URBAN POLITICAL ECOLOGY

Theoretical concepts, challenges, and suggested future directions

Anna Zimmer

With 1 figure
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Summary: Political Ecology is a highly dynamic research field within geographical studies on development. Since Blaikie and Brookfield (1987) laid the foundations of the approach and formulated its first definition, the field has evolved in many different directions (among others, see Blaikie 1999). Only in recent years, however, have we seen a tendency, especially within Anglo-American geography, of applying political ecological concerns to other contexts than the traditionally rural ones: A still relatively new Urban Political Ecology has formed (Heynen et al. 2006). While it has brought into focus a whole range of new research objects, it has also used other concepts in a fruitful manner. Particularly promising is the concept of hybridity, which rejects the idea of any unnaturalness of the city. The entry point for investigations is the concept of metabolism, which allows asking classical questions of Political Ecology concerning power relations. Some theoretical and methodological challenges, however, remain for the further development of the field. Moreover, this article argues in favour of recognising diversified urban environments, of addressing the role of power relations in Urban Political Ecologies, and of including environmental imaginaries into the analysis.

Zusammenfassung: Die Politische Ökologie ist ein höchst dynamisches Forschungsfeld der geographischen Entwicklungsforschung. Seit Blaikie and Brookfield (1987) die Grundsteine des Ansatzes gelegt und eine erste Definition vorgestellt haben, ist die Politische Ökologie in viele verschiedene Richtungen weiterentwickelt worden (vgl. u.a. Blaikie 1999). Neu sind jedoch Versuche der letzten Jahre besonders durch die angelsächsische Geographie, die vormals auf den ländlichen Raum fokussierten Fragen der Politischen Ökologie auch in städtischen Kontexten zu stellen: Es hat sich eine noch junge Urban Political Ecology gebildet (Heynen et al. 2006). Während einerseits neue Themenfelder für die Analyse erschlossen werden, werden andererseits neue Konzepte fruchtbar gemacht. Besonders vielversprechend ist das Konzept der Hybridität, welches der Stadt jeglichen Mangel an Natürlichkeit abspricht. Als Eintrittspunkt in die Analyse wird der Begriff des Metabolismus gewählt, um klassische politisch-ökologische Fragen nach Machtverhältnissen zu stellen. Derzeit bestehen jedoch noch theoretische wie methodologische Herausforderungen für die Weiterentwicklung des Forschungsfeldes. Der Artikel plädiert daher dafür, die Vielfalt urbaner Umwelten anzuerkennen und die Frage von Machtverhältnissen konsequenter zu stellen. Schließlich wird angeregt, diskursive Konstruktionen von Umwelt in die Analyse einzubeziehen.

Keywords: Urban Political Ecology, hybridity, metabolism

1 Introduction

In their introduction to "In the Nature of Cities. Urban Political Ecology and the Politics of Urban Metabolism", Heynen et al. (2006, 2) state: "the urban environment is often neglected". This statement arguably applies to the majority of analyses which have been published under the label of 'Political Ecology'. Starting from investigating soil degradation in rural areas, this approach has only recently turned towards ecological problems in the city (i.a. Keil 2003; Pelling 2003; Forsyth 2004; Swyngedouw 2004; Keil 2005; Heynen 2006a; Heynen et al. 2006; Véron 2006; Flitner 2008; Myers 2008; Zimmer 2009).

This paper intends to present this turn and, at the same time, to strengthen it. First of all, Urban Political Ecology discusses new concepts next to the classical theoretical foundations of political ecology as presented by Krings (2007a), which seem quite promising. Yet more important still, the fact that more than half of the world's population lives in cities since the year 2008 (UNFPA 2007, n. pag.) calls for an analysis of these spaces from a political-ecological perspective. Excluding them further would imply that the classical questions of Political Ecology are irrelevant in cities. This, however, would be a fatal error, as this would entail ignoring a growing range of ecological problems and putting aside conflicts around the environment in which more and more people live, and which more and more people endure and shape in their everyday lives. This article therefore agrees with Keil (2003, 728): „UPE [Urban

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Political Ecology] is well overdue". Various complexes of pertaining problems and general guidelines of investigation as well as the challenges emerging out of this new focus within Political Ecology will be presented and discussed in the following.

