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Climate change politics with Chinese characteristics:  
From discourse to institutionalised greenhouse gas mitigation

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## **Climate change politics with Chinese characteristics: From discourse to institutionalised greenhouse gas mitigation**

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### **Abstract**

China has seen tremendous economic growth in the past three decades, and in the order of eight to ten per cent since 2000. This development has come with ever increasing energy consumption, and thus emissions of greenhouse gases (GHG). This trend has been an important topic in the international climate negotiations under the United Nations Framework Convention on Climate Change; China is under constant pressure from other large economies to contribute to reversing the GHG emissions trend in order to avoid dangerous climate change. At the same time, the Chinese government has pursued an environmental and energy security agenda focussed at increasing the energy efficiency of its economy and the supply of energy from renewable sources. Alongside, a domestic climate change discourse has developed, and changed over time.

This thesis examines elements of the country-specific political ecology in the area of greenhouse gas mitigation in China, looking closely at what climate change means in China, and discussing how this influences the development and institutionalisation of mitigation mechanisms. I take a political ecology approach to scrutinize the nature and evolution of a climate change discourse in China, and the influences and implications of existing governance structures and institutions that affect greenhouse gas mitigation in the country. Adopting mixed empirical methods comprising semi-structured interviewing, media and numerical data analyses, and participant observation in research processes close to the government, data was collected between 2008 and 2011. In five academic papers with distinctive angles, I show the importance of engaging deeply with the formative, distinctly Chinese political, economic and ecological environment when discussing mitigation in China. The Chinese climate change discourse has changed significantly in recent years, for example resulting in different discursively acceptable ways for the country to engage in mitigation. These meanings of climate change in China have developed through specific interactions of the political and academic spheres, based on Chinese understandings of nature and history (and China's place in it), as well as with limited involvement of the media compared to western developed country cases. The notion of historical responsibility is a major component of what climate change means in China; in this thesis I therefore illuminate the numerical and conceptual ramifications of this part of the discourse, noting that the re-active nature of this frame, with China positioned against the developed countries, has not lend itself to support new mitigation action. Low carbon economy is another newer and now very important element of the discourse, a frame that locates China in an active, entrepreneurial subject position. My study on two cases – mitigation in the Beijing transportation sector and the introduction of seven local emission trading systems through a approach of governance through pilots – shows how this part of the discourse allows for the development of new mitigation approaches when they follow established institutions and governance mechanisms in a path-dependent manner. This thesis contributes to the research of global environmental change by advancing theoretical and practical ways of engaging with climate change in general, and mitigation in particular in China. It stresses the importance of considering the country-specific political ecology when formulating global climate change policy.

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## List of acronyms

BAU	Business as usual
BRT	Bus rapid transit
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CMA	China Meteorological Administration
CO <sub>2</sub>	Carbon dioxide
COP	Conference of the Parties (to the UNFCCC)
CPC	Communist Party of China
CPPCC	Chinese People's Political Consultative Conference
DNA	Designated National Authority
DOE	Designated Operational Entities
DRC	Development and Reform Commission
ERI	Energy Research Institute (of China)
ESCO	Energy service company
ETS	Emission trading system
FYP	Five-Year-Plan
G-77	Group of 77
GDP	Gross domestic product
GHG	Greenhouse gas

GWP	Global Warming Potentials
IPCC	Intergovernmental Panel on Climate Change
LDC	Least Developed Country
MATCH	Ad-hoc Group for the Modelling and Assessment of Contributions of Climate Change
MEP	Ministry of Environment
MRV	Monitoring, reporting and verification
NAMA	Nationally Appropriate Mitigation Action
NCCCC	National Coordination Committee on Climate Change (of China)
NCSC	National Center for Climate Strategy and International Cooperation of China
NDRC	National Development and Reform Commission
NEA	National Energy Administration
NGO	Non-governmental organisation
NPC	National People's Congress (of China)
SNLT	Sector no-lose target
SO <sub>2</sub>	Sulphur dioxide
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change

## **Chapter 1: Introduction**

### **1.1. Global context**

Anthropogenic, global climate change, caused by increasing levels of greenhouse gases (GHG) in the atmosphere is one of the key challenges with which the international community is faced today. Human society and its natural support systems are threatened by climate change (IPCC 2007), and there is an increasing understanding of the cost of mitigating and adapting to climate change (Stern 2006a). This thesis focuses on discursive and institutional elements of climate change in China, i.e. the existing and evolving knowledge of what climate change is, and how this can be translated into policies or mechanisms to achieve the goal of mitigation, all in the context of the international climate change negotiations and the Chinese domestic policy prerogatives.

The research for this thesis was done against the backdrop of the on-going negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, as well as a rapidly changing landscape of climate policy in China. The Bali conference in 2007 as well as the Copenhagen conference in 2009 have resulted in important decisions that pave the way for intense deliberations of a post-2012 climate change regime (COP 13 2007; UNFCCC CP 2009). The two-track structure of negotiations allows for a strengthening of commitments of the current Annex I Parties (industrialised countries) to the Kyoto Protocol, and exploration of new long-term cooperation of all 192 Members to the Convention (IISD 2007; Pew Center of Global Climate Change 2007; Höhne et al. 2008). Mitigation mechanisms are currently discussed in the international climate

negotiations options under the terms nationally appropriate mitigation actions (NAMAs) (COP 13 2007), new market-based mechanisms (AWG-LCA 2010), and submissions have been made for a reformed CDM (e.g. Sareen 2008; UNEP SBCI 2009).

Although there exists growing body of (policy) literature, the possible design of new international mechanisms to support GHG emission reductions is still very unclear. Open fields of discussion are the setting or calculation of baselines or targets, the methods of calculating (possibly sector-wide) reductions against such a baseline or target and integration of these mechanisms in the global climate regime. All these parts contribute to the institutional setup and governance structure needed for e.g. mitigation mechanisms that are or could eventually be internationally linked to be implemented in China.

## **1.2. China's climate policy**

Among the developing country Members to the Kyoto Protocol and the Convention, China holds one of the most influential and important positions. The country has surpassed the United States as number one carbon dioxide (CO<sub>2</sub>) emitter in the world in 2006 and as number one energy consumer in 2010 (MNP 2007). This results largely from a primary energy demand composed of nearly 84 per cent fossil fuels, predominantly in the form of coal (IEA 2007; Quadrelli et al. 2007). Furthermore, China's status and influence in the Group of 77 (G-77) of developing world states gives it additional weight in the international climate negotiations.

China remains firmly opposed to taking up nation-wide *internationally binding* emission reduction targets in the foreseeable future. It leads the G-77 in calling for developed country financial and technical assistance to deal with mitigation and

adaptation needs in developing countries, based on the UNFCCC principle of ‘common but differentiated responsibilities’, and historical responsibility of developed countries in particular.

At the same time, climate change has risen in importance in Chinese domestic politics over the past years. The country has been addressing the topic more aggressively domestically as well as in international fora (Heggelund 2007; Heggelund et al. 2007; Lewis 2007). A national program on climate change was enacted, which – just like the 11<sup>th</sup> Five-Year-Plan – aims to achieve massive reductions in GHG emissions via lowering the energy intensity in industry (China NDRC 2007a; China NDRC 2007c). Before the Copenhagen climate summit in 2009, China committed to unilateral mitigation actions leading to 40-45% reductions in the carbon dioxide intensity of the economy, which were later submitted as ‘nationally appropriate mitigation actions’ to the UNFCCC process (China NDRC 2009; China NDRC 2010b). Environmental policy, including policy aimed at climate change also has a prominent role in the 12<sup>th</sup> Five-Year-Plan as published in 2011 (China Daily 2011). China holds a huge potential for the mitigation of GHGs, both in absolute terms and in comparison to other countries (e.g World Bank 2004; Cai et al. 2008b). It has started to harness some of this potential through the Clean Development Mechanism (CDM) through which it will achieve emission reductions of over 1.3 Mt CO<sub>2eq</sub> until the end of 2012 in projects contracted as of 2010 – more than half of the worldwide reductions through the CDM (Fenhann 2010). Setting up the national institutional environment for this flexible mechanism has however represented a significant challenge to China, and there are many indications that the

internationally prescribed design of the CDM has not fitted well to the country-specific circumstances in the Chinese case (Zhang 2006; Ellermann 2007).

As a way forward towards new mechanisms for a post-2012 climate regime, the Bali Action Plan explicitly called for the development and testing of “[c]ooperative sectoral approaches and sector-specific actions” (COP 13 2007, Article 1.b.iv) to enhance mitigation in developing countries. The Chinese chief negotiator in Bali also stated that his country would consider aiming for targets “sector by sector” if technological and financial assistance from developed countries was available (Zhou 2007). These ideas are found in the negotiations in less explicit form as ‘new market-based mechanisms’ (AWG-LCA 2010).

