urban energy system is presented by Yannick Kalff 2016). Within the European 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 indicates the necessity to transform governance structures as well. Sustainability in governmental administration and governance structures displays itself in occurring challenges. The transition processes face 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 multifaceted 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 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 does not refer 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* (in the sense of Arnstein's citizen control) that are formed by citizens to foster an individualised but still collective form of energy transition. Such parallel structures do not exist in any surveyed city.

Especially actors from the United Kingdom state that in terms of decision autonomy some cities are initiating their 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 in 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 give responsibility to the individual. Against rigid sets of rules, 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.* However, this approach can hinder the idea of bottom-up processes that rely on the ideas of the community. There is an inherent opposition of two different political philosophies.

Local actors advance holistic approaches to socio-ecological transitions. It has to involve a variety of resource systems, strategies for sustainability, and finally different and heterogeneous actors in the transformation process. It is important for the research to assess the involved actors and to ask for the representation of local stakeholders. This also involves 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 that provide knowledge and technical assistance or uphold a counter-discourse for sustainability issues (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. Especially the creations of networks were efficient actions to generate a drive for sustainable movements – and more broadly 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 differentiated 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 their performances as well as global aspects like economic crises.

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 jointly with a general urge to simplify bureaucratic procedures and make administrative processes more accessible on the European level. The relevance of local autonomy is visible, especially from

national governments, while on behalf of legal frameworks European directives indicate increased leadership. 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 raise 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 programmes and national states with a more generous distribution of financial resources. *Actors, most prominent in in the United Kingdom, 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 a greater scale also countries. *The problems can be seen in structurally weak countries like Greece, which 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 these CO2 reductions were entirely eradicated by the development of alternative heating. By burning crude oil in old stoves, residuals and emissions were set free – and 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 ecosystem also needs 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 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 rapidly, 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 revolves 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 beyond that to initiate their own independent programmes or co-operations on the local level, which would need structural coupling to funding channels and programmes. This also implies that the two modes of democratic 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 a vibrant public sphere on the one hand and governmental representation on the other lies a key to productive public discourse – and to changes necessary for a successful

socio-ecological 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 extensively discussed in sociology and political sciences (cf. Richard Sennett 1976, Jürgen Habermas 1989, Richard Sennett 1992). The depoliticisation of the public sphere and the expansion of the private sphere into public life are a broad diagnosis taking 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 rapidly developing political focus that addresses individual self-responsibility, and a depoliticisation of the masses by political beliefs that are ‘without any alternatives’ in an era of “post-democracy” (Colin Crouch 2004).

3.2 Green Spaces

Regarding the presentation of the results on urban green spaces (Judith Schicklinski 2016, 2017), findings from the empirical data were displayed around the six guiding research questions 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 green spaces resource system is, more than the energy and water system, determined by local factors, yet not exclusively, as the influence of European Union 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 attempts 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 cooperative forms of management of green spaces emerge*, greatly 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 have 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 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 cooperation 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 ensuring 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 to 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. However, 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, 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 taking into consideration long-term social and ecological externalities with a concomitant shift in incentives. *The persistence of the economic growth logic manifests itself in increasing numbers of sealed surfaces and continuing urban sprawl due to infrastructure and building development pressure.* Swimming against this tide 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 green spaces resource system 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 to surpass its current niche status. Most often it originates in civil society but is then also carried 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 municipalities 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.

3.3 Urban water systems

The general potential of civil society involvement in sustainable water management was considered in detail (Stephanie Barnebeck 2016) 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 lakes, streams, or seawater and the opposition to the privatisation of the water supply.* The local activities of these organisations depend on apparent local challenges.

For the 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 the 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, so 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 and investment is very narrow without considerable financial means at 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 in sustainable water management. *Water conservation cannot be contemplated without sustainable agriculture and industry.* The system is very complex. Cooperation between these stakeholders on the content and funding of water transition are thus favourable, if not necessary. The main

decision-makers of the water system and the ones concerned by these actions need to be brought *around one table* to seek solutions. The roles of the market and the state are in any event 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 of the need for 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 demotivate 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 make people interested in 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 above, 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 of 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 sustainably. This influences elections and investment priorities. As discussed before, the water system is interwoven with many resource systems and thus gains from generally sustainable resource management. Corruption and/or ignorance among politicians as well as among 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 quality standards. Often, different actors (for example 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; Wietske Medema, Brian S. McIntosh, and Paul J. 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 commodity¹, 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’. 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 not a 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, 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 reallocation.* 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 is pricing useful, but not on a larger scale. Adrian Walsh (2011) 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 wish to point out the paradox described, one which is probably impossible to resolve as water is a unique resource.