2 Focal points within German speaking Political Ecology

The approach of Political Ecology, mainly developed by Blaikie (1985) and Blaikie and Brookfield (1987), was introduced into German speaking geography primarily by Geist (1992, 1999) and Krings (1996, 1999). The studies that were published under that label in the following period show strong actor-orientation and partly adopt a constructivist perspective (Krings 2002; Flitner 2003; Reuber 2005; Krings 2007b; Klöpper 2009; Zimmer 2010). The focus of political-ecological research by German speaking scholars is on the analysis of practices and the scope of action of different actors (Coy and Krings 1999; Krings 2002; Bohle 2007), as well as on their interests, strategies and power (Bieling and Höchtl 2006; Graefe 2006; Müller-Mahn 2006). The entry points of these investigations are either environmental change or conflicts in politicised environments (Krings and Müller 2001; Krings 2007b). A multi-scalar chain of explanation is the favourite methodological instrument to collect mostly qualitative data (Coy and Krings 1999; Müller 1999a; Krings 2007a).

Krings and Müller (2001) and Krings (2007a, 2007b) list the following research areas for Political Ecology: Soil degradation, tropical forests, biodiversity, conflicts around access to water, climate change, environmental entitlements, conflicts around protected areas, tourism, new social movements in developing countries, markets of violence, and more generally, environmental degradation, environmental conflicts, environmental protection and conflicts of livelihood strategies. The investigation of these topics has led to a differentiated picture of group specific access to nature as well as negotiation processes around entitlements (Krings and Müller 2001; Flitner 2003; Nüsser 2008). The understanding of a dialectic relationship between structure and agency thereby broadly follows Giddens' theory of structuration (Reuber 2005). Thus, specific utilisation systems that mediate between actors and their environment (Schickhoff 1999; Nüsser and Samimi 2005) are analysed with regard to their embeddedness in social relations (Bohle 2007) and economic as well as political structures (Fünfgeld 2008; Hammer 2008; Hartwig 2008). The aim is to understand the causalities that explain environmental change and conflict. Research also highlights the role of environmental discourses and the importance of meanings that struggle in different arenas for the lead in interpreting environment, environmental change and related possible solutions (Coy and Neuburger 2008; Flitner 2008).

3 Urban environmental problems in the focus of Political Ecology

Urban Political Ecology, as it has developed in Anglo-American geography over the last years, has a different focus, as well in terms of discussed topics as in its theoretical approach. First of all, it obviously addresses urban areas. As such, several studies discuss issues of water and air in urban areas (Gandy 2004; Swyngedouw 2004; Kaika 2006; Loftus 2006; Oliver 2006; Smith and Ruiters 2006; Véron 2006). Other concerns include green areas in cities, be it in the form of wooded areas (Heynen 2006a) or suburban lawns (Robbins and Sharp 2006; Robbins 2007). Other authors have worked on issues of land use in relation to urbanization processes (Myers 2008), urban environmental politics and control over the urban environment (Brownlow 2006; Keil and Boudreau 2006), risk (Pelling 2003) and environmental justice in cities (Flitner 2008; Pellow 2006). Moreover, questions of food (Heynen et al. 2006) and the metabolism of fat in cities (Marvin and Medd 2006), urban amusement parks (Darling 2006), and finally, also violent conflicts in cities (Graham 2006) have been discussed. In addition to these case studies, there are several articles that try to theorise the relationship between city and nature (Gandy 2004; Gandy 2006; Heynen et al. 2006; Swyngedouw 2006a; Swyngedouw 2006b).

Urban Political Ecology therefore already features a broad portfolio of topics that mirror the diversity of political-ecological perspectives on the city. Several more issues, from urban transportation systems, decentralized energy production, rain water harvesting, or questions of thermal insulation to consumption patterns of urban populations, etc., will be of interest in this context – the list of unexplored issues is impressive.

4 Concepts of Urban Political Ecology

Next to these thematic perspectives, however, the conceptual approach of Urban Political Ecology is of interest here.

First, Urban Political Ecology is still grounded on a more structuralist perspective as neo-marxist traditions prevail. Authors thereby broadly follow the concept of production of nature as developed by Neil Smith (1990) and David Harvey (1993). Many publications therefore include a detailed analysis of political and economic structures. Second, authors ask how the agency of nature can be taken into account – reacting thus to critics of Political Ecology who maintain that this approach has so far neglected insights from natural science (Vayda and Walters 1999; Zimmerer and Bassett 2003; Walker 2005). Third, the object of Political Ecology has shifted insofar as (next to environmental change and conflicts) researchers study situations in which no open conflicts or changes are apparent. Rather, the focus is on what is considered "normal" under current political, economical, and social conditions and thus goes unnoticed. Although Political Ecology already has the aim to provide an "engaged query of the status quo" (Müller 1999a, 430; *own translation*), scholars have had the tendency to work on those situations where conflicts are already apparent, and where criticism of the current situation has indeed been voiced, even if in the form of subaltern discourses of marginalized groups. Urban Political Ecology, on the contrary, whose representatives are located in industrialised countries and who partly engage in environmental struggles as actors (Heynen 2006b), looks mainly into issues that have not been discussed in terms of change and that have not received public attention so far.

