

From additions-and-withdrawals to environmental flows

Reframing debates in environmental sociology

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Abstract

Sociology is known for its academic debates. These debates are vehicles to accumulate understanding and interpretation of a constantly changing modern order. In environmental sociology, one of the axes of debate recently centered between Treadmill-of-Production ideas and Ecological Modernization perspectives. This paper reviews the nature of that debate in terms of controversies and commonalities, and looks into the various attempts of scholars to deal with the central controversies, sometimes with the intention to move to closure. In using recent insights from the sociology of networks and flow, we argue for the need to reframe and reformulate the nature of the discussions within environmental sociology, moving beyond some of the conventional stalemate positions.

1. Conflicting perspectives in environmental sociology

Ever since the emergence and articulation of an environmental subdiscipline within sociology in the 1970s, different schools-of-thought have entered into more and less forceful contestations on, among others, the ‘roots of the environmental crisis’, the main social dynamics that have to be held responsible for environmental deterioration and reform, the social actors and institutions involved in environmental conflicts and the economic, social and political ‘effects’ that go along with the environmental crisis. Those raised in a sociological tradition will not find this too surprising; or, alternatively, they would be surprised if environmental sociology had matured without much internal debates. Discussions and debates on conflicting interpretations are key mechanisms for accumulating knowledge, insights, understanding and theoretical profoundness in sociology. Hardly ever such debates are resolved or closed in a ‘normal science’ way: by confronting empirical evidence with distinct interpretation schemes to determine the adequacy and inadequacy of theories. More often debates are reformulated, conflicting interpretation schemes are integrated into a more

encompassing synthesis or differences get outmoded for various reasons without really being solved.

One of the more fundamental and central axes of debates in environmental sociology in the 1990s has been between what we might label a neo-Marxist Treadmill of Production¹ perspective and an ecological modernization interpretation scheme.² Various discussions, in not only environmental sociology but also far beyond that, can be understood along this axis, although they are not always labeled in such terminology. This paper deals with that controversy, but not so much in terms of right and wrong. The major argument this paper makes is that these debates are in need of reformulation, especially against the background of a rapidly changing global world order and the related emergence of new sociological theories. In order to define the new terms of debate, this paper starts with reviewing the current debate up till now and the attempts to deal with these conflicting perspectives. The second part of the paper uses insights from the sociology of networks and flows to renew the agenda for fruitful discussions in 21st century environmental sociology.

2. Treadmill-of-Production versus Ecological modernization: a review of the debate

Building strongly on a longstanding Marxist tradition in sociology, the Treadmill-of-Production emerged in the early days of environmental sociology, from the early 1970s onwards. It started to get formulated more coherently in 1980, with the classical study of Allan Schnaiberg and has since then not been removed from the theoretical agenda of environmental sociology. The late 1960s, 1970s and 1980s were a fertile period for the emergence and maturation of such a neo-Marxist perspective, with similar perspectives becoming dominant in other sociological subdisciplines, with an emerging environmental crisis moving high on the public and political agendas, and with limited answers to such crises from those in power. Ecological modernization, in contrast, has its foundation much later. Triggered by the failures of classical state responses to the environmental crisis in the early 1980 (cf. Jänicke, 1986), the crises in the conflict ridden environmental movement in West-European countries and the growth in environmental concerns in terms of sustainable development from the mid 1980s onward (cf. WCED, 1987), a new perspective was formulated. This Ecological Modernization perspective was deliberately formulated in response to - among others - the perceived inadequacy of neo-Marxist interpretation schemes and it should thus not surprise us to find severe debates between the two (cf. 2.1). But there are also - not very often cited - similarities (cf. 2.2)

2.1 Differences and controversies

In a few words the contradictions run like this. Neo-Marxist inspired scholars focus on the continuity of capitalist exploitation of nature, downplaying environmental improvements and blame the Ecological Modernization perspective for their failure to get at the “roots of the environmental crisis” (Pepper, 1984). Ecological modernizationists focus on advancements in

¹ We will label the various neo-Marxist traditions in environmental sociology all under the heading of Treadmill-of-Production (ToP), although we are aware of some differences between Schnaiberg's studies on additions and withdrawals; the second contradiction of capital idea in, among other, O'Connors' work; and the work of some western European neo-Marxist environmental sociologists such as Ted Benton and Peter Dickens.

² There have of course been other major axes of debate in 1990s environmental sociology, such as realists versus social constructivists, as well as a continuation of earlier debates such as those around population and environment.

environmental reform, balance the overemphasis on the capitalist exploitation of nature and blame neo-Marxist on their ‘old-fashioned’ ideas on social change. In looking at both positions more systematically, five major points can be raised to clarify the differences between the two schools of thought (see Table 1).³

First, Ecological Modernization studies concentrate on ‘environmental radicalism’ rather than on ‘social radicalism’. That is, in their assessments of existing patterns of change in-the-making Ecological Modernization perspectives tend to focus on the contributions to *environmental* reform, and not primarily on the effects of these changes in terms of various other criteria. ‘Small’ deviations from existing institutions and practices *can* produce substantial environmental improvements, just as ‘big’ changes in terms of a radical or fundamental reorganization of the economic relations of production *can* have limited environmental benefits (as we know from former communist countries in Europe and beyond). Ecological Modernization is first and foremost an *environmental* social theory, analyzing the environmental origins and environmental consequences of social change. Neo-Marxist scholars seem to be primarily interested in changes that involve a transformation of the capitalist or treadmill character of production and consumption. The hypothesized one-to-one relationship between the ‘relations of production’ and environmental disruption causes them to count changes as significant only if they undermine the treadmill.

In addition, the two perspectives differ in what we might call the independent variable they construct: while the one searches for ‘absolute’ sustainability (neo-Marxist), the other focuses upon ‘relative’ environmental improvements (Ecological Modernization). Criticizing Ecological Modernization Theory (EMT) for its rather naive ideas on environmental improvements, neo-Marxist scholars claim that all - or the overwhelming majority - of production and consumption practices are still governed by and to be understood in terms of treadmill logics. As such they claim that ecological, environmental or sustainability criteria will seldom, if ever, become significant, let alone dominant, in the organization and design of production and consumption. Many contemporary ecological modernization theorists will and should agree that treadmill (or economic) criteria and interests play a crucial and dominant role in organizing and designing global production and consumption, and that they will probably always remain at least as important as ecological or other criteria. But ecological modernization scholars claim that the innovation is that ecological interests and criteria are slowly but steadily catching up with economic criteria. Compared to some decades ago, environmental interests can no longer be ignored and increasingly make a difference in organising and designing production and consumption. In that sense, EMT looks at relative (but significant) changes in more environmentally sound directions, in contrast to the ‘absolute’ sustainability that neo-Marxist scholars are focusing on.

Thirdly, the two perspectives differ in their assessments of the environmental changes that have been set into motion from the late 1980s onwards: window-dressing (Treadmill of Production) versus structural changes in institutions and social practices (Ecological Modernisation). It goes without saying that empirical evidence to underpin either of the two can easily be found and constructed, and both schemes have done so. But the large variety in data sets, criteria, variables, time intervals complicates any ‘objective’ final answer or conclusion on the validity of these conflicting claims. Neo-Marxist scholars insist (and show) that they see no real, lasting environmental improvements and therefore define all environmental initiatives and institutional changes as window dressing: nothing new to report. Ecological modernisationists claim (with evidence) that an assessment of environmental transformations in terms of window-dressing seems to bypass the differences that exist between the current period of institutionalization of the environment - regardless of all the

³ Here we draw upon some earlier work. See Mol (2002).

shortcomings and limited successes - and that of the 1960s and 1970s. Below, we get back to the differences in empirical foundations and support for both theories.