Indeed new greenhouse gas mitigation approaches may be feasible for China from a discursive, policy-making, institutional and economic standpoint, not the least because of the possible parallel effects on energy intensity and local emission reductions and additional financing for technological upgrading. Experience with recent domestic mitigation activities in China, be it under the topics of low carbon economy broadly, or emission trading systems specifically, suggests possible pathways for the country to develop its climate change agenda with Chinese characteristics. Even if a direct linking to international mechanisms for climate mitigation under the UNFCCC is not the primary objective of Chinese climate policy at the moment, a close look at its origins, evolution and institutional setup is warranted.

### **1.3. Research questions**

The apparent discord between slow developments in the area of international agreements on new mitigation mechanisms and a rapidly developing domestic

energy and climate policy in China leads to the central research question of this thesis:

*What are the main discursive and institutional elements of climate change in China, how, why and with which interactions have they developed in their present form, and what are the consequences for the viability of certain approaches to address climate change in China?*

This question calls for a deep engagement with China to find out what climate change means in the country, and which factors – for example in terms of governance and institutions – can contribute to the increased inclusion of China in a global effort to mitigate climate change.

In detail, the thesis therefore addresses the central question through two lines of enquiry:

1. What is the Chinese climate change discourse – how has it evolved, what are the formative forces in its development and at what times do discursive elements lead to opportunities for increasing greenhouse gas mitigation in China?
2. Beyond the climate change discourse, what are other formative factors impacting the likely success of mitigation approaches in China?

By answering these questions, my research aims to contribute to the academic literature in the study of modern China as it stresses the importance of country-specific factors and treats the Chinese reaction to the much-discussed topic of climate change. The examination of mitigation approaches in China provides valuable academic input for the debates around the further development of a new (global) low carbon economy and the design of the future climate change regime – at

a time when well-informed, country-specific empirical information is in high demand to support the process of the negotiations under the UNFCCC. My research applies a political ecology framework to the complex issue of climate change and China, binding together politics and economic questions with ecological change and control over the environment, or in the words of Bryant (1998) it is “research [...] to understand the political dynamics surrounding material and discursive struggles over the environment in the third world.”

To answer the questions at the base of this thesis, I have chosen to address elements of this research in separate articles. While the publication of a thesis in book form makes it easier to stay within one single coherent framework, the paper route is more amenable, and allows for the flexible use of different theoretical frameworks and methods to arrive at answers to the central research questions.

My hypothesis is that the Chinese political environment, economic influences and societal norms determine the Chinese discourse of climate change and thus shape the possible range and institutional design of policy responses to this environmental problem. Although my research was never designed to be a strict endeavour to test this hypothesis, it was one result of my earlier research on elements of climate policy in China, and thus provided the basis for the fieldwork undertaken for this thesis. It also proved valuable as an ‘anchor’ to return to (and question) when bringing together elements of this complex topic seemed challenging.

## **1.4. Research approach**

### 1.4.1. Theoretical framework

#### *1.4.1.1. Modern China through the lens of political ecology*

“Political ecology has much to offer the analysis of the international climate regime including the political economies of responsibility for emissions, the distribution of vulnerability to climate changes, the decisions to use market solutions, the agency of non-nation state actors, the governmentalities of climate science and monitoring, and the interactions of climate policy and development.” (Bumpus et al. 2011)

“Political ecologists, with few exceptions, have largely ignored China, home to a fifth of the world’s population and site of rapid and sweeping changes in society-environment relations.” (Magee 2006)

The empirical study of China, and the production of area-specific knowledge lie at the heart of this thesis’ research. It requires the pragmatic integration of different areas of social science theory to arrive at conclusions that are true to the actual nature of the place of inquiry. This notion of interdisciplinarity follows from the concentration on one particular place of study, but also from the focus on the extremely complex topic area of climate change, which transcends the traditional boundaries of the natural and social sciences. The topic of this thesis exemplifies well how the study of human-environment interactions and linkages in the field of geography leads to valuable insights that are hard to gain from any other single-discipline approach.

There are a number of possible theoretical starting points to take when researching the issue of climate change in China. Ecology by itself for instance can be of great help in analysing the complexity of climate change as an environmental phenomenon, including the natural and anthropological origins of GHGs, its impacts, for example on agriculture, and possible ways of adapting to or mitigating climate

change. Ecology research is however mostly static and a-historical, it ignores politics and cultural or economic influences. In essence, it lacks the social theory needed to answer the questions asked in this thesis about the “matter of nature” in China (Fitzsimmons 1989). Political economy on the other hand is heavy on social theory, as it for example looks at property rights and the links of power and productive activity, includes politics, history and society. It is interested in questions of cause and effect and provides many socio-economic variables to analyse. It is by itself however often strongly deterministic, too focused on a top-down view and remote from ‘the local’ and the environment. Chinese Studies, or area studies China lastly is a relatively undertheorized field, borrowing from many strains of politics and economics, history, legal, anthropological and cultural studies. Much of its research is focused on the politics of modern China, providing invaluable insights into power relations and institutional change. While lacking theoretical depth in itself, Chinese Studies provides a treasure trove of methods and lessons for fieldwork, and is therefore indispensable to anyone seriously considering research in China.

Political ecology is “a field that seeks to unravel the political forces at work in environmental access, management, and transformation” (Robbins 2012). While at times charged with incoherence, political ecology is “expansive, eclectic and inclusive” (Blaikie 2008) in the way it integrates many of the aforementioned strengths of separate fields into a sound theoretical framework, building the intersection between political economy, material nature, and human agency. Where other theories have failed to account for the “political sources, conditions and ramifications of environmental change”, it is generally understood as a combination of human ecology and political economy – or a “political economy of environmental

change” interested in the dialectical relationships between humans and the environment (Bryant 1998).

A focus on the local level, or a bottom-up view from the local level to wider scales is central to much of political ecology research, as is a concentration on the developing world and its “bio-cultural-political complexity” (Greenberg et al. 1994). Political ecology brings concepts of relative power and conflicts over resources into the study of “humanized nature” (Greenberg et al. 1994) and its interactions with society, for example by studying property rights, their governance and related institutions as lenses through which to analyse environmental change, most often in developing country settings (Bryant 1992). The environment, as viewed by many political ecologists, is not only a place of human-nature interaction and struggle, but also a fundamentally social construct itself, and techniques of discourse analysis can be applied to shed a light on this important aspect (Forsyth 2003).

Political ecology theories provide a wealth of resources that have aided my analysis in multiple ways. Firstly, it allows me to understand climate change in China as a socio-political construct (Demeritt 1998), which is thoroughly formed by (shifting) social, political, historical, cultural and natural forces present in the country itself, and its interactions with the international community.<sup>1</sup> An analysis of the related Chinese discourse helps to locate those forces, and – by narrowing down the discourse to a number of main frames – define the narrative space in which to further examine the human-environment interaction. It is in effect the first step of my thesis in combining the natural or ecological (climate change) with the political.

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<sup>1</sup> See Section 1.4.1.2 for a more detailed description.

My in-depth look at the question of China's historical responsibility for climate change, secondly, resonates strongly with two of the main themes present in much of political ecology research, i.e. the struggle over property rights and notions of the conflict between the developed and developing world over access to a limited resource (Bryant 1992), i.e. here the atmosphere. As it has become adequately clear that the space for GHG emissions in the atmosphere is limited, provided catastrophic climate change is to be avoided (IPCC 2007), and a large portion of the acceptable cumulative emissions<sup>2</sup> over time and across space has already been taken up largely by developed country GHG emissions since industrialization, the question of country historical responsibilities for climate change is essentially a question over property rights (i.e. the right to the remaining shares of pollution) and their distribution among emitters, i.e. across countries or especially between developed and developing countries. The parts of the thesis that discuss historical responsibility for climate change both as a matter of the Chinese discourse, as well as empirically based on different numerical methods, can therefore be understood as case studies of what Bryant (2000) calls "politicized moral geographies".

Thirdly, my thesis explores ways in which the new framing of climate change as 'low carbon economy' allows (or does not allow) for the introduction of mechanisms of international climate change governance into the Chinese national, provincial and local politics of resource control. It examines how institutions in the form of political structures and decision-making procedures at multiple levels of government that regulate energy use and emissions in the municipal transport sector could interact

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<sup>2</sup> It is difficult to postulate what "acceptable" actually means in this regard, but scenario studies looking at atmospheric concentrations of GHGs and resulting climate change impacts can provide some insights IPCC (2000). IPCC special report: emissions scenarios, Intergovernmental Panel on Climate Change, Stern, N. (2006a). *The Economics of Climate Change. The Stern Review*. Cambridge, Cambridge University Press..

with or be transformed by different climate change mechanisms under discussion at the international level. This draws on political ecology literature concerned with the changes in the local social and economic relations that can be caused by global environmental politics (Newell et al. 2012); and conversely it also asks how Chinese realities and “dispersed nature of climate change governance” at multiple levels affect the applicability and effectiveness of climate policy mechanisms “in order to determine where policy interventions are likely to have the most success” (Betsill et al. 2007). This chapter also pays particular attention to the question of scale, which I here understand as less as a matter of territory, but as a result of socio-ecological construction (Brown et al. 2005; Paulson et al. 2005; Sayre 2005) in the form of choices in the design of possible GHG mitigation mechanisms and their boundary. Lastly, my analysis of the emergence of a domestic carbon economy in China concentrates on the way decisions to use a market solution have been influenced by the existing institutional setup of environmental governance in China. Carbon trading in China, at the moment tested in seven municipalities and provinces, is a form of environmental governance that is rapidly commoditizing and marketised. It is implemented in a learning by doing, partially decentralised “piloting” manner by a multitude of state and non-state actors. Political ecology provides a useful lense through which to study the evolving environmental governance in the case of the Chinese carbon markets, and their institutionalisation from national guidelines to local level regulations, to the very dynamics of negotiating allocation amounts with emitters.