In the following, the last two points – i.e. the agency of nature as well as the readjusted object of investigation – will be discussed, as promising theoretical concepts have been elaborated here.

4.1 A Political Ecology of hybrids and the agency of nature

At the conceptual level, Urban Political Ecology benefits from a reception of the ideas of Latour (among others 1993, 1998, 2004). This reception mirrors the development in neo-marxism more in general. While early neo-marxist thought tried to grapple with the concepts of first and second nature (Smith 1990, 55ff.) and highlighted nature's commodified dimension, more recent work has equally come to elaborate on Latour's forceful rejection of the notion of nature altogether (amongst others Castree 2003). Latour introduces the term hybrids which he defines as "mixtures (…) of nature and culture" (1993, 10). Hybrids are tangled beings, assemblages of different entities that cannot be divided in two poles (Latour 2004, 24). Looking at hybrids allows a new visibility of "matters of concern" (Latour 2004, 22ff.) which include non-humans, humans, as well as the producers of assemblages. The categories of nature and culture are for Latour nothing more but "convenient and relative reference points" (1993, 85), but no ontological entities (Zierhofer 2002, 202ff.).

While modernity has accelerated the production of hybrids – hybridisation – it contributed at the same time to the repression of this fact – purification. In it, powerful discourses present hybrids as if they belonged to one of the two poles – hybrids are "purified". At the same time, both poles are not equal; rather, the "nature"-pole is considered to be of lower value than the cultural one (Latour 1993, 10). This power-laden distinction has been elaborated further especially by Haraway (1991), and is of special interest for Political Ecology too, as will be discussed below.

The concept of hybrids applies to a variety of urban phenomena: alleys of trees, planned by city councils and planted with the help of scientific knowledge in botany; urban drinking water and waste water that are treated and distributed through pipelines only to be treated again with the help of specific bacteria after use; urban air that is polluted with different chemical compounds and necessitates specific corridors to guarantee sufficient circulation; and countless more examples. Looking for example at the provision with drinking water in Delhi shows purification strategies as water shortage is presented as an exclusive problem of water availability in the region by the city administration (for Guayaquil see the analysis of Swyngedouw 2004, 47). In contrast, questions of excessive consumption by richer parts of the city and of losses in the pipelines are hardly ever addressed. Waste water problems, too, are discussed as if the lack of fresh water in the river Yamuna was the root cause of dismal water quality, as low water volumes prevent the sanitisation of waste water through self-cleansing processes (representative of Delhi Jal Board, personal communication). Nongovernmental organizations, however, try to debate waste water in the context of urban infrastructure, i.e. (to speak as Latour) to 'purify' the hybrid waste water by moving it towards the cultural pole (CSE 2007).

The reception of the Actor-Network-Theory, which is based on LATOUR's concepts, in geographical studies cannot be described in this article for obvious reasons. In the context of our subject however, the question is relevant, how the theoretical model of hybridity has been adopted in recent discussions (BRAUN and CASTREE 1998; CASTREE and BRAUN 2001; WHATMORE 2002). It turns out that the concept of hybridity is useful to geographical research in that it allows a fresh discussion of the term 'nature', and furthermore advances the critical discussion of social constructivism, insofar as the agency of natural processes is recognised.

In the context of Political Ecology, further central questions need to be addressed, first of all those specified by ZIERHOFER (2002): These are asking for power relations, which are expressed in the abovementioned process of 'purification'. ZIERHOFER, in discussing the discursive dichotomy of nature vs. culture, speaks of it as the "caste system of modernity" (2002, 210; *own translation*), and a form of rule (ibid., 213). This leads to a rather strong normative standpoint, and the formulation of a postulate to develop an ecological "regime" based on the "maintenance of good relations within heterogeneous networks" (ibid., 290; *own translation*).

ROBBINS (2004, 212) sees the reception of LATOUR's work as the beginning of a trend-setting branch of Political Ecology in general. In fact, mutual enrichment is taking place, as on the one side, Political Ecology more intensively questions the concepts of nature and environment, and on the other side, the concept of hybridity is linked with questions of power and interest within human collectives.