Fourthly, a distinction should be made between the nature of the changes advocated by the two frameworks. As most theories in environmental sociology, and quite distinct from post-modernist interpretations, both neo-Marxist and Ecological Modernization perspectives contain analytical as well as normative, and even prescriptive dimensions. This means that they both analyze contemporary processes of social continuity and change, but also seek to contribute to the development of normative, strategic, political trajectories of transformation that ought to take place in order to turn the tide of environmental destruction. Most neo-Marxist studies display a major gap between the quite advanced and detailed theoretical analyses of the immanently destructive character of the treadmill of (global) capitalist production on the one hand, and the suggestions made for concrete trajectories towards social change, on the other. David Pepper (1984), James O'Connor (1998), Goldfrank's (1999) World-System Theory volume, and the recent special issue of the *Journal of World-Systems Research* (Kick and Jorgenson, 2003), to name but a few, put forward detailed and refined neo-Marxist analyses of the destructive pattern of the capitalist (world) economy, but rather 'meager' and utopian countervailing strategies for environmental reform. It seems to us that the strategies and trajectories for possible social and environmental change developed within neo-Marxist inspired perspectives (i) have not been improved and refined in step with their analyses of environmental disruption; (ii) are founded only marginally on existing patterns of social transformation and thus have a highly 'utopian' character. In contrast, within ecological modernization there is a closer link between the analyses of existing changes-in-the-making in the main institutions and social practices, and the design of 'realist-utopian' (cf. Giddens, 1990) trajectories for environmental reform for the near future. Best practices, niche innovations, sustainable experiments that fit - and at the same time reform - current social structures are typical for ecological modernization studies.

Fifthly and finally, a distinction can sometimes be found in the kind of environmental problems that form the object of evaluation or are used to argue for positions. We touched upon this previously in noticing that the "apocalyptic horizon of environmental reform", arguably more dominantly used in neo-Marxist inspired studies, is often only related to the so-called 'high-consequence risks' of climate change, biodiversity, and the like (Mol and Spaargaren, 1993).⁴ At the same time, 'conventional' environmental problems such as surface water pollution, solid waste, local and regional air pollution, and noise are - or at least have been until the mid 1990s - the more typical objects ecological modernization studies use to enhance their position. One nice example of such a contrast comes to the fore in the debate around the presentations of the Environmental Sustainability Index at the World Economic Forum in 2001.⁵ The Environmental Sustainability Index (ESI) is a measure of overall progress towards environmental sustainability, developed for 122 countries. The ESI scores are based upon a set of 22 core 'indicators', each of which combines two to six variables for a total of 67 underlying variables. It is used to rank countries from most environmentally sustainable (Finland, Norway and Canada being the top three) to least environmental

⁴ This is clearly not the case in the work of Schnaiberg and colleagues on waste recycling in the USA (Schnaiberg et al., 2000; Pellow et al., 2000; Weinberg et al., 2000).

⁵ This study was done by the Columbia University Centre for International Earth Science Information network (CIESIN), the Yale Centre of Environmental Law and Policy, Yale University, and the World Economic Forum's Global Leaders for Tomorrow Environment Task Force. See <http://www.ciesin.columbia.edu/indicators/ESI>. The Environmental Sustainability Index (ESI) is a measure of overall progress towards environmental sustainability, developed for 122 countries. The ESI scores are based upon a set of 22 core "indicators," each of which combines two to six variables for a total of 67 underlying variables. Here we are not interested in the more technical problems that have been debated following this index.

sustainable (Haiti, preceded by Saudi-Arabia and Burundi). Among others, it was the New Economics Foundation NEF that attacked the report and calculations as “global misleadership”, especially criticizing the fact that the USA was listed 11th and comparing that with the ecological footprint (USA lists place 129 out of 151 countries) and carbon dioxide/climate change indicators (USA lists 149 out of 151 countries). While these latter indicators - and also the NEF - take a predominantly global perspective, the Environmental Sustainability Index is preoccupied with local and national successes in combating environmental pollution, incorporating global issues as climate change as just one out of 67 variables that make up the ESI.

	Treadmill-of Production	Ecological Modernization
Kind of radical changes	Economic radicalism	Environmental radicalism
Independent variable	Absolute sustainability	Relative improvements
Assessment of environmental change	Window dressing	Real changes
Relation analytical and normative claims	weak relation	Strong relation
Object of evaluation	High consequence risks	‘Conventional’ environmental problems

Table 1: Comparing contrasting perspectives on environmental reform

In summary, an ecological modernization perspective balances (i) the idea of an all-determining (global) capitalism that only results in further environmental decay and (ii) the conviction that any serious environmental reform will have to change the capitalist mode of production beyond recognition. A Treadmill-of-Production point of view will stress the enduring continuity of environmental crises as long as the fundamental logic of modern capitalism is not abolished.

2.2 Commonalities and similarities

Irrespective of these major, fundamental controversies between EMT and ToP, it is important to notice some commonalities between both frameworks, especially vis-à-vis other more or less dominant theories in environmental sociology. Besides the fact that both perspectives are founded on sociological insights and theories and take environment - society interactions as their core object of reflection, we want to point out three more specific parallels that are often neglected in comparing these frameworks.

Central objects in both the Treadmill of Production and in Ecological Modernization Theory are (i) processes of production and consumption and (ii) the environmental disturbances that go along with these basically economic activities. The organization of production and consumption, and the material flows (in terms of ‘additions and withdrawals’) that ‘mediate’ between society and the natural environment following production and consumption, are taken as a kind of definition of the environment. Both perspectives analyze how social dynamics, actors, institutional arrangements and processes structure in a specific way the additions and withdrawals in production and consumption processes.

That means, secondly, that both perspectives deviate to a major extent from stronger constructivist approaches that define environmental problems only in terms of social constructions and storylines. Neo-Marxist and Ecological Modernization theorists easily converge and agree in their criticism against strong social constructivism, without neglecting

the social dimensions that are always involved in defining environmental problems. Both perspectives are in agreement on the fact that environmental problems do have a 'real' existence. As we have put it in an earlier occasion (Mol and Spaargaren, 2000) environmental problems

“belong to the type of problems which needs to be analyzed and understood not only as social constructs but also in terms of the language of the natural and biological sciences. If we ignore this fact, we would end up where we started in environmental sociology, namely with the HEP-NEP distinction, with postmodern constructivist environmental sociology as the latest variant of exemptionalist thinking.”

This quote comes very close to, for instance, O'Connor's (1998: 135ff) account of subjective and objective dimensions of the environmental crisis and studies of Schnaiberg and his colleagues, which focus on 'real' existing environmental flows as objective of study.

More in general, both perspectives can clearly be put into - different branches of - the modernist project, taking firm stances against all kind of post-modern analyses of environmental problems and solutions. In looking for alternative (organizational) structures that better meet the 'standards' of sustainability, the focus of both perspectives remains on the core clusters of modernity: science and technology, the industrial organization, the capitalist mode of production, modern systems of values and culture and the nation-state system. The two perspectives make different assessments of the contribution of the institutional clusters to environmental disruptions, and they propose (or analyze) each their own transformations of these clusters, but do not move beyond the project of modernity.

3. Attempts at 'closing' the debate

Several suggestions have been made to interpret and to some extent close the debate between these two sociological perspectives on the environment. Here we will especially elaborate upon and assess three often mentioned strategies for closures: empirical research to find out which of the schools is right and wrong (3.1), geographical contextualisation (3.2), and looking for theories that help to understand and perhaps even bridge gaps (3.3).

3.1 Limitations of empiricism

In their friendly assessment of the ecological modernization paradigm and its contributions to the maturation of environmental sociology. Fisher and Freudenburg (2001) point at the strong debates in which the school-of-thought has been engaged in, especially with – but not restricted to – neo-Marxist Treadmill-of-Production scholars. The way to move this debate forward towards closure or resolution, according to them, is to be found not so much in further theoretical elaboration and linking with other, more intermediate, theoretical traditions (see below), but rather via empirical testing. Via empirical research the relevance of both approaches for understanding, interpreting and explaining environmental continuity and change could be clarified, and the 'working domain' could be identified.

A typical example of such an approach can be found in studies on urban waste recycling in American cities. In applying a Treadmill-of-Production perspective, Allan Schnaiberg and his colleagues have carried out in-depth research on urban waste recycling schemes of especially Chicago, focusing on the limited environmental improvements (or rather: the environmental regression) and the linked social problems and inequalities promoted by the Chicago Blue Bag and other programs (cf. Pellow et al., 2000; Weinberg et al., 2000). Their conclusion basically is that ecological modernization has little to offer in understanding what is happening in American urban recycling schemes. In contrast, and challenging a Treadmill-

of-Production interpretation, Scheinberg (2003) has looked into the same empirical subject from an ecological modernization perspective, concluding that the development of American urban recycling can be interpreted as a typical case of ecological modernization, supporting most of the basic tenets of the theory.