The diverse angles through which political ecology allows me to treat human-environment interactions in terms of discourse and a political economy including

environmental governance and institutions, in a location-specific – Chinese – setting offer a chance to arrive at valuable conclusions regarding the nature of climate change in China, and the conditions for possible new mitigation activities in the country, and possibly linked to the international climate policy regime. The following two subsections address in further detail how elements of this theoretical framework have helped my research.

#### *1.4.1.2. Discourse analysis*

A political ecology approach understands material elements of climate change as discursive at the same time, constructed through social and political processes, allowing me to analyse climate change in China in a post-structural way by exploring it as a matter of discourse. This is in order to unravel the “matter of nature” (Fitzsimmons 1989) and understand the meaning and knowledge of climate change in China as constructed through the use of power, by variable groups of actors with different interests, and for different goals. A discourse of nature is understood as formed, propagated and changed in a myriad of media, scientific and government documents, and daily conversations (Robbins 2012). In the first part of this thesis, I use a broad definition of discourse as a shared meaning of a phenomenon. The approach to discourse studies borrows among others thoughts of Hajer (1995a) as it “aims to understand why a particular understanding of the environmental problem at some point gains dominance and is seen as authoritative, while other understandings are discredited.” Shi-xu’s *cultural approach to discourse* (2005) also provides much inspiration, understanding “knowledge to be socially oriented [and] culturally organized”. Climate change, as a constructed matter of nature, is of course not a single monolithic piece of discourse, but rather a collection of parts, which at times

overlap or contradict each other. In Chapter 3: I therefore explore these parts, identifying the most prominent frames of the Chinese climate change discourse (Trumbo 1996; Scheufele 1999; Fletcher 2009; Nisbet 2009). The analysis of climate change frames in a given country, their changing importance over time and relative importance at a given point in time, is a valuable way of looking at the interaction of the political economy and environment, e.g. with the goal of identifying formative power relations, and opportunities for enhanced GHG mitigation action.

The history of the western, developed country discourse on climate change has been a topic of research for more than a decade (Weingart et al. 2000; Hajer et al. 2005; Bäckstrand et al. 2006; Boykoff et al. 2010).<sup>3</sup> Using the same kind of framework to try and describe the Chinese discourse on climate change presents multiple methodological challenges – only starting with the differences in language use (Moder et al. 2004). The Chinese discourse evolves in a culture with a background of completely different histories, conditions, problems, issues, aspirations etc.

Similarly, the formative political environment — and with it the function and place that media occupy — cannot be ignored, but rather needs to be central in any analysis. It is therefore necessary to leave the confinement of looking through a purely western lens, but rather adapt an “*in-between cultural stance*” (Shi-xu 2005) and explore the textual corpus innovatively. This syncretic approach (Polkinghorne 1983) makes it possible to identify the nature of discourse in the form of the main frames – regularities in expressions and topics – that dominate it, analyse the actors producing, reproducing and transforming the discourses, as well as the social impacts

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<sup>3</sup> See Chapter 2: for a review of some formative literature in this field.

and policy outcomes of this discourse. This framework has proven very valuable in the study of the Chinese climate change discourse.

#### *1.4.1.3. Institutions and (multi-level) environmental governance in practice*

In this thesis I follow Lemos and Agrawal (2006) in understanding environmental governance as “synonymous with interventions aiming at changes in environment-related incentives, knowledge, institutions, decision making, and behaviors.”

Environmental governance makes use of “regulatory processes, mechanisms and organizations through which political actors influence environmental actions and outcomes” (Lemos et al. 2006).

Based on climate change being a part of constructed nature, environmental governance in the area of climate change in China takes place in the discursive realm or space of what climate change means in China. Discourses, according to Hajer (1995b) furthermore possesses an institutional, or even institutionalising nature. The use of institutions in Chapters 5 to 7 hence follows from an understanding of institutions as sedimented discourses (Howarth 2000). This thesis goes beyond seeing only formal organisations as institutions, and rather includes existing government structures and rules related to environmental and climate policy, but also other tools and processes established in environmental governance. Hence I chose to borrow from the different strains of new institutionalism (described in detail in Chapter 2.3) and follow Soltan (1998) in defining institutions as “abstract objects that can be the basis of choices, ranking alternatives and determining their values, and thus providing a basis for accepting some alternatives and rejecting others.” Their influence on human behaviour is largely consistent in repeated situations as well as for different actors. Besides analysing the concrete cases of environmental

governance in designing and implementing transport policy and emission trading system pilots to further climate change mitigation in China, my thesis will therefore – guided by the research questions – elaborate in what way and to what degree culturally normative, historical or rational influences shape the origin and evolution of institutions in environmental governance in China. The hypothesis is that country-specific factors of the political ecology, and discourse in particular, play an important role in this and that new institutional arrangements to govern the environment in any mitigation mechanism will evolve in a strongly path-dependent manner and within the boundaries set by discourse.

“The multiscale character of environmental problems – spatially, sociopolitically, and temporally – adds significant complexity to their governance.” (Lemos et al. 2006) As Chapter 6: of my thesis shows, an analytical focus on questions of scale, multi-level governance and institutional origins as well as implications – combined with a clear understanding of the localities in which GHG emission reductions are to be achieved – is in any case appropriate when examining possible new approaches to mitigation. It lays out how in the case of transportation in Beijing, China, GHG mitigation activities affect and are affected by institutionalised decision making at city, province and national level, and discusses focusing on activities that have a GHG mitigating effect. It shows how local emissions are influenced by a mixture of policies and measures, which originate at national and municipal level, and which are designed to reduce different parameters that as a whole determine transportation emissions. The environmental governance of transportation emissions in Beijing is well developed and constantly evolving; it is however not yet linked up with the international climate regime. My paper thus explores the question of how to address

a complex environmental problem through the design of a governance mechanism that works across multiple levels of governmental authority, and at the same time builds on the institutional heritage of a particular place. Concretely, the question is how a GHG mitigation mechanism could provide a linkage between the Beijing transport sector and the international community in order to generate international carbon finance – either in the form of direct funding or through the use of carbon markets – to further incentivise mitigation action in Beijing’s transport sector.

In Chapter 7, I present the emerging Chinese carbon market as a case of *governance through pilots*, which refers to a practice in China, where new policies or policy instruments – often controversial at the time – are regularly tried out at in designated areas at the local level, with the explicit or only implicit approval of higher levels of authority, as studied in depth by Heilmann (2008b; 2008a; 2009). Framing the topic in this way obviously relates back to the question of how environmental governance is implemented across multiple levels of government as well as how and why it is increasingly decentralized (Lemos et al. 2006). I follow a path of identifying how carbon markets as a form of environmental governance through pilots on the one hand follows from the discursive space that has opened up through the introduction of the ‘low carbon economy’ frame of climate change, and GHG mitigation is thus institutionalized as sedimentation of discourse (Howarth 2000). On the other hand, emission trading schemes, as compared to carbon taxes, follow from institutional choices for environmental and energy governance that have been made in the past and at different levels, and now lead to the preference of mechanism over others.

#### 1.4.2. Methodology – doing research in China

Doing research in China for this thesis has meant working with flexible theoretical frameworks, and adaptably using several different methods, which this section describes and justifies in broad terms. Each paper provides detailed insights into the choice and execution of methods used for the particular part of research. The concentration of this thesis on qualitative data collection methods, when useful combined with quantitative analysis, has allowed me to capture the diversity of characteristics in the nature of the Chinese climate change discourse, and how it lends itself as the background to the evolution of certain institutions for climate change mitigation before others.

Adopting mixed methods (Bryman 2006) comprising semi-structured interviewing, media and numerical data analyses, and participant observation in research processes close to the government, data was collected between 2008 and 2011.

##### *1.4.2.1. Participant observation*

Participant observation is a key qualitative research method at the heart of this thesis, as it aims to deeply engage with the place of study. This research has benefited tremendously from my association with research and consulting projects as outlined below. I have been able to gain access to a variety of stakeholders involved in the discussions of possible new mitigation mechanisms, both at national level and at the local level of Beijing municipality as well as emission trading system (ETS) pilot test sites.