SWYNGEDOUW moreover pushes the concept further by moving the focus of interest from hybrids as "*piece of matter*" (ZITOUNI 2004 in SWYNGEDOUW 2006a, 114) towards their processual character. He states that hybrids are formed by a variety of processes, by 'natural' such as biological, physical and chemical ones, by material, cultural and discursive practices of various actors, and by social relations between actors (SWYNGEDOUW 2004, 22). It follows that hybrids have three dimensions: a physical material one; a practical, commodified one; and a discursive, constructivist dimension (see Fig. 1). The processes belonging to these dimensions are mediated through social relations, as well as societal relationships with nature (BECKER and JAHN 2006).[1)] Social relations, according to SWYNGEDOUW (2004, 22), stand in a dialectic relation to discourses and practices; while discourses and practices are embedded in social relations, they can also, in the long term, modify and alternate them. Discourses and practices, on the one side, and non-human processes on the other, are articulated through the "caste system of modernity" – the disqualification of natural processes as less valuable. Both types of relationships are focused in German speaking Political Ecology when, e.g., DÜNCKMANN and SANDNER (2003, 78; *own translation*) speak of the "human-human-relationship" or when SCHICKHOFF (1999, 405; *own translation*) qualifies utilisation systems as "hinges between anthroposystem and ecosystem".

The processes and relations, both of human and non-human origin, which produce hybrids, are again framed by conditions that are equally dynamic even if their dynamics are only visible in longer perspectives. Ecological conditions such as climatic zones, catchment areas, geology and topography, etc., especially influence, of course, biological, chemical and physical processes. Yet economical conditions, such as the economic system and global flows of finance and goods, act upon decisions about which of these processes are investigated and influence the way they are valorised and used in the product chain. Political conditions, such as the political system of a state, regulate material practices, e.g., by interdictions, but also by offering certain services to its citizens. Similarly, discursive practices may be easily encouraged, or oppressed by the political constellations. Finally, cultural frames structure material and discursive practices by offering cognitive patterns and norms of legitimacy. Social relations and relations between society and non-humans are affected by these conditions, even if the latter have been co-produced by the former. In this way, economical and political dependencies can (over-) write social relations to a high measure. Furthermore, cultural frames are the main mediators creating an 'order' between humans and non-humans; i.e., power relations within society as well as the "caste system of modernity" referred to above.

In order to analyse practices, discourses and biological, chemical or physical processes, as well as relations and framing conditions, hybrids – as the embodiment of these – are useful entry points. Hybridisation, such as the commodification of biological processes when using non-human entities to purify water in sewage treatment plants, or the use of physical processes for nuclear or solar energy, is power-laden. Its product – the hybrids (in our case, waste water, or electricity) – benefits different actors in distinct ways. Hybrids are thus contested, and their

[1)] The problem of maintaining the term nature here, in contrast to LATOUR's rejection of it, will be elaborated on in section 8.

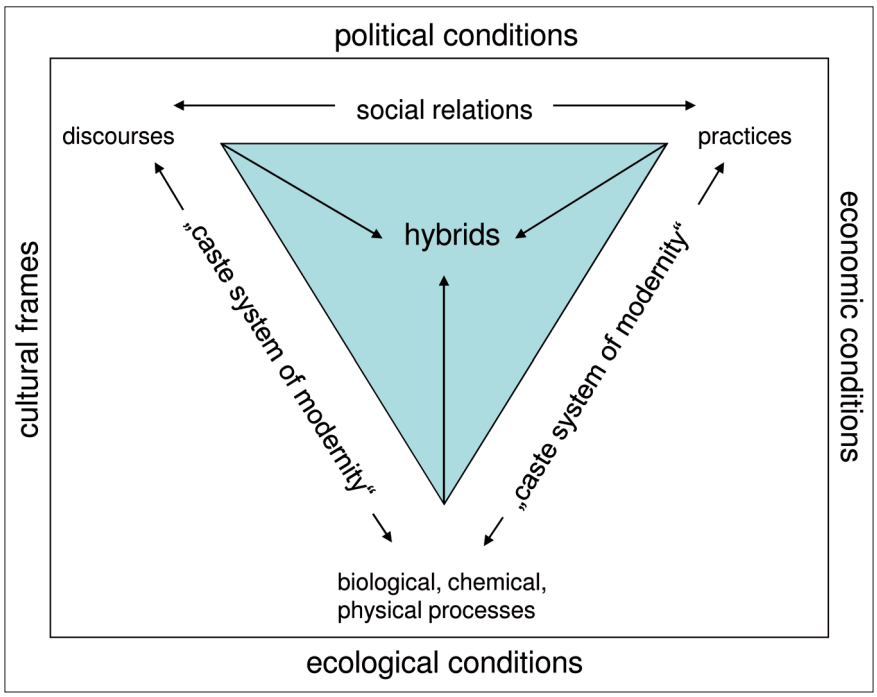

Fig. 1: The production of hybrids in the context of social relations and societal relationships with nature and broader conditions (based on Swyngedouw 2004, 22).