This, and other empirical research on one subject from different theoretical traditions, illustrates the limitations of empirical studies in closing theoretical debates. So where York and Rosa (2003) and to some extent also Carolan (2004) try to illustrate the limited value of ecological modernization theory by using empirical evidence, it is usually not too difficult to challenge their conclusions. This counts in a similar way for neo-Marxist theories using a Treadmill-of-Production logic to explain and understand social reality with respect to environmental deterioration. Either these empirical validations simplify the theoretical refinements of such theories, or contrasting cases in the same range can be easily identified that support these theories. Obviously, with respect to such more encompassing theories the relation between theory and empirical evidence cannot be done away with via a positivist 'verify or falsify' claim: the black swan is never the falsification. While the promoters of empirical testing are right in that theoretical claims need to be related to empirical evidence to prevent them from becoming footloose constructions floating around in a theoretical space only, the value of such theoretical frames are their contributions in understanding and interpreting social dynamics of environmental deterioration and reform. It is interesting to witness how easy theorists of both traditions agree in the restricted value of empirical evidence only in criticizing their 'opponents'.⁶

3.2 Geographical contextualization

A second line in the various attempts of understanding and closing debates between the two schools of thought can be seen in specifying the difference in their objects of reflection, basically along two lines: (i) the social practices under study, and (ii) geographical specification.

In the first category Carolan (2004) can be used as an illustration, where he seems to suggest that the difference between ecological modernization and the Treadmill-of-Production partly lies in the neglect of the domain of consumption by the former. The strong focus on only the domain of (industrial) production would partly explain ecological modernization's optimistic outlook. Others have identified a stronger emphasis on exhaustion of natural resources (withdrawals) by treadmill-of-Production scholars, while ecological modernization studies concentrate on 'additions', the emissions, to the environment. Regardless of the fact that these interpretations are heavily contested (cf. Mol and Spaargaren, 2004, on Carolan's consumption claim), they offer us limited explanation on why in the core domains of production and additions the frames continue to differ so strongly.

The most frequently mentioned and arguably the most promising specification of the object of both theories is a geographical one. Several authors have suggested that it is not by accident that the Treadmill-of-Production perspective has been developed and still has most of its adherents in the United States. Equally, they suggest that there is a logical and causal connection between the Ecological Modernization school-of-thought and the North-West European region. In both cases, the specific geographical, or rather social and political-economic, constellation has strongly influenced the emergence and maturation of the theories, as well as their strong contestation of competing interpretation schemes.

⁶ This was one of the outcomes of a debate between Treadmill-of-Production scholars and Ecological Modernization adherents at a symposium of the Research Committee on Environment and Society (RC24) of the International Sociological Association, held in Chicago, 1999.

For Instance, both Buttel (2000a) and Mol (2001) explore the eurocentricity of ecological modernization, starting from the fact that both the theoretical roots and most of the empirical work is heavily biased to Northwest European countries. While in the end they reach different conclusions on the viability of the ecological modernization project to explore non-European transformations, they agree in the explanatory power of these geographical differences. At the same time several scholars, both within and outside the ecological modernization tradition, are skeptical of the value of an ecological modernization perspective in exploring environmental transitions in developing countries (cf. Mol, 1995; Blowers, 1997). In contrast, political economy perspectives have traditionally been strongly involved in explaining environmental decay in developing regions, building upon Dependencia and World System theories (cf. Goldfrank et al., 1999; Kick and Jorgenson, 2003). The work of for instance Michael Redclift, Piers Blaikie and others is also illustrative of this. In a similar way and giving today's records in environmental reform among nations, one should thus not be surprised to find most contemporary adherents of a Treadmill-of-Production perspective in the USA, rather than in Western Europe.

But contrasting suggestions and studies are there. Ashford (2002) claims that ecological modernization perspectives are exactly useful in developing countries as diffusion rather than technological innovation has pride of place in these contexts. And more empirical studies of Lang (2002), Wilson (2002), Rikevicius (2000) have illustrated that ecological modernization ideas can help to understand what is happening both within developing and transitional countries, as between North and South. We have been involved in various studies in transitional China and Vietnam (cf. Frijns et al, 2000; Phung, 2002; Dieu, 2003; Mol, 2003; Mol and van Buuren, 2003), drawing ambivalent conclusions on the usefulness of ecological modernization as originally formulated.

3.3 Theoretical integration and interpretation

Thirdly and finally several authors have used other theoretical constructions to interpret, understand and close the difference between ecological modernization and Treadmill-of-Production.

In applying a Habermasian framework, Dana Fisher (2002) concludes that the differences between the two schools are to be interpreted in their focus on different types of crises, subsystems and spheres. According to her, Treadmill-of-Production scholars have basically an interpretation of the current constellation in terms of liberal capitalism and thus interpret the environmental problems basically in terms of problems in the economic subsystem only: the second contradiction of capital is in the end an economic argument. Ecological Modernizationists, in contrast, focus also on the other subsystems and spheres, most notably the political and socio-cultural spheres, and thus they interpret environmental crises and reforms not only in terms of the economic sphere but also in terms of overcoming rationality and legitimation crises. While originally Habermas used his classification of the different types of crises capitalist societies are confronted with historically, Fisher (2002: 62) argues that "this focus on Habermas's descriptions of different stages of capitalism is not meant to suggest that the Treadmill of Production is out-of-date and only applies to liberal capitalist societies." But the overall argument seems to be that of a restricted and not up-to-date Treadmill-of-Production theory, contrasting a more fashionable, up to date and encompassing ecological modernization perspective.

In reviewing the ecological modernization literature, Fred Buttel on various occasions (2000a; 2000b) suggests that a stronger foundation of especially the ecological modernization ideas in classical and contemporary sociological theory might clarify further the basic position of the theory and relate it to other perspectives. Evans' (1995) work on embedded autonomy

and state-society relations, as well as overall frames of reflexive modernity and the classical founders of the discipline (Marx, Weber, Durkheim) deserve mentioning in this, according to Buttel. While founding ecological modernization in broader (reflexive) modernization theories has happened to some extent in various writings (e.g. Wehling, 1993; Spaargaren, 1997; Mol, 1996; Spaargaren, Mol and Buttel, 2000), a more profound anchoring in the classical sociological traditions remains still open. Such a project could clarify the differences in a rather straight, clear historical line between Marxist theory and Treadmill-of-Production studies on the one hand, and more diverse and less easy identifiable historical roots of ecological modernization ideas. It could also specify the time-boundedness of both theoretical schemes, differentiating between the continuities over long time spans in neo-Marxist interpretations of the ecological crisis ever since capitalism started to take shape, and the shorter time spans and historical specificity on which ecological modernization claims to have relevance.

There is much value in making sense of the differences between both schools-of-thought in environmental sociology by applying other theoretical frames. But in doing so, it might be of more use to look for 'theoretical assistance' in contemporary social theories than going back to the classics. It is useful to anchor current environmental sociology in the sociological discipline by relating it to the latter's founding fathers and those who have reworked them. But if we want to understand, interpret and redefine the value of today's debates on environmental deterioration and reform, we need social theories that focus on the specificities of today's and tomorrow's social order.

4. Reformulating the debate: the sociology of environmental flows

4.1 The sociology of flows and the environment

While geographical specification has contributed to an understanding of differences in the emergence of the two schools of thought, and initially also provided an explanation for the different degrees of popularity in different countries, we argue that a reformulation of the debate between the two perspectives is both needed and possible. Such a reformulation will not solve the academic debate between the two schools. But as outlined below a new, 'sociology of flow' perspective (i) brings the two schools closer to each other in terms of common research agendas, (ii) opens up new perspectives that might combine strong points in both perspectives; (iii) does no longer allow both theories to withdraw in geographical niches or localism, which is essential in a era marked by globalization. A 'sociology of flows' might also help us to reformulate the debate between the two schools and contribute to set a new – and to some extent joint – agenda for twenty-first century environmental sociology.