The fieldwork that I undertook in China was in part supported by overlapping projects of the *Oxford Institute of Energy Studies* (“Clean Development in China” (Allsopp et al. 2008)) and Ecofys and the Energy Research Institute of China (ERI),

which both contain components that are examining the implementation of new mitigation approaches in China, and which I have been able to follow from design through implementation and analysis. Especially the work with Ecofys has been valuable, as

“Consultancy fieldwork offers us opportunity to gain practical insights that can benefit theoretical and academic debates, to access particular types of data that one could not have collected through conventional fieldwork, and, importantly, to access the political decision-making process that would be very hard to get into through normal fieldwork channels. It also provides opportunities for us to rethink purely theoretical positions.” (He 2006)

In contrast to some research methods (e.g. questionnaires), which see personal distance to the study subjects as beneficial, participant observation aims to understand the social world from the point of view of the subject of study. As a research method it provides a high level of flexibility, aiding the convivial nature of the paper route to thesis publication, and it can result in deep knowledge of high quality on a certain topic.

It is important to note that this method can be criticized for limiting the scale and scope of the study topic, and thus the generalizability of the results. Based on my academic background as a student of modern China, speaking Chinese fluently, and with the resources at my disposal – i.e. the ability to spend significant time in close interaction with the relevant political, media and academic circles in China – participant observation was however an obvious choice to generate much of the qualitative knowledge at the basis of this thesis.

It would not have been promising to embark on fieldwork research in China without a proper set of connections, cooperation partners and affiliations to trusted and valued organisations (Gold et al. 2002). These reciprocal social connections that can

be either official or personal – *guanxi* in Chinese – have enabled me to make use of the networks that dominate Chinese daily life. Since official research permits have lost their importance in China in practice, *guanxi* remain essential to gain access to important stakeholders and data in the field. My close contacts to two departments of Tsinghua University – the leading knowledge centre for technical as well as social science studies of climate change in China – as well as the Energy Research Institute have been very valuable in this sense. Initial contacts there and trust that was built up during research and consulting project interactions have lead to connections to many other academics, policy makers as well as stakeholders in the business community that I have been able to interact with and interview.

Studying elements of discourse as different cases – theoretical in the case of historical responsibility, spatial in the case of transportation in Beijing and conceptual in the case of ETS pilots – has proven to be an appropriate way to provide in-depth analysis through ‘intensive research’ (Sayer 2000). Environmental as well as other policies have in the past routinely been ‘tried out’ in pilot projects in one or more provinces (Ma et al. 2000; Lieberthal 2004) in China before being widely disseminated – the Clean Development Mechanism being no exception (Ellermann 2007). Apart from the overreaching investigation of the Chinese climate change discourse, the cases that are illuminated in the third, fourth and fifth papers can therefore provide valuable insights, which deepen the analysis further and contribute to answering the overall research questions beyond their individual study case (Gomm et al. 2000; Schofield 2000; Stake 2000).

#### 1.4.2.2. *Interviews*

The second method of data collection that I used widely during this research is of qualitative nature as well.<sup>4</sup> For the analysis of the climate change discourse in particular (Chapters 3 and 4), I conducted 45 interviews with journalists from newspapers, magazines as well as television, who are involved in reporting on climate change, many of them also present at the international negotiations in Bali, Poznan, Copenhagen and the intermediate sessions in Bonn. Further seventeen interviews with policy-makers and academics complemented the focus on the media with insights of those who are involved in the ‘production’ of climate change in a post-structuralist sense, for the first and second papers.<sup>5</sup> Access to key informants for the fourth and fifth papers was primarily achieved through direct access originating out of research and consultancy collaborations as detailed in section 1.4.2.1. Those primary contacts, who were often individuals with significant professional standing and networks, were asked to identify further individuals or institutions that could contribute further insights, an approach sometimes referred to as ‘snow-balling’ (Bryman 2008). Through referrals and introductions by these ‘gatekeepers’, it was possible to get access to other individuals, where it would have been impossible through direct ‘cold’ contact by phone or email (Gubrium et al. 2001b). However, in order to avoid a bias towards a certain constituent group or ‘school of thought’, contacts were also made to a range of international, regional and local actors beyond

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<sup>4</sup> Lists of interviews conducted for this thesis are provided separately at the end of each substantive chapter, with respective citations in each chapter. For Chapters 3 and 4 the list of interviews is combined as the interview corpus overlaps.

<sup>5</sup> See Section 3.7 for a full list of interviews, including 24 individual journalists, 21 repeat interviews with some of the journalists that I was able to meet several times in different settings, and 17 interviews with representatives of government, research institutions or NGOs.

those with immediate connections and not belonging to the small Chinese climate policy circle that centres in Beijing.

A total of 24 interviews with researchers, consultants as well as representatives of government and domestic and international think tanks were conducted in 2009 and 2010 for the fourth paper (Chapter 6: <sup>6</sup> For the fifth paper (Chapter 7: ) I concentrated on local and central research institutions, local emission exchanges as well as government agencies for a total of 25 interviews.<sup>7</sup>

Paying tribute to the different backgrounds of the interview partners, interviews were generally of a semi-structured nature, allowing the discussion to move following the interviewees responses, and allowing me to pursue specific topics as they arise (Brenner et al. 1985; Gubrium et al. 2001a; Marsland et al. 2001). In the largest number of cases where the interviewees were Chinese, I conducted interviews in Chinese (Mandarin) so as to facilitate a free flow of ideas by the interview partner, be able to ‘read between the lines’ (Thøgersen 2006) and create a dynamic setting that allowed me to change the path of the interview to follow interesting information (Brenner et al. 1985; Solinger 2006). Interviews have not been recorded since this would have created an atmospheric barrier, but instead notes were taken and transcribed on the same day when possible. Interviews were conducted face-to-face, preferably in an informal setting and in a rather flexible and explorative style – a strategy that has proven extremely successful in getting access to information that very likely would have remained unmentioned in a more formal environment or in the presence of a larger group of people.

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<sup>6</sup> See Section 6.6 for a full list of interviews by affiliation and location.

<sup>7</sup> See Section 7.6 for a full list of interviews by affiliation and location.

#### 1.4.2.3. *Media and data analysis*

A significant corpus of media reports was built as the basis for the qualitative (and partially quantitative) study of the discourse in China. More than 2170 news reports in Chinese from various sources were selected as primary textual sources for the first and second papers. The whole textual corpus was used to analyse the structure and evolution of the discourse in a quantitative way, i.e. counting the occurrences of certain words and expressions. As this thesis does not attempt to be an exploratory discourse analysis in the quantitative or linguistic sense, this very simple proxy was deemed as sufficient to illustrate the change in importance of the topic in general (Fairclough et al. 1997; van Dijk 1997b). A more limited number of reports for in-depth analysis were selected that include a maximum of contrast – to cover the whole spectrum of discursive elements – as well as those with minimal contrast – to reconstruct distinguishable frames as exhaustively and exactly as possible. Given the functioning of the Chinese printed news industry, importance was attached to the most influential official news sources such as *People's Daily* and its website *People's Net* that carries many of the reports of the state news agency *Xinhua*. Chapter 5 stands out in its application of quantitative methods and theoretical concepts to explore the ethical notions underlying the historical responsibility frame that is present in the Chinese climate change discourse. It builds on theoretical concepts developed in an earlier paper which I co-authored (Müller et al. 2009), and applies them to the China country case. I use the quantitative output of the work of the *Ad-hoc group for the modelling and assessment of contributions of climate change* (MATCH) (Höhne et al. 2003) that has resulted in the submission of four technical papers to the UNFCCC and for publication in academic journals (den Elzen

et al. 2005a; Ito et al. 2008; Prather et al. 2009; Höhne et al. 2010) as a data basis.

The ethical concepts for attributing responsibility of climate change are then translated into calculations giving different numerical results to the notion of historical responsibility, a process detailed in Chapter 5.

### **1.5. Thesis structure**

The first part of the thesis, in the form of two articles, analyses the discourse on climate change in China using a post-structuralist political ecology framework.

Through qualitative analysis of reporting on climate change issues in the media, official documents and open-ended interviews with policymakers and experts, in the first paper I elaborate the dominant frames and illustrate their formative context. In this way, I aim to answer the question, what does climate change mean in China and to the Chinese? How have historical experiences and social constructions played out in forming this meaning?

The second paper goes into more detail, analysing how scholars and politicians in China have become intertwined in ‘producing’ (in the discursive sense) climate change as a political matter of concern. I look at whether the Chinese media have worked together with scientists, experts, and politicians possibly fostering public and official awareness and leading to increased political pressure; and how climate change becomes narratively enshrined in national identity – altogether resulting in a ‘climate change with Chinese characteristics’.

I find that the discourse is very specific to the country, and that through a number of frames it renders climate change comprehensible as a problem and suggests certain problem solutions before others. In the remaining articles, I therefore examine

whether and how certain framings are conducive to supporting the development of solutions to climate change, i.e. institutionalized mitigation approaches.