constant (re-)production is conflictual. In sum, looking at the hybridisation shows how spatially, temporally and culturally specific practices and discourses as well as the power relations and societal relationships with nature in which they are embedded are negotiated on a daily basis in micro-politics. Political Ecology thereby outgrows the traditional frame of environmental problems and pays attention to wider social-ecological realities – it has, in Latour's terms, "to let go of nature" (2004, 9).

Latour's concept moreover allows acknowledging the agency of non-human entities (Robbins and Sharp 2006). This question remained unsettled in Peet and Watts (1996), which provoked criticism by those who reproached Political Ecology for neglecting ecological aspects, in spite of its name (Vayda and Walters 1999; Zimmerer and Bassett 2003; Walker 2005). Latour insists on the recognition of non-humans as co-producers of our environment. This implies that hybrids may show a behaviour, which is independent of humans (e.g., water following gravity, see amongst other Bakker 2003; Jones and Macdonald 2007), and that they may influence human activity (Robbins 2007). Nature is therefore not only seen as an "*object* of differing interests" (Krings 2007a, 955; *own translation and italics*), but non-humans are recognized as the locus of an independent agency, or at least "quasi-objects" (Swyngedouw 2004, 13).

For Political Ecology, the concept of hybridity implies a reformulation of central questions: The primary interest is now to understand the power over the processes of hybridisation, to identify conflicts fought about those processes, and to analyse the power over the discourse into which hybrids are embedded. Despite recognising the role of power, the empirical analysis of negotiation processes in Urban Political Ecology could benefit from a more detailed look into actors' diversified interests and strategies. It is also of fundamental importance to determine who the winners and losers of specific forms of hybridisation or purification are. This fact points to the importance of diversity in the urban environments, which has not been acknowledged enough up to now. The political content of Urban Political Ecology is further discussed under the concept of metabolism.

4.2 A politicised metabolism

The idea of a metabolism between humans and nature is a disputed one, and the term is used in various ways (Gandy 2004). In Urban Political Ecology, metabolism is understood in a highly political sense, thus decidedly arguing against an uncritical naturalisation (Keil 2005, 643; Keil and Boudreau 2006, 43; Gandy 2004, 364). Swyngedouw (2006a, 106)

explains this intention when stating that it is his goal "to mobilise 'metabolism' and 'circulations' as socio-ecological processes that permit framing questions of the environment, and in particular, the urban environment, in ways that are radically political". The traditional meaning of metabolism should thereby be expanded in four dimensions, namely the political changes, the critique of capitalism, social factors and the agency of nature (Keil and Boudreau 2006, 43). By paying attention to social issues such as modes of regulation and patterns of consumption (Keil 2005, 643), the term metabolism is embedded into social science.

For Latour, of course, this metabolism can only be grasped as the interaction within the assemblages, within the hybrids – and not as an interaction between humans on the one hand and a unified nature on the other.

The understanding of metabolism in Urban Political Ecology is rooted in a Marxist theory that places human labour at the centre of it. Whereas eco-socialism takes the term as denoting something purely material such as the flow of energy and matter (Martínez-Alier 2006), Urban Political Ecology takes a different view. Based on Marx, metabolism in Urban Political Ecology is taken as a material or energetic exchange, but this exchange is seen as a historical product (Smith 1990, 33). This means that humans are able to control their input according to intention and interest, so that the metabolism is the result of specific "drives, desires, [and] imaginations" (Swyngedouw 2006b, 24). The aim of humans therein is the satisfaction of their respective needs. However, not all humans can reach this aim equally – the reason for this being the fact that the metabolism is mobilised and realised within existing social relations. The metabolism is designed in such a way that surplus values produced by it go to certain social classes: Élites get a bigger share of its profits (Smith 1990, 39; Heynen 2006a, 502; Swyngedouw 2006b, 27f.).