The sociology of mobility or the sociology of flows is most strongly identified with the recent work of Manuel Castells and John Urry, while a more peripheral group of authors - of which Saskia Sassen is exemplary – have formed building stones in constructing this theory. While the theoretical traditions of Castells and Urry differ, they unite in emphasizing the growing relevance of networks and flows in understanding and interpreting modern society at the turn of the millennium. Several conventional categories in 20th century sociology (nation-states, societies, capital accumulation, actors) are abandoned, reinterpreted or replaced (for instance by new concepts such as space of flow and space of place, actants, iterations, attractors). In all, they claim to fundamentally alter the sociological tradition of the twentieth century.

Although environmental flows regularly function as illustrations of global flows (especially climate change, the ozone layer and the movement of solid waste) and also of the

difficulties of nation-state based governance of global flows, in general they can be said to suffer from marginalization and a lack of profound analyses in the sociology of flows. This marginalization can take different forms, from being reduced to only social dimensions in a constructivist perspective, to being relegated and locked up into the 'space of place', giving shape to the resistance identity against the space of flows, as in Castells' network society theory.⁷

In this section we want to evaluate in a systematic way the potentials of the sociology of flows for environmental sociology. Or if one would prefer to frame it in terms of the debate mentioned above: what has the sociology of flow to offer in studying 'additions and withdrawals' in an era marked by globalization, networks and flows? But this confrontation is also vice versa. We will make use of present-day insights, experiences, themes and studies from environmental sociology (especially - but not only - ToP and EM) to assess the value of the sociology of flow, as we think environmental sociology's tradition in flow analyses so far, has something to offer. While bringing in knowledge and insights about *environmental* flows into the sociology of flow, we evaluate, assess and reformulate parts of this emerging sociology of flow perspective. We will do so around four major themes: the definition of flows, the relation between the social and the material (hybrids), issues of power and inequalities, and (global) governance.

4.2 Definition of flows: changing research agendas in environmental sociology

With Sassen (1994) and Castells (1996/1997) transactions, flows and the space of flows are very much the privileged domain of global economics and information and communication technologies. It is the new constellation of these latter two that are at the origin of flows of especially money, information and related economic services. Not surprisingly, environmental flows, or more in general material flows, are not included in Castells' 'flow analysis'. The environment or nature comes in only as negative side-effects of the space of flows, which in the end comes down to a reformulation of the conventional point of view of environmental economics (external effects) in combination with the traditional 'protest-approach' in environmental sociology (social movements organizing resistance against modernity).

When compared to Castells, John Urry provides a much broader interpretation and definition of flows, widening the perspective considerably beyond just economics and information (technology). At the same time he radicalizes the flow perspective by making flows and fluids the key units of (sociological) analysis and the organizing principles of social systems in the 21st century. Fluids and flows are to be regarded as the "utterly crucial categories of analysis in the globalizing social world that have in part rendered both regions and networks less causally powerful" (Urry, 2003: 61). As discussed above, the negative side of this move is the rather imprecise and arbitrary picture that results. It appears that anything that moves, can be interpreted as a flow: from clouds to people, from vibrating atoms to transboundary solid waste.

What the sociology of flows adds to – and how it might change the agenda of – environmental sociology, becomes clear when one compares the additions and withdrawals that have been so central in late 20th century environmental sociology with this new sociology of flows (see Table 2).

⁷ John Urry forms a positive exception among social theorists for his wide and continuing efforts to give the environment more than only a marginal place. He shares with social theorists such as Anthony Giddens and Ulrich Beck the crucial role attached to the ecological discourse in processes of globalisation. But as a social geographer he details his environmental analysis much further, among others in 'Contested Natures' (McNaghten and Urry, 1998), and in sections on ecological citizenship (Urry, 2000b).

*First, the additions and withdrawals perspective⁸ is rather region-focused, static and place-bound in comparison with the sociology of flows. The sociology of flows is especially developed as an answer to the shortcomings of the strong region and society orientation of sociology. The clustering of objects in regions around which (nation-state) boundaries are drawn becomes untenable, especially through globalisation. And globalisation can also no longer be interpreted as just another region on a higher aggregation level. The sociology of flows puts global fluids, global network dynamics and the space of flow on the research agenda, rather than localities, static practices and the space of place. The idea of boundaries and fixed clusters, especially within a nation-state society, is replaced by borderless global fluids. This comes close to some of the environmental analyses of World System Theory (cf. Bunker, ...) But most of the environmental analyses conducted within World System Theory situate and discuss environmental flows within the concept of nation state societies, with additions and withdrawals flowing in between rather fixed networks and scapes, following walled routes. The arguments in favour of global fluids and against local statics should be taken serious by environmental flow analysts. But this should not result in placeless perspectives. Notwithstanding processes of disembedding, deterritorialisation, delocalisation and the becoming footloose of global financial and economic flows, Saskia Sassen (1994), Anki Hoogvelt (1997) and others illustrated the fact that flows of financial capital and information have to be processed at places (the metropolitan cities), that they originate their profit from places and that they have to 'settle down' at places, for example as (green) investments in skyscrapers and other material objects (Melchert, forthcoming). As we saw in section 2, Castells developed the tensions between the space of flows and the space of place into the very centre of his social theory, interpreting the space of place as a kind of 'place of resistance' against the flow - and ICT- dominated global economy.

Second, up till now environmental sociology rather seldom investigated or analysed environmental flows as such. Most studies on additions and withdrawals focus on social practices of production, consumption, mining, agriculture and the like, *resulting* in additions and withdrawals and the concomitant changes within the sets of ecosystems making up the material sustenance base of modern societies. As the sociology of flows perspective would have it, material substance flows become the genuine unit of analysis in environmental sociology, around which actors and social practices - labelled in terms of nodes and moorings, institutional developments and scapes, discourses, and networks - can be identified and analysed in order to understand these fluids *sui generis* and the (policy)issues of management and control they bring along with them. Framed in the HEP-NEP dichotomy which was put so forcefully on the agenda by Riley Dunlap and others in the 1970s and 1980s, this can even be interpreted as a further radicalisation beyond the NEP. While from a NEP perspective, conventional sociological theories were questioned on their Human Exemptionalism and their unwillingness to give ecology/environment a place, an environmental interpretation of the sociology of flows goes one step beyond the New Ecological Paradigm by placing 'material flows proper' at the centre of analysis. It is this radicalisation of the NEP that results in the end in questions on whether we are to trespass the boundaries of the sociological discipline (see below).

So third, while - in the case of environmental flows - the sociology of flows pushes material flows into the centre of analyses, it at the same time makes environmental flows inherently social. An environmental flow is not only or just material substances and technical

⁸ The 'addition and withdrawals' perspective should not be seen as only relevant for neo-Marxist or political economy inspired schools of thought in environmental sociology. This pair of concepts flourish widely in various environmental sociology traditions (including ecological modernization and world system theory), in most environmental study paradigms (such as industrial ecology and environmental system analysis) and in hands-on theories used by policy-makers.

infrastructures, but also the scapes, nodes, networks and discourses which go along with the flows or fluids in question. In this respect, it distinguishes itself from the environmental science and environmental study models and paradigms, such as environmental system analysis, substance flow models and industrial ecology, which focus on most of present day material/substance flows. In analysing flows, the sociology of flow concentrates on the social embeddedness while at the very same time emphasizing the material dimension. Such a perspective might be fruitful in bridging the gap between some of the environmental science traditions that put material flows as their core object (be it only in natural science terms) on the one hand, and neo-Marxist, World System Theory and other 'realist' perspectives as developed in environmental sociology.

Fourth, from a sociology of flow perspective, environmental flows in terms of additions and withdrawals are to be regarded as a rather narrow and static interpretation of environmental flows, since the focus is on only one aspect, e.g. the final stage of the flow-process (cf. the net additions to the environment, or the net withdrawals from the environment into production/products). The dynamic of the flows themselves as displayed along the way, their behaviour as constant moving, deterritorialised fluids, is left undertheorised. If we are to take the sociology of flow serious, environmental flows – and our analyses of these flows – do not stop once they have been extracted from the environment or added to the environment. There is no goal or end stage in flows, and this viewpoint has to have consequences for the way we treat our object of analyses. Carbon cycles and phosphate cycles – together with the characteristics of the automobility-system on the move – would be more archetypal objects of study than the extraction of ores, or the emissions of heavy metals from plating industries into surface water.