In the third article, I start by examining the Chinese position on historical responsibility for climate change, which has been one of the formative frames in the understanding of climate change in China and guiding the country's position towards the international community. Far from suggesting what the *correct* attribution of historical responsibility is, I put forward and discuss different methodologies for the numerical differentiation of China's responsibility in the light of the international debate on this topic, as well as the predominant framing of the question in China. It goes to note that although the framing of moral, historical responsibility is an important element of the Chinese climate change discourse, it has not led to the "sedimentation" (Hajer 1997) of the discourse into institutions or governance structures for mitigation.

With the understanding of climate change being deeply embedded in the formative country-specific discourse, I then turn to look at manifestations of another more recently dominant frame in China, that of climate change as low carbon economy. In contrast to the rather passive and defensive historical responsibility frame, I highlight how two very different aspects of a possible Chinese low carbon economy lead to the translation of discourse into sets of concepts, rules and organizational practices:

The first case, the fourth paper and Chapter 6: of this thesis, is a study of institutions and governance of three possible mitigation mechanisms that could be feasible for reducing developing country greenhouse gas emissions of a whole sector in return for financing from developed countries. A qualitative analysis of the transport sector is undertaken through the case study of Beijing municipality, using partially

structured interviews and analysis of primary information on the sector, the governmental oversight structure and relevant stakeholders. I concentrate on how the interplay of multiple layers of government on the national, provincial and city level as well as businesses and their organisations influence the possible setup and performance of mitigation mechanisms. Since any form of mechanism will be completely embedded in the Chinese context, I follow an approach of normative and sociological institutionalism to understand what the locally-specific rules, norms and decision structures are, in which it will have to function. Multi-level governance perspectives give additional insights into the interplay of various levels of authority, from local (city) government to the international climate regime. The Beijing transportation case is therefore an example how the active, internally motivated nature of the low carbon economy framing of climate change in China can support the evolution of existing governance and institutional structures into new mitigation action.

The fifth and last paper is a review of developments in the area of emission trading systems in China. Based on the increasing importance of the low carbon economy framing of in the Chinese climate change discourse, the domestic implementation of an ETS – which was still unthinkable in 2010 – has become possible. In this paper I outline how in this new area, the notion of low carbon economy leads to a sedimentation of the discourse into institutional practice. I find that the typical Chinese piloting approach to governance has been particularly conducive to this process. However the ETS case also exposes the practical capacity limitations to the full institutionalisation of an ETS, as the framing of low carbon economy does allow

for the entrepreneurial development, but still within the borders of path-dependent institutional evolution.

In summary, this DPhil thesis follows the ‘paper route’ as outlined in the University of Oxford Examinations Regulations (Oxford 2005) by

- 1) examining how climate change is framed in the Chinese discourse and the implications thereof for policymaking;

This paper is presented as Chapter 3 and has been submitted to *China Quarterly*.

- 2) looking in-depth at the formative interplay of politics, nature and the media in shaping the Chinese climate change discourse;

This paper is presented as Chapter 4 and has been submitted to *Environmental Science and Policy*.

- 3) discussing different methodologies for the attribution of historical responsibility of China and their respective results;

This paper is presented as Chapter 5. It has been published in an edited volume after being accepted through a peer-review process and appears as: Ellermann, C., N. Höhne, et al. (2011). Differentiating historic responsibilities for climate change: Exploring the case of China. China's responsibility for climate change. Ethics, fairness and environmental policy. P. Harris (ed.). Bristol, Policy Press.

- 4) analysing the multilevel governance of carbon finance in the transition to possible new mitigation mechanisms in the transport sector of Beijing municipality;

This paper is presented as Chapter 6 and has been submitted to *Global Environmental Change*.

- 5) giving a critical assessment of the piloting approach to introducing emission trading systems against the backdrop of Chinese environmental governance and related institutional evolution.

This paper is presented as Chapter 7 and has been submitted to *Environmental Policy and Governance*.

The thesis closes with final remarks and conclusions to be drawn from the present body of research and providing suggestions for areas of further research.

## **1.6. Summary**

In this thesis I explore how both the prevailing climate change discourse as well as existing institutions have a strong influence on the areas in which a new mitigation approach can be developed in China and the form it can take. First, the hypothesis is that climate change is framed differently in the Chinese discourse compared to western discourses, influencing the range of options available in policymaking. Second, (new) institutionalism suggests that the historical, economic, political and cultural contexts (including discourse) determine the origination and evolution of the kinds of institutions that would come into play in the design and implementation of new mitigation approaches in China. Experience from the CDM so far corroborates this second hypothesis and shows that an intensified *ex-ante* examination of the Chinese discursive and institutional environment will be needed to render new mitigation approaches both politically and economically feasible in China as well as effective and efficient to mitigate climate change (Ellermann 2007).

This thesis therefore aims to give an account of some country-specific discursive *and* institutional aspects underlying environmental governance, which influence the possible success or failure of climate policy approaches in China, whether they may be of unilateral, domestic nature, or those currently under discussion for the post-2012 climate policy framework. My research focuses on the feasibility of the design and implementation of an institutional and governance setup to support greenhouse gas emission reductions in the realm of the Chinese political, economic and natural environment, as manifest in the climate change discourse. This thesis suggests that political responses to the natural challenge of climate change are strongly shaped by socially determined, country-specific factors and that post-2012 climate policy – whether linked to the international climate regime or of unilateral, domestic nature – can only be successfully implemented in China if it is firmly embedded in existing framings of climate change that allow for the proactive, entrepreneurial development of new institutions, and if it builds on established institutional structures and the interests vested in them.

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## **Chapter 2: Review of the literature**

### **2.1. Discourse analysis**

Discourse analyses or studies have come to be widely used, meaning many different things in as many different places (Fairclough et al. 1997; van Dijk 1997b; van Dijk 1997a; Keller 2007). Most of this activity owes a lot to the work of Michel Foucault (1979; 1984; 1991) and is concerned with the connection of writing/speaking as an activity or social practice and the (re-)production of systems of knowledge, the embedded social actors, the rules and resources on which this process is based and its consequences in society and politics (e.g. see Keeley et al. 2000; Robbins 2000; Adger et al. 2001).

Discourse analysis has been applied widely in human geography. Empirical studies of land or forest degradation (Zimmerer 1993; Fairhead et al. 1995; Guthman 1997; Willems-Braun 1997) have shown how local or external discourses on certain problems persist and influence decisions and policy although they do not hold when faced with material, scientific scrutiny. The interplay of knowledge and local policy-making has been analysed by others (Keeley et al. 2000; Robbins 2000) who find that locally distinct groups find different answers to similar questions, based on local discourse. Many note that discourses of the environment have a major effect on the relationship of humans to 'nature' and resulting resource use (Hajer 1995b; Liepins 2000; Warner 2000; Ingram 2007).

The history of the western, developed country discourse on climate change provides the background for much that has happened in international climate policy over the past decades. In his analysis of some western discourses of climate change, Weingart

finds that in the past thirty years “communications about climate change have abounded in mutual accusations of downplaying or exaggerating risk, of sensationalism, ‘bad’ science, inciting public hysteria, and even conspiracy” (Weingart et al. 2000). The intensity of discussions on climate change picked up in the scientific communities of the USA and European countries in the late 1970s and early 1980s, soon focussing on climate stabilization and optimal levels of carbon emissions – “the levels of pollution which nature can endure” (Hajer 1997) – based on cost-benefit analysis. After lingering in academia for some years, this debate started to inform and frame the discourse in the political communities in the late 1980s. When the Intergovernmental Panel on Climate Change (IPCC) was enshrined as a legitimate authority on climate change, many countries subsequently used its recommendations to justify political decisions and more generally informed the public discourse (Weingart et al. 2000). Concepts of ‘eco-management’ based on climate stabilization “provided a ready interface between scientists, economists, policymakers and environmentalists” (Oreskes et al. 2008; Boykoff et al. 2010) and have become institutionalized in public thinking. Framing the problem in this way has resulted in the western industrialized country discourses focusing on mitigation compared to adaptation and have obscured framings of climate change in terms of equity, (historical) responsibility, development implications and burden sharing. Framing climate change as an issue of ‘ecological modernization’ has also led to the strong prominence of market-based solutions like carbon trading and offsetting to reduce the danger of climate change (Oels 2005; Bäckstrand et al. 2006; Liverman 2009).

### 2.1.1. Discourse analysis and China

In the field of modern Chinese studies, discourse analysis has been applied in the social sciences (Duara 1991; Dikötter 1992; Fang 1994; Ma 1994; Dirlik 1997; Renwick et al. 1999; Murphy 2004), but also in medicine and psychology (Lee 1999; Wang et al. 2000). Analyses in the arena of environment or energy are less common (Downs 2004) and only one publication has so far treated the coverage of climate change in the Chinese media (Tolan 2007). There remains the need for a better understanding of the Chinese climate change discourse and its implications for the range of policy options, and the first paper of my thesis will address this topic in depth.