Regarding human practices and discourses, this entails that hegemonic, dominant practices and discourses overlay subaltern ones. Yet even non-human dynamics are concerned with social power relations. The questions how, by whom and to what extent certain 'natural' processes may be used for human aims are governed themselves by certain social rules and regulations, institutional practices and political-economical processes (Heynen 2006a, 509f.; Keil and Boudreau 2006, 41). The metabolism, though co-produced by humans and non-humans, is therefore dominated and mediated by humans (Swyngedouw 2006b, 25f.). In short, it is politicized. This raises the question "why (…) 'things as such' [are] produced in the way they are – and to whose potential benefit" (Kirsch and Mitchell 2004 in Swyngedouw 2006b, 29). It is first of all the actors' power, which determines what kinds of hybrids are produced, and in which way. The existence of hybrids is thus the result of historical change and political struggles; it is "malleable, indeterminate" (Gandy 2006, 64). In taking its starting point in these metabolic processes, Political Ecology gains the possibility to raise critical questions concerning these struggles, but also concerning the ownership of and power over the production process of hybrids, and to identify winners and losers. Swyngedouw (2006b, 28) underlines in this context that present day forms of metabolism are specifically capitalistic (see also Smith 1990, 47). The authors of Urban Political Ecology therefore see it as their task to contribute to a fundamental criticism of the problematic socio-ecological realities of the capitalist system. However, this is not the only normative statement that Urban Political Ecology puts forward.

5 Political concerns of Urban Political Ecology

One aim of Political Ecology has been, right from the beginning, the emancipation of subaltern groups (i.a. Blaikie and Brookfield 1987; Bryant and Bailey 1997; Peet and Watts 2004). According to Heynen et al. (2006, 2), Urban Political Ecology describes a political project intending to investigate dynamics which (re-)produce certain socio-economic conditions within the city. Asking who produces what kinds of conditions in whose interest, allows formulating claims towards a more democratic handling of environmental problems (see also Keil and Boudreau 2006, 59; Loftus 2006, 188). As becomes clear, Urban Political Ecology, too, aims at "liberation ecologies" (Peet and Watts 2004).

However, transferred to the concepts of hybridity and metabolism, this means the following: Urban Political Ecology studies not only power relations between human actors, but also hierarchies among human and non-human entities. Keil (2003, 724) is explicit in this regard when he says that "the emerging field of UPE (…) is also (…) indebted to a neo-pluralist and radical democratic politics that includes the liberation of the societal relationship with nature in the general project of the liberation of humanity". Authors reflect on the relationships existing between the marginalization of certain actors and the domination of nature by humans. Urban Political Ecology

assumes that similar to social relations, which are subject to constant negotiation processes, societal relationships with nature are also being struggled over continually (Keil and Boudreau 2006, 55). Societal relationships with nature and social relations thereby reinforce each other: On the one hand, the social standing of an actor is strengthened by performing environmental practices perceived as legitimate; on the other hand, these practices reproduce a certain interaction with nature (Robbins and Sharp 2006, 120). Societal relationships with nature are the expression of social systems, and changes in the political regime may modify society's interaction with non-humans (for the example of South Africa, see Loftus 2006, 188). A virulent question in Urban Political Ecology is, therefore, that of democratic participation in the production and governance of societal relationships with nature.

At the same time, the legitimacy of certain ways of interacting with non-humans comes under questioning. Poststructural influences on Urban Political Ecology explain this legitimacy with environmental discourses (Kaika 2006, 162) or broader societal discourses such as those about control and discipline (Oliver 2006, 96f.). Furthermore, certain practices become intelligible through institutions (in the sense of rules and norms), which lend them legitimacy. Therefore, another focus of political-ecological analyses of the city is to investigate the contested character of certain institutions and practices. However, the precise formulation of a normative aim of desirable societal relationships with nature is still not available. Swyngedouw (2006a, 118) defines it as a state of "stability or coherence of (…) social groups, places, or ecologies" or as "sustainability"; Castree and Braun (1998, 3) confine themselves to the term "survivable futures". Latour's (2001) postulated "parliament of things", which should allow new forms of representation of non-humans, has met with disregard so far. It is therefore rather difficult to know what exact propositions regarding socio-ecological realities are held within Urban Political Ecology.

6 Studying the city as manifestation of social-ecological processes

How does a Political Ecology of the city, an Urban Political Ecology, look like when taking the concepts of hybridity and metabolism into account? Transferring the idea of hybridity onto a city means that it becomes a reality, simultaneously embodying 'natural' and 'social' processes. Urban Political Ecology thereby comes close to Harvey's deliberations that cannot see anything "unnatural about New York City" (1993, 31). Instead of focussing on environmental changes and conflicts, Urban Political Ecology takes interest in cities as dynamic hybrids, constantly (re-)produced by humans and non-humans alike. This point of view allows a new problematisation (Dean 2010, 38) of the urban environment.

These deliberations considered, how could a research programme for an Urban Political Ecology look like?