Finally, the sociology of flows would reinterpret some of the environmental sociology studies that have never been identified with flows and flow analysis. In the sociology of flows, flows are not necessarily or exclusively material. They can also be for the most part social, or a combination or hybrid: a social-material flow. Those environmental sociology traditions focusing on, for instance, social movements and environmental NGOs; on environmental information, knowledge and labelling; or on discourses, ideas, norms and values can be reworked into an environmental sociology of flows. The mobility of environmental ideas, information, interpretation frameworks flowing between networks and nodes around the globe, can – according to the sociology of flow – be interpreted in much the same way as material flows. Rather than place-bound, geographical communities, mobile placeless communities are emerging under conditions of global complexity, each involving a particular intersection of belonging and travelling: e.g. groupings or alliances organised around food, gender, environment, spirituality, road protests, culture etc. These communities are within and beyond the nation-state. Regions, boundaries and places become relative, permeable and in most cases have limited relevance for understanding mobility within and between these social entities. The mobile flows themselves might not be material in such cases, but the infrastructures, the nodes, the route used certainly are to a certain extent. Linking environmental issue networks with particular environmental substance flows would then become a challenging perspective. However, such a widening of the flow concept in environmental sociology enhances the need for further systematisation, categorisation and definition of environmental flows. The categories 'additions' and 'withdrawals' should be replaced for new flow categories.

In all, we think reinterpreting and reconsidering environmental flows in ways suggested by the sociology of flows is beneficial for environmental sociology, as it opens up new kinds of theoretical analyses, it prepares ground for new empirical research, and it helps moving beyond the too narrow nation-state perspective dominant in twentieth century environmental sociology.

	Additions and withdrawals	Flows
‘Geographical’ focus	Region and place-bound	Borderless
Unit of analysis	Production and consumption	Mobile flows themselves
Nature of flows	Material substances	Hybrids
Scope of studying (substance) flows	Moving in and out of production and consumption	Flows without end stage
Definition of flow	Substances	Substances, ideas, environ. information, etc.

Table 2: Differences between additions and withdrawals (in ToP and EM) and flows (in the sociology of flows)

4.3 In between the social and the material: the role of hybrids in environmental sociology

Within environmental sociology and environmental studies, the relation between the social and the material, between society and nature, has always been tense and subject to controversies and debates. The HEP- NEP debate, the clashing constructivism – realism controversy and the debates surrounding the Latourian/Callonian actor-network theories (ANT’s) all give evidence of this wrestling with the material dimensions of social theories in the context of environmental social change. Within the sociology of flows it is especially John Urry who, building rather strongly on actor-network theories of Latour (1987), Callon (1980 and 1987) and the reinterpretation of Mol and Law (1994), tries to overcome (or do away with) the dichotomy of the social and the material. In doing so, he goes way beyond the conventional schemes of environmental sociologists, who generally speaking are already satisfied when studying social systems as systems having a material base, with the recognition of the fact that material conditions do matter for social practices and institutional developments. The sociology of flows does not accept the distinction of the material and the social and argues for a merge of the natural and the social into hybrids, putting ‘material worlds’ or hybrids at the centre of analysis (cf. Urry, 2003).

In doing so the sociology of flows as developed by John Urry at least, moves away from the ‘oversocialised’ analyses of classical sociology that explain social facts by social facts only.⁹ Without fully embracing the NEP-paradigm in its classical formulation, both Treadmill of Production and Ecological Modernization scholars seem to be sympathetic to Urry in his effort to construct nature and society not independently from the material flows that sustain social life. Also at the conceptual level, the social and the material should be kept close to each other. But this bringing closer of the social and the material has a number of consequences, which should be given careful attention.

First, the merging of the material and the social dimension of flows brings Urry to question the adequacy of sociology as a discipline and to call for a stronger cross-disciplinary collaboration. In his most recent works Urry argues in favor of the in-migration of other - also natural science - disciplines into sociology. Understanding the complexity of globalization enforces sociologists to look around into other sciences for all the help they can get in

⁹ When it comes to the material underpinnings of social life, Urry strongly deviates from Castells, who offers a thoroughly HEP-based view on nature and environment. For Castells, modern societies in the end have succeeded in ‘freeing’ themselves from the constraints of nature. Only in the informational age of the 21st century nature can and must be re-invented and conceived of as cultural form, independent from its material base (Castells, 1996: 478).

interpreting and understanding global mobilities. He also would not hesitate to integrate various disciplines into a new (complexity) science for interpreting and understanding global modernity: “the complexity sciences seem to provide the best means of transcending such outdated divisions, between nature *and* society, between the physical sciences *and* the social sciences” (Urry, 2003: 18; emphasis in the original).

Although in the environmental field the calls for integration and for the abandonment of strict monodisciplinary scientific work are all too frequent and familiar (partly driven by funding agencies), it is remarkable to find such calls with one of the leading contemporary social theorists. The search for and the practices of multi- or interdisciplinary collaboration have been debated vividly in the environmental (social) sciences and studies already from the 1970s onward. At that time, there was a more or less similar claim that the complexity of environmental problems could not be understood, let alone solved, by natural sciences or social sciences working separately. Several attempts have been made to develop environmental studies into a new scientific discipline, with its own theories, concepts, research methodologies and methods (cf. Boersema et al., 1991; Leroy and Nelissen, 1999). Most of these initiatives emerged from the natural or economic sciences, and tried to incorporate social sciences (e.g. integrated environmental assessment, industrial ecology). In contrast, Urry’s attempt for integration originates from the social sciences, where the terms are set for the in-migration of natural sciences. This makes his claim the more interesting. However, the experiences with twenty years of developing integrative methodologies and conceptual frameworks in the environmental (social) sciences has not resulted in major advancements in analyzing, interpreting and solving problems related to additions and withdrawals. Partly, this failure can be explained by a lack of attractive and promising, cross-disciplinary conceptual work, which manages to attract adventurers from different disciplines. A flow perspective might surpass this drawback, but it might be too early to give up the disciplines and the conceptual division between society and nature. In the end, also with Urry’s hybrids, flows, scapes and related formal conceptual work, the proof of the pudding will be in the eating, e.g. the success and attractiveness will be determined to a great extent by the ability to (better) analyze and understand global fluids.

Second, with considerable attention being paid to the material dimension the result is a much stronger emphasis on technology and technological developments in sociology and the social sciences compared to for instance structuration theory. Both in Castells’ Network Society and in Urry’s recent work on flows and mobilities, technology is brought to the core of social development and change. Environmental sociologists of different kinds would feel comfortable with such a strong emphasis on technological developments in interpreting, explaining and criticizing (late) modernity. Technological infrastructures have always occupied a central place in environmental sociology, whether it be in the form of utility infrastructures, production plants, environmental technologies, or consumer products such as cars and computers.

Third, the merging of the social and the material tends to downplay any conventional idea of agency. In line with actor-network theories, it is not only human agents who act in networks, fluids and scapes. According to the sociology of flows, both human agency and material objects can ‘act’, can make a difference. There is no autonomous realm of human agency, there are no uniquely human societies. Societies are made up of hybrids, and when accepting the notion of hybrids, the language of actants, referring both to humans and objects or technologies, becomes inevitable. With Urry the merging of the social and the material is inextricable bound up with his ‘turn to complexity’. It is complexity science that brings him to the rather strong emphasis on the impossibility for actants to purposefully steer and control social developments and to create and sustain structures, in sum, to act as knowledgeable and capable agents. Actants are linked up in Urry’s theory of complexity with iteration. Courses

of action based on local information lead to unpredictable consequences at the global level due to non-linear processes of iteration. In the end we are left with inherently unpredictable fluids, without a clear direction. Urry comes close to system theory where he develops the (mechanical?) notion of 'attractors' as the main force causing changes in fluids and their movements through scapes. The question becomes noteworthy then, how far removed we are with John Urry from the classical - and in social science often disputed - ecosystem perspectives as put forward by for example Odum (cf. Odum and Odum, 2000).

4.4 Power, inequality and access

Within the sociology of flows, power and inequality are no longer only related to ownership of capital, as has been the dominant view in neo-Marxist studies, nor to the state, as was the mainstream conviction in most other schools-of-thought. In addition to these 'conventional' categories of power and inequality, the sociology of flows defines new inequalities in terms of having relative access to or being de-coupled from, flows. Groups, persons, cities and regions with access to the core flows and located in or close to the central nodes and moorings, are to be the wealthy and powerful. This comes also close to Rifkin (2000), who stresses the importance of access rather than ownership in late modernity. It is access to the information flows via the Internet, to the flows of monetary capital and the skills of people moving around the world, that distinguishes the better-off peoples, groups, cities and regions from their marginalized equivalents. This 'access to' concerns both direct access as the ability to structure the scapes and nodes to partially influence the fluids in terms of speed, direction, intensity etc.