### 2.2. **New market-based mechanisms for mitigation**

New climate change mitigation approaches that aim to reduce emissions on the sector level are not yet applicable under the current regime, but they have been discussed for the post-2012 future at least since 2002 (Samaniego et al.).

Consequently, the larger part of the relevant literature exists in the form of policy papers developing or comparing different mechanisms. Many contributions have come from the IEA/OECD (Bosi et al. 2005; Ellis et al. 2005; Philibert 2005; Watson et al. 2005; Baron 2006; Baron et al. 2006; Baron et al. 2007), the Center for Clean Air Policy (Sussman et al. 2004; Helme 2005; Schmidt et al. 2005; Schmidt et al. 2006), the Centre for European Policy Studies (e.g. Egenhofer et al. 2007), GtripleC and Ecofys (Ward 2006; Ward et al. 2006; Ecofys et al. 2008) and various others (Bodansky 2004; den Elzen et al. 2004; Kok et al. 2004; METI 2004; Sterk et al. 2005; Siikavirta 2006; Srinivasan 2006; Bodansky 2007; Bradley et al. 2007).

As it is still unclear what form a new market-based mechanism under the UNFCCC might take, academic sources include overviews of different sectoral approaches (Grubb et al. 2006; Sterk et al. 2006), concentrate on methodological issues (Den Elzen et al. 2005c; den Elzen et al. 2008) or specific sectors (Meyer et al. 2007; Quadrelli et al. 2007). These policy and academic publications as a whole frame the possible design options of a new market-based mitigation approach in China and are thus the starting point for the analysis in the latter three papers of my thesis.

### 2.2.1. Mitigation mechanisms and China

Some authors have already touched upon this topic in connection to the Chinese situation (Srinivasan 2006; Tsinghua University et al. 2006; Yang 2008). Like in the case of the CDM some years ago (e.g. World Bank 2004), the focus is on the mitigation potential of certain sectors – e.g. transport, iron and steel and electricity (Zhang et al. 2006; Cai et al. 2007b; Wang et al. 2007a; Cai et al. 2008b; Cai et al. 2008a).

As my previous research on the CDM in China has shown, analyses of technical or even economic potentials of a mitigation mechanism are of little predictive power as to the later success of the mechanism. This is ultimately determined by questions regarding multi-level governance, the institutional design and implementation, which – in their country-specific context – will be the topic of research in the larger part of my thesis. This research thus provides an important contribution to the theoretical underpinning for the academic and policy debate on new market-based approaches.

### **2.3. Institutionalism**

Institutional approaches had traditionally – up to the 1950s that is – been the core of political science, mainly concerned with the description of constitutions, legal systems and government systems as well as their evolution over time (Rhodes 1997; Lowndes 2002). Their dominance in political science was first replaced by behavioural approaches that “were devoted to dismissing the formalisms of politics – institutions, organizational charts, constitutional myths and legal fictions – as pure sham.” (Goodin et al. 1996) Later-on ‘rational choice’ captured many political scientists attention, stressing formal order, quantitative analysis and mathematical rigor (e.g. Elster 1986).

By the end of the 1980s institutionalism had returned to prominence, albeit in a new shape, allowing political scientists to “no longer think in the either/or terms” and at times limiting sets of assumptions of behavioural and rational choice models (Goodin et al. 1996), but use a blend commonly called ‘new institutionalism’ after March and Olsens (1984; 1989) seminal work. They convincingly argue that “the organisation of political life makes a difference” (March et al. 1984). However there has never been a single ‘new institutionalist’ approach, but the term rather comprises a range of developments that have since developed (Hall et al. 1996; Hall et al. 1998; Peters 1999). Their main differences can be understood in the way they conceptualize how and why institutions originate, how and why institutions change (Peters 1999) and how institutions affect the behaviour of individuals (Hall et al. 1998).

‘Historical institutionalism’ understand institutions as organisations as well the rules and conventions promulgated by formal institutions (Hall 1986; Ikenberry 1988;

Steinmo et al. 1992). Institutions are seen to provide moral and cognitive templates for interpretation and action. They are thus relatively resistant to redesign, their evolution is strongly path-dependent and they condition policy by encouraging societal forces to organise along some known lines and opt for long-accepted solutions to problems (Krasner 1988; Jenson 1989; Collier et al. 1991; Pierson 1993). Economists have contributed by stressing the inefficiencies generated by existing institutions, their path dependent evolution and the possibly resulting unintended consequences (North 1990).

‘Rational choice institutionalism’ understands institutions as rational solutions to collective action problems, lowering the (transaction) cost compared to a situation without institutions (Williamson 1985; Shepsle 1986; Shepsle et al. 1987). Rational choice institutionalists rely on traditional neoclassical assumptions – i.e. actual institutions as the optimal outcome of several competing institutional options and institutions as a solution for rationally calculating individuals (Hall et al. 1998).

Some later studies have led the way for more common ground between the rational choice school and other strains of institutionalism, stressing the value of norms and ideas offering points for rational actors to converge (Garrett et al. 1993) and rational selection of new institutions for instrumental purposes, but from a menu of alternatives that is available in a given society or culture (Ertman 1997).

‘Sociological’ or ‘normative institutionalism’ defines institutions as practices that are culturally specific, assimilated into organisational form and transmitted like culture (Meyer et al. 1977; DiMaggio et al. 1991). This broad definition at times blurs the divide between institutions, ideas and culture (Scott 1994; Campbell 1998) when asserting that “institutions influence behaviour by providing the cognitive scripts,

categories, and models that are indispensable for action” (DiMaggio et al. 1991) and placing institutions in a social-constructivist context (Wendt 1987). New “appropriate” institutions enhance the social legitimacy of an organisation or its participants, but are not necessarily efficient or strictly instrumental (DiMaggio et al. 1991; Jepperson 1991; Zucker 1991).

### 2.3.1. Institutionalism in China studies

Institutional analysis has been widely used in the study of modern China – either explicitly or implicitly – e.g. more recently in the fields of economics and development (e.g. Child et al. 1996; Wang 2000; Horowitz et al. 2002; Hafsi et al. 2005), law (e.g. Mertha et al. 2005) and politics (e.g. Brødsgaard 2002; Glaser et al. 2002; Wang et al. 2005b). However research on China is rarely clearly attributable to one of the ‘schools’ identified above, but often use approaches that integrate various ideas, striving to provide the most valuable and valid insights.

Similarly, influential literature in Chinese studies touches on institutional aspects, for example cultural models exhibiting shared features with historical and normative institutionalism (e.g. Pye 1992; Dittmer 1996; Fewsmith 2002), bureaucratic politics models focusing on the process of decision-making and implementation (e.g. Lampton 1987; Lieberthal et al. 1988b) and clientelist models concerned with informal, personal relationships (e.g. Nathan 1973; Walder 1986; Oi 1989).

Several authors have analysed institutional issues of environmental politics in China (Ma et al. 2000; Zhao et al. 2003; Gu et al. 2005; Carter et al. 2007; Li 2007a). This thesis will contribute to the institutional literature in the rather new field of climate change politics in China, which has so far only seen rather descriptive treatment of formal institutions (Teng et al. 2007) and their evolution in face of international

pressure (Heggelund 2007; Yu 2007). In-depth institutional analysis of the design and implementation of climate change mitigation efforts in China supported by extensive fieldwork is still lacking and this thesis will add to the broader research agenda on institutional change in China.

#### **2.4. Multilevel governance**

Political science research of climate policy has traditionally been mostly concerned with the interaction of nation-states. Authors have used regime theories to provide insights into the processes of the UNFCCC and the Kyoto Protocol, focussing on the positions and struggles between member states (Luterbacher et al. 2001; Depledge 2006; Harris 2009; Okereke et al. 2009). More recently, non-nation state actors from NGOs to businesses as well as sub-national entities have received considerable attention (Collier 1997; Deangelo et al. 1998; Schröder et al. 2009), and in the geographies of climate change, a new focus on multi-level governance questions of climate change has appeared (Betsill et al. 2007). “Climate change is an issue that requires integrated action at multiple levels of government and within the spheres of politics, economics, and society.” (Okereke et al. 2009). Governance broadly concentrates on the set of actors, processes, decisions, institutional structures and mechanisms that determine a course of action, including the division of authority and underlying norms. It therefore draws on theories of the state, the role of non-state actors (for example businesses and NGOs) and institutional organization. Multi-level governance stresses the particular importance of the interactions between actors and institutions, especially those at different scales of authority. As Bulkeley (2005) points out, theories of ‘global environmental governance’ with their careful

consideration of scale, hierarchy and territoriality can provide important insights into problems of governing climate change.

City governments for example have considerable influence over transportation and thus the emissions from that sector within their jurisdictions. Indeed, Collier (1997) in one of the early works on multi-level governance applied to environmental problems identifies transportation as one of the main policy areas, in which climate policy has a local dimension. "It is often argued that the local is the most appropriate political jurisdiction for bringing about any necessary reductions in these emissions" (Betsill and Bulkeley 2006), and therefore a view at the local – city or province – level is warranted. While mitigation in the end always happens at the local level, the political, social and economic determinants are set at a variety of scales and levels of authority, spanning vertically from national to provincial to city government as well as horizontally from industrial to research to energy policy, and so on. A multi-level governance approach then captures the interactions, in which actors articulate authority and power across and between those scales, and the institutions that develop around these interactions.