- Urban Political Ecology assumes its objects to be hybrids;
- These are investigated through studying the processes of their co-production by humans and non-humans;
- These processes are socially embedded and historically specific. This implies that they are influenced by power relations which mediate between humans as well as between humans and non-humans;
- Special attention is paid to the dynamics, i.e. instabilities and discontinuities of, as well as conflicts in and around, practices, discourses and social relations as well as societal relationships with 'nature'.

7 Methodological questions

Yet, how can this research agenda be realised? Methodologically, Urban Political Ecology questions the use of the classical "chain of explanation" for the analysis of cities as perhaps no longer making sense. Especially Robbins and Sharp (2006, 119) criticise the model as "somewhat unconvincing", as the agency of nature remains unnoticed in it; furthermore, this concept is seen as unable to explain the emotional needs of the actors. Keil and Boudreau (2006, 53) add to that the introduction of various types of interactions in which local discourses are legitimised or delegitimized by those held at higher scales. Swyngedouw (1997) finally highlights the constructed and contested character of scales that blurs any attempt of following a chain of explanation (see also Dünckmann and Sandner 2003, 89).

However, uncovering the multiple dimensions of hybrids represents serious epistemological and methodological challenges. It is obvious that major steps still lie ahead of Urban Political Ecology here. This holds especially true regarding the difficult combination of constructivist approaches and Latourian analyses. This problematic will be sketched out briefly in the following.

Latour (2004, 41) is explicit in his rejection of "the impossible choice between realism and constructivism". Instead, he holds that scientists are to be seen as the (not unproblematic, but still best) representatives of non-humans, attempting to speak for them (Latour 2004, 67ff.). The methodology then needed to study hybrids is based on science studies which discuss findings about 'nature' in the context of their production (ibid., 24) – hybrids should be looked at "under the single gaze of a single discipline" (Latour 2004, 36). Quite simplistically, yet, he draws upon anthropology for assistance in devising a method of perception that does not accept the dichotomy between nature and science: according to him, non-Western cultures have "preserved the conceptual institutions, the reflexes and routines that we Westerners need" (Latour 2004, 43). This undifferentiated and superficial statement is of no use; especially so if engaging sincerely in a study of Political Ecology in non-Western countries.

While methods of the natural sciences rest on a positivist approach, Urban Political ecology analyses discourses either in a hermeneutic fashion based on constructivist approaches (Reuber and Pfaffenbach 2005, 210) or following Foucault's archaeological and genealogical methodologies (Dreyfus and Rabinow 1986). Social constructions of nature play an important role in the analysis, too (Swyngedouw 1999) – yet the constructivism is never of a sort that negates the existence of the material world. The problems in combining this approach with Latour nevertheless require urgent further elaboration.

Foucault's approach seems better suited for the analysis of hybrids (Swyngedouw 2004, 22), as he, too tries to work "beyond Structuralism and Hermeneutics" (Dreyfus and Rabinow 1986) and rejects social constructivism. His approach is based on problematisations (Lemke 1997, 341), which means scrutinising from a distance, making something look awkward and unfamiliar. Foucault distinguishes between two dimensions of this process: archaeology and genealogy.

Very briefly, archaeology can be characterised as a method to understand the nexus between knowledge and power that works towards the acceptability of certain phenomena and situations (Lemke 1997, 41ff.). Genealogy looks into the causes for the appearance of a phenomenon or situation, attempting to "restore the conditions for the appearance of a singularity born out of multiple determining elements" (Foucault 1997, 57). This entails isolating the different components through which power works such as technologies and "micro-practices" (Dreyfus and Rabinow 1986, 185; see also Füller and Marquardt 2009, 97). In a second step, the interplay between these elements is analysed (Dreyfus and Rabinow 1986, 175; ibid., 194) with regard to social function The central question here is: "what is the effect of what they are doing?" (Dreyfus and Rabinow 1986, 123).

These steps might be helpful in order to first problematise hybrids, analyse the conditions which made them acceptable, and then determining which different elements are building and maintaining this assemblage, and to what effect. Yet, Latour rejects the notion of subject (Latour 2004, 51), so important in Foucault's work. To allow a critical discussion of these issues, Urban Political Ecology should be more explicit here on the epistemological underpinnings of its analyses.

8 Challenges and conclusions

Urban Political Ecology offers a whole series of concepts which may deepen considerably our understanding of urban environments. However, there are also several challenges – besides the methodological ones discussed in section 7 – that should be responded to by future investigations in the field.