In following this analytical pathway, a sociology of environmental flows would pay attention to the conditions for access to environmental flows and to the scapes which structure the current of strategic environmental fluids, and analyze in some detail the consequences for groups, actors and organizations to whom access is denied or who do not manage to establish links with the relevant networks. This would re-orient conventional environmental flow studies as conducted mainly from a natural science perspective (e.g. material flow analysis, industrial ecology, etc.) by giving priority to the social perspective in the analysis of environmental substance flows. It also would enrich conventional additions and withdrawals studies, as power and inequality are being linked to flows in a more direct way. Power is thought to reside in the additions and withdrawal themselves, and not only in the social practices of production and consumption. The environmental justice paradigm and studies can be seen as a category that fits very well into such an environmental flow sociology.

Arguably, environmental sociologists interested in studying questions of inequality and power from a sociology of flow perspective, would choose Castells work as the most promising starting point. Castells is explicit and outspoken in his analysis of inequalities in the network society, especially by his distinction and tension between the space of flow and the space of place. Those with access to and in (partial) control of the key economic and information flows can be said to dominate the new informational world order, at the expense of the place-bound local actors outside the core nodes of the global networks. Like many political economists and neo-Marxist environmental sociologists, Castells discusses inequalities in relation to the environment primarily in the context of a rather simple dichotomy: place-bounded environmental movements resist the omnipotent actors of the space of (economic) flows. Within Castells' framework there seems to be little room for including environment and environmental reform within the time-space dynamics of the space of flows itself, as among others ecological modernization scholars would have it. While Urry's notion of power is much less articulated (in part due to his notions of iteration, system theory and self-referentiality), and seems sometimes detached from human beings (as in the

case of his notion of attractors), he provides more conceptual space for a broader, more encompassing analysis of inequality and environment. By interpreting environment and nature as attached (also) to flows rather than seeing them only as part of the 'space of place', and by providing an interesting new conceptual framework for analyzing the scapes, nodes, moorings, networks and fluids determining the dynamics of flows, questions of access to and exclusion from flows make power-analyses less predetermined and more open in character. But the advantages of such an 'openness' could disappear overnight when the concept of power is being tightly linked to iteration, self-referentiality, and complexity in a way as it does not seem to fit very easily the social science tradition of dealing with inequality and power in relation to human agency. When compared to his earlier work, John Urry in his recent work on complexity seems to move away from power as conflict, transformative capacity and control, to be substituted by a rather vague discussion of power in the context of iteration, chaos theory, complexity and self-referentiality (Urry, 2003).

4.5 State, governance and regulation

Within environmental sociology, the role of the state and issues of governance always had and still have a prominent place. For one, as a collective good the environment is seen by many as in need of regulation beyond market dynamics. The state has been for a long time the 'natural' institution to regulate consumption of collective goods, even following studies on state failure (cf. Jänicke, 1986) or neo-Marxist studies on state-capital linkages. This position was only reaffirmed when international and global environmental problems reached the political and research agendas, and institutionalists and regime theorists turned their attention massively towards the environment from the early 1990s onwards. Second, most studies in environmental sociology - including the two schools addressed in this paper - have a strong normative undertone: environmental deterioration is often studied and analyzed with an explicit or implicit idea of improvement, management and reform. This always entails a kind of governance, although not necessarily by the nation state or governmental structures only or even primarily. Although the notion of governance has been broadened considerably beyond state governance - also in the environmental social science literature -, ideas of (science and technology based, top down or horizontally organized, local or global, etc.) management, control and regulation of environmental flows are very prominent in most studies.

But environmental sociologists have never been naïve on the state. Their conventional position on the state and politics is very much in line with 20th century sociology: nation-state based politics have difficulties to control increasingly internationally organized capitalist markets, networks and economies. Governance of global economic practices and flows runs counter to the specific relations between states and markets in modern, capitalist societies. In that sense Treadmill-of-Production and Ecological Modernization scholars share insights. The sociology of flows partly follows this line, where it emphasizes the changing role of nation-states, state control and governance, without asserting the end of governance or possibilities of control. In analyzing global integrated networks the sociology of flow interprets routinized behavior in, and predictable and calculable outcomes of rather fixed relations between the nodes in a network, and thus analyses possibilities for governance. In his earlier work on flows and mobility, Urry emphasizes the shift of the role of the state from a gardener state to a gamekeeper state, seeking to identify the new ways in which states try to 'regulate' global networks and flows (e.g. the audit state)¹⁰. Castells (1996/1997) equally downplays the role of

¹⁰ In developing a perspective on nation-states the sociology of flows starts from Zygmunt Bauman's (1987) idea of a transformation from the gardener to the gamekeeper state. Under conditions of

the regulating or gardener state, but emphasizes new governing agents and arrangements on stage: e.g. social movement networks and multinational corporations. This is all not too far beyond the reformulations of the 'environmental state' in some of the more recent studies and theories in the environmental social sciences, such as those on mediation, on transparency, on subpolitics, on state-society relations and on global governance.

But where the sociology of flows identifies the growing importance of global fluids, ideas of governance start to take a dramatic turn. One should not be too surprised that environmental social scientists feel rather uncomfortable with Urry's emphasis on uncontrollable, unpredictable, non-linear and unmanageable fluids that move through space and time through numerous iterations and 'interventions' of actants. The change and chaos in these fluids have nothing to do with human agents actually and deliberately seeking to change the flow in size, moment, direction, or consistency. Individual agencies or countries seem no longer to be very relevant categories in structuring and governing flows, or in predicting outcomes. Especially the state seems to fade away, to become almost irrelevant. Governmentability belongs no longer to the vocabulary of this interpretation of the sociology of flow.

This all results in abandoning the concept of unintended consequences, a notion that has always been strongly related to ideas of external effects in the environmental sciences. Due to systemic complexity, iteration, the dissolution of agency and governance, and the idea that fluids have no goal or end state, 'unintended' consequences are interpreted as systemic features (Urry, 2003: 14) rather than unwanted side-effects or failures. The concept loses its critical meaning and normative claim. It is the 'post-ecologist' environmental sociology of Blühdorn (2000) that seems to come very close to such a position. But there are more and far-reaching consequences, upon which we will touch below.

5. New agendas for new debates

In engaging with the sociology of flows we want to formulate in this final section the terms for a renewed debate within environmental sociology. In outlining the terms of these debates we will not focus on substantive environmental problems or attempt to be complete, but rather emphasize the innovations vis-à-vis the 'old' terms of the debates that use to dominate environmental sociology. In doing so we focus on reformulating three controversies: dynamics of capitalism, governance and control, and civil society.

5.1 From capitalism to space of flows

Treadmill-of-Production scholars clashed with ecological modernization scholars on the greening of economic - or capitalist - processes of production and consumption. It is especially capitalism and its internal contradictions that took central stage in that debate. Following the sociology of flow, the focus would move away from capitalism, capitalist relations of production and the contradictions that come along with that. Coming from a Marxist background, Castells emphasizes that, while the capitalist character of modernity has not vanished, the central axis - or tension if one wants - in today's modern society should be found in the space of flows versus the space of place. For environmental sociology, a new debate then starts to emerge on the representation of nature and environmental interest and

globalisation states have lost the ability and willingness to detail the patterns, regularities and order of societies, and increasingly turn to regulating mobilities and ensuring the conditions for favourable interaction processes and flows. But in developing the gamekeeping perspective, the sociology of flows moves much beyond this metaphor as far as nation-states are concerned.

qualities in the space of place and the articulation and inclusion of environmental interests and rationalities in the space of flows. To what extent and how can and are environmental considerations represented, articulated and 'regulated' in the space of flow, where money, capital, people, and material substances criss-cross borders in global networks? Or should we only interpret and understand the space of flows as ecologically 'insensitive' and even destructive, in need of bottom-up and localized counter-veiling powers, as Castells seems to suggest? From our perspective, the dichotomy scheme offered by Castells is not satisfactory, since it emphasizes in the space of flows disembedding of nature and the environment over and at the expense of new mechanisms of re-embedding, while at the same time it localizes nature and the environment only in the space of place, neglecting the place-bound communities and identities involved in environmental disruption.