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## **Chapter 3: Paper 1: Chinese framings of climate change. From moral responsibility to low carbon economy**

*Christian Ellermann, Maximilian Mayer*

### *ABSTRACT*

Through a discourse analysis of the Chinese framings of climate change, this paper asks the questions, what does climate change mean in China and to the Chinese? How have historical experiences and social constructions played out in forming this meaning? The discourse, which is specific to the country, renders climate change comprehensible as a problem and further suggests certain problem solutions before others. In a political ecology framework, seeing nature as a social construct, we can contribute to a deeper understanding of the evolution of China's domestic and international climate policies, going beyond the usual realist focus on strategic national calculus. Basing our research on interviews with Chinese media, academics and politicians, as well as textual media analysis, we uncover a monumental shift in parts of this discourse. The dominance of certain frames has changed significantly, resulting in different subject positions for China, which could eventually also alter China's international position on climate change.

### **3.1. Scrutinizing China's climate policies**

In contrast to the common perception that China's stance in international climate negotiations can be simply derived from realist interests, our analysis aims at

transcending an exclusive focus on China's assumed national strategic considerations. Western climate-related social science research on China has generally concentrated on assessing mitigation policy activities (see for example Heggelund 2007; Teng et al. 2007; Qian 2008; Yang 2008; Hallding et al. 2009) and followed the Chinese official negotiation position at the United Nations Framework Convention on Climate Change (UNFCCC) (e.g. Lewis 2007; Bosetti et al. 2009). This work has contributed to a much better understanding of the issue, yet in essence, it is either looking at the country from the outside or it remains reduced to a purely rationalist perspective. Using a political ecology framework, this paper understands climate change in China as a socio-political construct (Demeritt 1998), which is thoroughly formed by (shifting) social, political, historical, cultural and natural forces present in the country itself, and its interactions with the international community (Escobar 1996; Bryant 1998; Adger et al. 2001).<sup>8</sup> Through a discourse analysis of the Chinese framings of climate change, this paper therefore proposes to ask the question, what does climate change mean in China and to the Chinese? How have historical experiences and social constructions played out in forming this meaning? Only then we can properly understand the evolution of China's climate policies (Oels 2006). This discourse analysis is in effect the first step of my thesis in combining the natural or ecological of climate change with the political, It uncovers a monumental shift in parts of the discourse, which could eventually alter China's international position on the topic.

Over the past years, pressure has steadily increased on China to play a greater role in mitigating greenhouse gas (GHG) emissions to avoid dangerous climate change.

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<sup>8</sup> See Section 1.4.1.2 for a more detailed description.

Increasing importance has been attached to climate change in China's policy developments as well. The inter-ministerial National Coordination Committee on Climate Change (NCCCC) was established in 1998, shortly after the conclusion of the Kyoto negotiations, and a National Leading Group to Address Climate Change was set up in 2007 under the chairmanship of Premier Wen Jiabao. Numerous national policies and measures, and their translation into amounts of emission reduction are outlined in the National Climate Change Programme and the State Council White Paper on China's Policies and Actions on Climate Change in 2008 (State Council 2008; Yan 2010). They include energy efficiency actions, renewable energy policy, transport (fuel economy standards), building standards, reduction of non-CO<sub>2</sub> greenhouse gases, afforestation actions, and the Clean Development Mechanism (CDM). In addition, before the Copenhagen climate summit in 2009, the country committed to unilateral mitigation actions leading to 40-45% reduction in the carbon dioxide intensity of the economy (China NDRC 2009; China NDRC 2010b). Climate-related policies also claim a prominent role in the 12th Five-Year-Plan (China Daily 2011), and most recently China is experimenting with GHG emission trading schemes.

In brief, China has not only emerged as the biggest GHG emitter – a fact that Chinese officials don't dispute – the Chinese government has also pursued a complex climate change strategy, including numerous plans, policies and regulations. This appears to contradict what we see in the international negotiations where Chinese negotiators have focused on 'common but differentiated responsibilities', technology transfer, and other similar topics. This core principle of the United Nations Framework Convention on Climate Change (UNFCCC) mandates developed

countries to take the lead on emission reduction while leaving space for countries like China to prioritize their own (sustainable) development. If the focus on these topics originates from internal discourse of climate change, what are the features of this discourse and how has knowledge of climate change developed in China, i.e. what does climate change mean in China and to the Chinese?

In order to understand China's climate policies, this article argues that we have to explore the meaning of climate change for the Chinese.<sup>9</sup> We assume that for certain positions to make sense, and concrete policy to come into existence, a discourse has to render climate change comprehensible as a problem and further suggest certain problem solutions before others. Our argument proceeds along the following line: after having conceptualized climate discourses in the next section, we detail the relative importance of climate change vis-à-vis other issues. We then explore the different framings of climate change in the Chinese media and policy circles and highlight the shifting subject positions. In conclusion, the political relevance and methodical advantages of a 'cultural' political ecology approach to climate change are discussed and possible areas for future research are suggested.

### **3.2. Conceptualizing climate change discourse**

It does not come as a surprise to students of political ecology and science studies that different understandings of the topic have ultimately contributed to the slow progress of the international climate change negotiations in spite of the IPCC's claim to universal consensual knowledge of the science behind it. Indeed, multiple works have demonstrated that the environment is not simply a matter of fact, but a

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<sup>9</sup> This article adds to the few studies of Chinese contemporary discourses on social science topics in general and those of (global) environmental problems in particular. For an example of a related work in the field of energy security, see China Daily (2011). Key targets of China's 12th five-year plan. *China Daily*. Beijing.

fundamentally social and political construct (Watts 1983; Demeritt 2002; Forsyth 2003; Zimmerer et al. 2003). Discourse studies of environmental and climate politics – although meaning many different things in as many different places (Hajer et al. 2005; Bäckstrand et al. 2006; Pettenger 2007) – commonly point to struggles over or the social production of the natural. The majority of this work owes much to the writings of Michel Foucault and is concerned with the evolving systems of knowledge, the embedded social actors, the rules and resources on which this process is based and its consequences in society, i.e. the production of meanings of political issues and respective rational solutions (e.g. Fairclough et al. 1997; van Dijk 1997a; Oels 2006; Keller 2007).

Accordingly, discourses may be contested in different parts of the world, for instance producing specific yet contradictory subject positions (Fischer 2003; Epstein 2008) for the involved actors, and they can change – slowly over time or even abruptly. To fully understand climate change beyond its physical and chemical dimensions, the social framing of this issue is highly relevant (Nisbet 2009). How is climate change embedded in different social, cultural, scientific and practical contexts? What are constants, and what alterations in the meaning of climate change have been taking place within China?

We assert that the climate change discourse in China – as elsewhere (Trumbo 1996; Carvalho 2007) – is structured around a few recurring frames. Frames present a complex and contradicting problem in a clear-cut yet reduced storyline or portrayal. Each frame of climate change “emphasises certain aspects of the issue, while de-emphasising others” (Hulme 2009). China is thus theoretically construed as a distinct ‘knowledge community’, in which beliefs about the verity, legitimacy, and

applicability of particular forms of knowledge are transmitted, maintained and re-enforced (Büger et al. 2007). A frame may also appeal to specific selected audiences, it can for instance be prominent in the scientific community, while others are more intensively discussed in mainstream media and the public at large. Frames are also decisive for decision-making processes. Although the process of framing is interactive and involves multiple participants (Scheufele 1999), many studies focus on elites and media as decisive actors that determine how a problem is discussed in the public (Entman et al. 1993; Callaghan et al. 2001). Analysing frames stresses the “role of political language and worldviews in the construction of plausible, meaningful and socially relevant pathways that can enrol a majority of stakeholders and citizens in collective action.” (Fletcher 2009)

In China, where media coverage is strongly guided by the state, framing can thus be partially understood as a strategy of “political communication” to the public (Scheufele et al. 2007). The description of the frames makes it possible to investigate the formative interplay of the scientific, cultural, and political forces behind them,<sup>10</sup> to uncover ‘common sense’ in the Chinese discourse, as well as to expose hidden meanings and silences (Shi-xu 2005). So the question is, what are those frames and which subject positions do they provide for the country at large, its government, population and others? Over time, how have particular frames developed and changed in prominence?