4. Conclusions

In the present paper two related questions lead the inquiry: For which urban spaces and resources can commons be a viable alternative governance model? Does it make sense to consider the resource systems - energy, green spaces, and water - as urban commons? We conclude that it indeed makes sense to consider these resource systems as potential urban commons, but that the opportunities to govern them as commons by delegated power or citizen control are depending heavily on the specific resource system’s characteristics. Complexity and scale are probably the most severe constraints of dealing with them as self-organised and democratically controlled resource systems. This particularly true with regard to the governance of the local water

¹ Privatisation commonly relates to water infrastructure, commodification to water resources.

systems: Here are the opportunities of citizen control seriously constrained by the complexity of these systems, the invisible technology, and the indivisibilities of the local aquifers as the key resource system. In some parts of Europe, particularly in the South, pollution and scarcity were perceived as the main challenges for the local water systems as in Eastern Europe the overall awareness of such problems was rather low. Despite the infrastructure of water provision was considered by the experts in Southern and Eastern Europe as weak and vulnerable, they missed the financial capabilities to change this situation. These financial constraints raise many problems in many cities. Probably this will enhance the pressure to privatise the public water utilities. On the other side the pricing of water was characterised as sensitive issue which could provoke an anti-privatisation sentiment at the local level. But, civil society actors in local water politics are in general of little importance, and, hence the public awareness for ecological problems of the water provision rather low. Over-abstraction of the local water aquifers is hard to monitor for the public, and hence difficult to sanction, while many experts did hint at current discrepancies between the legal framework and its local implementation. Furthermore, local decision-making autonomy regarding the water provision is not present in all cities. Thus, it appears to be most appropriate to deal with the local water aquifers as natural monopolies, which should be accountable to a strong and transparent public regulation.

In contrast to the water systems the options of renewing the energy system from the bottom up are not so hardly constrained by the resource system itself (which is actually a at least a planetary one, open to many technological and institutional options on the regional and local levels), but constraint by the technological path-dependency especially of the electric power network and deeply enshrined power structures, limiting the choices on the local and national level. The globally agreed decarbonisation of the energy system actually means a transition from using solar energy stored in a pre-human past as fossil fuels to using solar energy stored currently in technological new devices to safeguard a stable and secure provision of electric energy. This transition could pave the way for a spatial recoupling of the energy systems and the creation of new forms of citizen control and self-organisation on the local level. But, as our case study on this topic shows, these theoretically derived opportunities for self-organising the transition to renewable energy sources on the local level are hardly to be observed in the reality of city sample of our case study. This is true, despite most of the experts referred to similar concepts of sustainability transitions, mostly defined on the EU level. Only in Northern and Western Europe the transition to renewable energy sources is the top priority of the intended sustainability transitions. In almost all cities the experts had no clear idea of the boundaries of the local energy system, hence the idea to self-organise such system was quite uncommon to them and the civil society excluded from any decision making. Despite this low degree of civil society involvement, the local research centres and universities, where they existed, were considered as key actors driving the local socio-ecological transition of the energy system. In general the autonomy of the local decision making on the urban energy system was considered as constraint by many intervening actors. The electric energy in many cities, particularly in Eastern Europe, is provided by a traditionally centralised and fossil-fuel driven energy system beyond the urban borders, so that the decentralised provision of renewable energy from renewable for localised sources inside the urban areas appeared to be a rather far-fetched idea for many experts interviewed. In contrast to that they saw the responsibility for fostering the energy transition overwhelmingly on the EU and national government level, hence in a

more top-down process, where a constructive and self-organized citizen intervention in this process is almost marginalised.

The best example of emerging new institutional arrangements based on local self-organisation and citizen control, hence of windows of opportunities for establishing urban commons are local green spaces. Here, generally, a high degree of local autonomy is stated - very often confronted with limited financial resources of the municipality. These two factors combined with the availability of unbuilt land appear to open the door for new governance models for this resource system. Sometimes this incentive to economize public funds by means of citizen support looks like obstructing a long-term transition in the governance of this valuable resource system. Furthermore, sometimes the citizen involvement in the management of green spaces was characterized by the experts as insulated, without sufficient integration in an overall strategy of sustainability transition. Despite these qualifications, cities which are already advanced in developing a comprehensive and integrated sustainability transition strategy allow innovative experiments of their citizens with urban green spaces and scale them up, if successful. These experiments and initiatives are driven by participation and self-organisation as well as by motivated civil servants, who gained a high reputation by their long-term activism. They could be considered as change agents for local commitment and capacity, the adaption of building codes and sectoral plans. Given these preconditions, sometimes fought for, sometimes granted by benevolent local governments, it becomes easier for the citizens to get support for such initiatives and transforming civil society actors into active players. There is still much to learn from these approaches to transform urban green spaces into urban commons.

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