We think environmental sociology has a contribution to make in showing how 'space of flow based' regimes, for example for the handling of water, food, people or energy, can be combined with equally important dynamics of the space of place in environmental improvements. In any case, the debate can no longer be secluded to place-boundedness, making geographical specificity no longer valid as the only interpretation of differences in theoretical schemes in environmental sociology. Both ecological modernization and Treadmill-of-Production scholars have to deal with global flows in analyzing place-bounded environmental disruption and reform (and vice versa), and starts have been made with that.

5.2 'Global' governance?

The former point closely relates to the debate on environmental governance and the nation-state. While both traditions in environmental sociology have moved very far from any naïve position in which the nation-state is interpreted as the only or even the main institution in environmental governance, insights from the sociology of flow might further radicalize and reorient their positions in a revised debate. No matter how diffuse, how widely spread among a variety of actors, and how far located outside the nation-state institutions, ideas of governance and reform (as well as criticism on governance and failing environmental reform) have always belonged to the very essence of the environmental social sciences. But with the sociology of flows the terms of the debate on environmental governance will change:

- from 'geographical' governance to 'mobility' governance
- from the questions of state sovereignty to questions of network governance
- from state-market relations to flow-place relations.

But environmental sociology in general, and the two traditions that have been addressed here, also feed back into and challenges the sociology of flow. Especially where John Urry uses global fluids as the new unit of analysis he makes nation-states into an irrelevant category and flows as no longer subject to any purposeful or directional governance and under any kind of 'control' by knowledgeable and capable agents. This might at first seem to be close to a neo-Marxist position on global capital, but on second thoughts strongly deviates from it in that MNCs as well as the global financial institutions are believed to be as much 'out of any control' as states and NGOs.

If accepted, this latter sociology of flow perspective on (the absence of) governance has far reaching consequences for a 'sociology of environmental flows'. In moving beyond any form of governance, regulation, steering and control environmental sociology would move to a discipline of mere interpretation and understanding. We, as (environmental) sociologists can then indeed no longer be legislators, but only interpreters (cf. Bauman, 1987) of a changing nature and environment. Complexity and system theory seem to be the ultimate consequence. That would be one bridge too far for both ToP and EM perspectives. In the end, both work

towards strategies of environmental reform, no matter how realist or utopian they might seem to be.

5.3 Beyond civil society

Finally, the interpretation of and debate on what has often been labeled civil society will shift. Most of the time civil society actors have been approached positively by environmental sociologists, interpreting them as counter-veiling powers against the logic of capital (Treadmill-of-Production), advocates of environmental rationalities (Ecological Modernization) or designers of 'post-industrial utopia's' (cf. Frankel, 1987). In all these interpretations, environmental NGOs - as key environmental representatives of civil society - are placed outside the logic and domain of state and market, as place-bound actors engaged in environmental interest representation and collective identity formation using rationalities that are distinct from political and economic ones. This interpretation seems to be in need for revision, and with that the 'assessment' of the role, place and contribution of NGOs in environmental reform strategies.

In Castells' interpretation scheme, civil society and its environmental representatives have still predominantly been related to the space of place. With globalization, and global flows and networks, we think this interpretation loses much of its adequacy. First, civil society and environmental NGOs are as much part of the global flows and networks, as they are related to local places, as others have emphasized (Keck and Sikkink, 1998). Second, their identities, interpretation schemes, action radius and strategies can no longer be easily grasped under one common denominator, as used to be done for the environmental movement of the 1970s and 1980s. Thirdly, the sharp distinction between civil society NGOs and what used to be labeled economic and political actors becomes increasingly messy. Notions as subpolitics, public-private partnerships, and government organized NGOs (GONGOs) point to that. This all becomes clear when we compare, for instance, the global networks and coalitions WWF, Conservation International, and Greenpeace are engaged in with the arrangements in which local environmental groups in African cities and villages participate. It also becomes evident when one relates environmental interests and considerations with global media, the Internet and the significant amounts of global capital being spent in nature conservation by environmental NGOs.

It becomes increasingly inadequate to analyze (collective) actors in terms of their dominant rationality and their positioning in the (national) political, economic or civil society domain. Such features less and less determine their course of action and one cannot draw any lasting conclusion from that with respect to their (potential) contribution to environmental revolution or reform. Increasingly actors' access to, and ability to co-design, global networks and flows become relevant features. Also there, Treadmill-of-Production ideas on inequality, unequal distribution of power and domination are relevant, but these no longer match in a one-to-one relation with either civil society/NGOs or environmental interests. A whole new set of questions seems to emerge from what Rifkin (2000) colorfully portrayed as the shift from ownership to access.

References

- Andersen, M.A. and I. Massa (2000), "Ecological Modernisation - Origins, Dilemmas and Future Directions", *Journal of Environmental Policy and Planning* 2, 4, pp. 337-345
- Bauman, Z. (1987), *Legislators and Interpreters*, Cambridge: Polity

- Beck, U. (1997), *Was ist Globalisierung? Irrtümer des Globalismus - Antworten auf Globalisierung*, Frankfurt am Main: Suhrkamp
- Blowers, A. (1997), "Environmental Policy: Ecological Modernization and the Risk Society?", *Urban Studies* 34, 5-6, 845-871
- Blühdorn, I. (2000), "Ecological Modernisation and Post-Ecologist Politics". In: G. Spaargaren, A.P.J. Mol and F. Buttel (eds), *Environment and Global Modernity*, London: Sage
- Boersema, J.J. et al. (1991), *Basisboek Milieukunde*, Amsterdam: Boom (4th revised edition)
- Bunker, S.G. (1996), "Raw Material and the Global Economy: Oversights and Distortions in Industrial Ecology", *Society and Natural resources* 9, pp.419-429
- Buttel, F.H. (2000b), "Classical theory and contemporary environmental sociology: some reflections on the antecedents and prospects for reflexive modernization theories in the study of environment and society". In: G. Spaargaren, A.P.J. Mol and F. Buttel (eds), *Environment and Global Modernity*, London: Sage, pp. 17-40
- Buttel, F.H. (2000a), "Ecological modernization as social theory", *Geoforum* 31, 1, pp.57-65
- Callon, M. (1980), "The state and technical innovation: A case study of the electrical vehicle in France" *Research Policy* 9, pp.358-376
- Callon, M. (1987), "Society in the Making: The Study of Technology as a Tool for Sociological Analysis" In: W.E. Bijker, T.P. Hughes and T.J. Pinch (eds), *The Social Construction of Technological Systems. New Directions in the Sociology and History of Technology*, Cambridge (Mass.): MIT, pp.83-103
- Carolan, M. (2004), "Ecological Modernization: What about Consumption?", *Society and Natural Resources* 17 (forthcoming)
- Castells, M. (1996), *The Rise of the Network Society. Volume I of The Information Age: Economy, Society and Culture*, Malden (Mass)/Oxford: Blackwell
- Castells, M. (1997a), *The Power of Identity. Volume II of The Information Age: Economy, Society and Culture*, Malden (Mass)/Oxford (UK): Blackwell
- Castells, M. (1997b), *End of Millenium. Volume III of The Information Age: Economy, Society and Culture*, Malden/Oxford: Blackwell.
- Castells, M. (2000), "Information Technology and Global Capitalism". In: W. Hutton and A. Giddens (ed), *Global Capitalism*, New York: The New Press, pp. 52-74
- Cohen, M. J. (2000), "Ecological Modernisation, Environmental Knowledge and National Character: A Preliminary Analysis of the Netherlands", *Environmental Politics* 9, 1, pp.77-105
- Dickens, P. (1998), "Beyond Sociology: Marxism and the environment". In: M. Redclift and G. Woodgate (eds), *The International Handbook of Environmental Sociology*, Cheltenham/Northampton (Mass): Edward Elgar, pp. 179-192
- Evans, P. (1995), *Embedded Autonomy. States and Industrial Transformation*, Princeton: Princeton University Press
- Fisher, D.R. and W.R. Freudenburg (2001), "Ecological Modernization and Its Critics: Assessing the Past and Looking Toward the Future", *Society and Natural Resources* 14, 8, pp.701-709
- Fisher, D. (2002), "From the Treadmill of production to Ecological Modernization? Applying a Habermasian Framework to Society-Environment relationships". In: A.P.J. Mol and F.H. Buttel (eds), *The Environmental State under Pressure*, Amsterdam etc.: Elsevier, pp. 53-64
- Frankel, B. (1987), *The Post-Industrial Utopians*, Cambridge: Polity Press
- Frijns, J., Phung Thuy Phuong and A.P.J. Mol (2000), "Ecological Modernisation Theory and Industrialising Economies. The case of Viet Nam", *Environmental Politics* 9, 1, pp.257-292