First, and especially remarkable, as seen by some authors themselves, is the scholarly concentration on cities of industrialised countries (Keil 2005, 647). In the interest of global justice, Urban Political Ecology should in no way neglect the traditional focus of Political Ecology, which lies on the so-called developing countries. It is exactly here, in the rapidly growing mega-cities, small and medium towns, and large peri-urban areas of the global 'South' that the environmental problems are aggravating dramatically, and call for scientific analysis (Pelling 2003; Swyngedouw 2004; Véron 2006; Myers 2008; Marshall et al. 2009; Zimmer 2009).

Second, political-ecological studies of cities acknowledge the fact that not all actors can mobilise metabolisms in the same way. Yet, scholars should demonstrate more clearly the diversity of societal relationships with 'nature' in order to identify winners and losers at the urban level. The cities of the global South (but not only those) offer good examples for the parallel existence of different cityscapes in different quarters, so that a plurality of Urban Political Ecolog*ies* must be stated. Quite significantly, it is exactly the few published studies on cities of the South that take into account this diversity, thereby meeting a central concern of Political Ecology. Such an approach would also enable the Political Ecology of cities in the global North to investigate group-specific questions around the usage of the environment and pertaining environmental entitlements (Leach et al. 1999).

A third neglected aspect is an actor-oriented approach, which is only rarely taken into account in Urban Political Ecology publications. It would make sense here to bear in mind earlier studies published in German that have carefully worked out this "intermediate position between structural and actor-oriented approaches" (Müller 1999b, 243; *own translation*). So far, Urban Political Ecology does not specify enough in which way the human part of the process of production of hybrid cities is shaped through interests and power relations between actors. How are the production of nature and its commodification negotiated in cities? Up to now, actors in cities have not been looked at in a differentiated way; instead cities are spoken of as units, as in "cities are developing strategies" or "the concern of cities is to avoid…" (Marvin and Medd 2006, 149).

Fourth, as Urban Political Ecology is based on Marxist scientific traditions, analyses of political economy have an important share in its investigations. Admittedly, constructivist perspectives have taken a back seat so far (Oliver 2006, 94; an exception being Kaika 2006) – due to Latour's objection to constructivism, among others. However, a systematic incorporation of "environmental imaginaries" (Peet and Watts 1996, 263) and scientific as well as other "environmental narratives" (Forsyth et al. 1998, 37) as equally real hybrids will provide new insights, and should therefore be studied more intensely (Krings 2007a).

For this reason, the research programme sketched out in chapter 6 should be extended by the following points:

- Processes that take place in a city and produce it thereby are so diverse, that the term Urban Political Ecology can only be used in the plural[2]: Urban Political Ecolog*ies*;
- Societal processes that take part in the production of hybrids should be studied with the help of existing concepts, such as entitlements, livelihoods, or vulnerability by asking for the interests, scopes of action and agendas of every particular actor and group, and for the power relations between them;
- These processes do not only bring about visible, material cities, but also different social constructions and meanings of cities, or "invisible cities" (Calvino 2007). These invisible cities are to be considered produced hybrids in need of explanation.

Finally, two major theoretical challenges remain that should be taken up by Urban Political Ecology. On the one hand, it is far from clear how the 'city' is to be defined, and what characterises the difference between city, peri-urban and rural areas. Concepts such as hybridity and metabolism of certain regions can equally be applied to rural conditions or rural-urban interlinking processes. What is therefore the specific 'urban' aspect of Urban Political Ecology? This implies that Political Ecology in general could draw profit from the theoretical development in Urban Political Ecology and also could check the concepts proposed with respect to their usefulness in rural areas.

On the other hand, Urban Political Ecology uses the term "societal relationships with nature" without acknowledging the tension between Becker and Jahn (2006, 164) and Latour (1993). The former cling to the difference between society and nature, whereas the latter takes hybrids as starting points for every investigation and rejects the term nature altogether. With other words, the relation between Social Ecology and Political Ecology remains to be clarified.

Despite these challenges, the introduction of the concepts of hybridity and metabolism and the research interest for the urban environment enrich and enlarge Political Ecology. Most importantly, the concepts permit problematising the seemingly unproblematic term 'nature', while at the same time opening seemingly 'unnatural' cities to the study of political-ecological questions. Hybridity and metabolism underline the processual and historical character of the city, and its analysis gains a dynamic perspective. Therefore, the possibility arises to uncover the process of hybridisation and the production of nature with methodological instruments proposed by Latour as well as through a 'genealogy' in Foucault's sense.

[2] An obvious exception is its use to designate the research field.

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Author

Anna Zimmer
University of Bonn
Department of Geography
Meckenheimer Allee 166
53115 Bonn
Germany
zimmera@uni-bonn.de