- Giddens, A. (1990), *The Consequences of Modernity*, Cambridge: Polity Press
- Giddens, A. (1994), *Beyond Left and Right. The Future of Radical Politics*, Cambridge: Polity Press
- Goldfrank, W.L., David Goodman and A. Szasz (eds) (1999), *Ecology and the World-System*, Westport (Conn)/London: Greenwood Press
- Hajer, M.A. (1995), *The Politics of Environmental Discourse. Ecological Modernisation and the Policy Process*, Oxford: Clarendon Press
- Hoogvelt, A. (1997), *Globalisation and the Postcolonial World. The New Political Economy of Development*, Houdsmills and London: MacMillan Press
- Jänicke, M. (1986), *Staatsversagen. Die Ohnmacht der Politik in der Industriegesellschaft*, München/Zürich: Piper
- Jänicke, M. (1991), *The Political System's Capacity for Environmental Policy*, Berlin: Freie Universität
- Jänicke, M. (1993), "Über ökologische und politieke Modernisierungen", *Zeitschrift für Umweltpolitik und Umweltrecht* 2, pp. 159-175
- Keck, M.E. and K. Sikkink (1998), *Activists beyond Borders: Advocacy networks in International Politics*, Cornell University Press
- Kick, E. and A. Jorgensen (Eds) (2003), "Globalization and the Environment". *Journal of World-Systems Theory* (special issue) vol. 9, no. 2,
- Lang, G. (2002), "Deforestation, Floods and State Reactions in China and Thailand". In: A.P.J. Mol and F.H. Buttel (eds), *The Environmental State under Pressure*, Amsterdam etc.: Elsevier, pp. 195-221
- Latour, B. (1987), *Science in Action*, Milton Keynes: Open University press
- Leroy, P. and N. Nelissen (1999), *Social and Political Sciences of the Environment. Three decades of research in the Netherlands*, Utrecht: International Books
- McNaghten, P. and J. Urry (1998), *Contested Natures*, London: Sage
- Mol, A.P.J. (2002), "Ecological Modernization and the Global Economy", *Global Environmental Politics* 2, 2, pp.92-115
- Mol, A.P.J. (2001), *Globalization and environmental reform. The ecological modernization of the global economy*, Cambridge: MIT Press
- Mol, A.P.J. (1995), *The Refinement of Production. Ecological Modernisation Theory and the Chemical Industry*, Utrecht: Jan van Arkel/ International Books
- Mol, A.P.J. (1996), "Ecological modernisation and institutional reflexivity. Environmental reform in the late modern age", *Environmental Politics*, 5, 2, pp. 302-323
- Mol, A.P.J. (1999), "Ecological modernisation and the environmental transition of Europe. Between national variations and common denominators", *Journal of Environmental Policy and Planning*, Vol.1, no. 2, pp. 17-38
- Mol, A.P.J. and D.S. Sonnenfeld (Eds) (2000), *Ecological Modernisation Around the World: Perspectives and Critical Debates*, London: Frank Cass
- Mol, A.P.J. and F.H. Buttel (eds) (2002), *The Environmental State under Pressure*, London etc.: Elsevier
- Mol, A.P.J. and G. Spaargaren (1993), "Environment, Modernity and the Risk-Society: The Apocalyptic Horizon of Environmental Reform", *International Sociology*, 8, 4, pp.431-459
- Mol, A.P.J. and G. Spaargaren (2004), "Ecological Modernization and Consumption: A Reply", *Society and Natural Resources* 17 (forthcoming)
- Mol, A.P.J., and J.C.L. van Buuren (eds) (2003), *Greening industrialization in Asian transitional economies*, Lanham (Maryland): Lexington/Rowman and Littlefield
- Mol, A and J. Law (1994), "Regions, networks and fluids: anemia and social typology", *Social Studies of Science* 24, pp.641-671

- O'Connor, J. (1998), *Natural Causes. Essays in Ecological Marxism*, New York and London: Guilford
- Odum, H.T. and E.C. Odum (2000), *Modeling for all Scales: An Introduction to System Simulation*, San Diego etc.: Academic Press
- Pellow, D.N., A.S. Weinberg and A. Schnaiberg (2000), "Putting Ecological Modernization to the Test: Accounting for Recycling's Promises and Performance", *Environmental Politics* Vol. 9, no. 1, 109-137
- Pepper, D. (1984), *The Roots of Modern Environmentalism*, London etc.: Croom Helm
- Phung Thuy Phuong (2002), *Ecological Modernisation of Industrial Estates in Viet Nam*, Wageningen: Wageningen University (dissertation)
- Rifkin, J. (2000), *The Age of Access. How the shift from ownership to access is transforming modern life*, London: Penguin
- Rinkevicius, L. (2000), "The ideology of ecological modernization in 'double-risk societies: A case study of Lithuanian environmental policy". In: G. Spaargaren, A.P.J. Mol and F. Buttel (eds), *Environment and Global Modernity*, London: Sage
- Sassen, S. (1994) *Cities in a World Economy*, Thousand Oaks/New York/London: Pine Forge Press
- Scheinberg, A. (2003), "A Change by Any Other Name: Re-examining the Urban Recycling Experience in North America and its Implications for Ecological Modernisation Theory", *Environmental Politics*, vol. 12 (forthcoming)
- Schnaiberg, A. (1980), *The Environment. From Surplus to Scarcity*, Oxford/New York: Oxford University Press
- Schnaiberg, A., A.S. Weinberg and D.N. Pellow. (2002), "The Treadmill of Production and the Environmental State". In: A.P.J. Mol and F.H. Buttel (eds), *The Environmental state under pressure*, London: JAI/Elsevier, pp.15-32
- Seippel, Ø. (2000), "Ecological Modernisation as a Theoretical Device: Strengths and Weaknesses", *Journal of Environmental Policy and Planning* 2, 4, pp.287-302
- Sonnenfeld, D. (2000), "Contradictions of Ecological Modernization: Pulp and Paper Manufacturing in South East Asia", *Environmental Politics* Vol. 9, no. 1, pp. 235-256
- Spaargaren, G. (1997), *The Ecological Modernisation of Production and Consumption. Essays in Environmental Sociology*, Wageningen: Wageningen Agricultural University (dissertation)
- Spaargaren, G., A.P.J. Mol and F.H. Buttel (eds) (2000), *Environment and Global Modernity*, London: Sage
- Tran Thi My Dieu (2003), *Greening Food processing Industry in Vietnam. Putting Industrial Ecology to Work*, Wageningen: Wageningen University (dissertation)
- Urry, J. (2000a), "Mobile Sociology", *British Journal of Sociology* 51, 1, pp.185-203
- Urry, J. (2000b), *Sociology beyond Society*, London: Routledge
- Urry, J. (2003) *Global Complexity*, Cambridge: Polity
- WCED (1987), *Our Common Future*, Oxford: OUP
- Wehling, P. (1993), *Die Moderne als Sozialmythos: zur Kritik sozialwissenschaftlicher Modernisierungstheorien*, Campus verlag
- Weinberg, A.s., D.N. Pellow and A. Schnaiberg (2000), *Urban Recycling and the Search for Sustainable Community Development*, Princeton University Press
- Wilson, D.C. (2002), "The Global and the Local: The Environmental State and the Management of the Nile perch Fishery on Lake Victoria". In: A.P.J. Mol and F.H. Buttel (eds), *The Environmental State under Pressure*, Amsterdam etc.: Elsevier, pp. 171-192
- York, R. and E.A. Rosa (2003), "Key Challenges to Ecological Modernization Theory" *Organization and Environment*, 16, 3, 273-287