In contrast to the well-developed political ecology literature on other international environmental problems, no attempt has been made thus far to systematically assess the Chinese discourse of climate change during the last decade, apart from some

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<sup>10</sup> See Chapter 4 for an explanation of the competing forces in the ‘construction’ of climate change; as well as the paper of Downs, E. S. (2004). "The Chinese Energy Security Debate." *The China Quarterly* 177(-1): 21-41.

preliminary analyses of related news coverage (Tolan 2007; Wong 2010). One reason might be that reporting on climate change had not seen a comparable surge in China as it has in the western media since the publication of the *Stern Review* (Stern 2006b) and the Al Gore documentary *An Inconvenient Truth*. Thousands of news stories have nevertheless circulated in Chinese print media, online and on radio and television programs; state officials have made statements on topics related to climate change in many speeches, and Chinese scientists travel the globe exchanging views on the topic with their colleagues. To present a full picture, our analysis follows thus a triangulation method reflecting media coverage with ideas that have arisen in interviews with policy makers, journalists, activists and scientists and including reflexive comparisons with related scientific publications and official statements. As far as media coverage is concerned, more than 2170 textual news reports in Chinese from various sources were compiled for our study (see Table 3-1).<sup>11</sup> While the whole textual corpus was used to analyse the recurring frames, a more limited number of reports for in-depth analysis were selected that include a maximum of contrast – to cover the whole spectrum of discursive elements – as well as those with minimal contrast – to reconstruct distinguishable frames exhaustively and understand them as exactly as possible.

Given the functioning of the Chinese printed news industry, importance was attached to the most influential official news sources such as *People's Daily*<sup>12</sup> and its website

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<sup>11</sup> The process of building this corpus of materials was guided by adapted ideas of theoretical sampling developed in grounded theory, so as to ascertain that theory-based and reflected criteria led its compilation.

<sup>12</sup> The print edition of *People's Daily* however only covered climate change three times during the Bali COP in 2007 for example, plainly noting the opening and closing of the conference as well as UN secretary general Ban Ki Moon's praise for Chinese emission reduction results: "Panjiwen chengzan Zhongguo zhengfu jianpai chengguo." Strauss, A. and J. Corbin (1998). *Basics of qualitative research: techniques and procedures for developing grounded theory*. Thousand Oaks, Sage.

*Renmin Wang* that carries many of the news reports of the state news agency Xinhua. The Shanghai-based *Oriental Morning Post* offered the broadest coverage of the UN climate change conference on Bali and the topic at large. However the paper was not able to keep up this reporting during the subsequent COPs in 2008 and 2009.

*Southern Weekly* and *21st Century Business Herald* are included in the analysis as they often gave voice to Chinese officials through extensive interviews, and also provided deeper background information. The fortnightly *Caijing Magazine* has also run a large number of detailed articles on the topic and is included as one of the more independent-minded print media outlets in China. The shaded area in Table 3-1 represents the data basis in the form of textual accounts that have been used in addition to interview sources and document analysis.

### **3.3. Importance of Climate Change in media coverage**

The Chinese public discourse on the topic in the media was very limited up to around 2005, and even at the end of 2009 it still largely consists of summaries of political events, statements reflecting the Chinese negotiation positions or matter-of-fact reporting on the natural science of climate change. Scientific publication activity also only increased in recent years, following China's growing political involvement in the international climate regime, and the domestic business success of the CDM in particular, though there have been internal debates going on since the early 1990s. Given that we do not aim at a quantitative discourse analysis, we use a very simple proxy for the quantitative importance of the discourse.<sup>13</sup>

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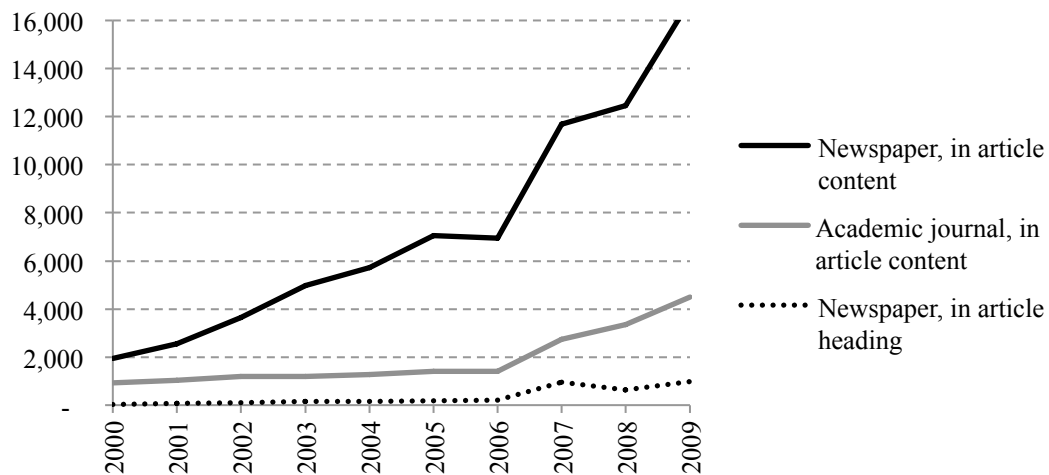
<sup>13</sup> I.e. the occurrence of at least one of the words *qihou bianhua* (climate change), *qihou biannuan* (climate warming) or *quanjiu biannuan* (global warming) that are usually used to refer to the topic, in newspaper headings, newspaper article full text and academic article title, abstract or keywords (see Table 3-1). The newspaper article search was done using an online database holding articles of 543 newspapers from city level and upwards. Ma, X. (2007). Panjiwen

Year	In newspaper article heading	Newspapers (full text)						Academic journals
		Total <sup>14</sup>	People's Daily	Oriental Morning Post	Southern Weekly	21 <sup>st</sup> Century Business Herald	Caijing Magazine	
2000	26	1,942	40	n/a	n/a	n/a	n/a	918
2001	61	2,541	47	n/a	n/a	n/a	n/a	1,038
2002	111	3,651	108	n/a	n/a	n/a	n/a	1,205
2003	161	4,972	135	n/a	19	21	n/a	1,198
2004	153	5,728	139	n/a	29	35	n/a	1,279
2005	190	7,052	166	51	16	54	n/a	1,406
2006	199	6,958	211	-	3	62	-	1,418
2007	945	11,701	526	153	35	159	9	2,733
2008	641	12,474	425	112	28	201	6	3,347
2009	988	16,837	566	113	63	468	21	4,509
2010	686	19,045	638	84	81	336	n/a	n/a

**Table 3-1. Occurrences of the words *qihou bianhua* (climate change), *qihou biannuan* (climate warming) or *quanjiu biannuan* (global warming).**

chengzan Zhongguo zhengfu jianpai chengguo. *People's Daily*. Beijing: 1. Academic journals were accessed through CNKI. (2010b). "Zhongguo zhongyao baozhi quanqwen shujuku." from <http://epub.cnki.net/grid2008/index/ZKCALD.htm>.

<sup>14</sup> The total includes the five newspapers selected for this study plus all others from the database.



**Figure 3-1. Change in media and scientific publication activity on climate change.**

Although media coverage of the topic has picked up somewhat in recent years – especially since the Conferences of the Parties (COP) to the UNFCCC have increasingly become global media events – climate change and related issues did not rank prominently in the official measures of public concern. For instance, the National People's Congress and the Chinese People's Political Consultative Conference publishes an annual survey of the topics that are of most concern to the Chinese people. Since 2005 ‘energy saving and emission reduction’ only made it onto the list once in 2008, in 14<sup>th</sup> place of the most pressing problems, and ‘low carbon economy’ appeared in the last spot in 2010. Climate related topics do not show up in the surveys of other years, which all exhibit employment and social security topics as the largest concerns (NPC 2010). Using the prominence of newspaper reports as a quantitative proxy for relative importance to other topics (e.g. localized environmental pollution, corruption, real estate prices) reveals a similar picture.

### 3.4. Chinese framings of climate change

The Chinese understanding of climate change can, based on our analysis of the discourse, be boiled down to five main frames. Needless to say, climate change has diverse meanings to the actors involved – whether policy makers, business representatives, social and natural scientists or different spheres of the broader public. Because of this, and the drastically changing nature of the discourse, it is impossible to make a definitive claim about an order of importance of the frames presented here. *In toto* however, we believe that they constitute the main elements of *what is climate change in China*. Table 3-2 provides a short overview of the characteristics of the five frames that are described in detail below.

Frame	Subject position of China	Political arena
<b>Mitigation hurts economic growth</b>	Dilemma position	Economic development
<b>Moral responsibility of the developed countries</b>	Group leader of the underprivileged	Image seeking
<b>‘Ecological imperialism’</b>	Victim	Power politics
<b>Technological fixes</b>	Engineer	Modernization
<b>Low carbon economy</b>	Economic entrepreneur	Economic development

Table 3-2. Overview of frames.

#### 3.4.1. Mitigation hurts economic growth

For a long time, roughly until 2009, the framing of climate change mitigation as incompatible with growth generally prevailed. Similar to Western climate discourses, the related debate was a classic case where “‘truth claims’ are embedded with certain worldviews, judgments and preferences” (Carvalho 2007). Uncertainty over the macro-economic effects of GHG mitigation on growth exists in China just as in other

countries. Following a common factual assertion by Chinese politicians that mitigation has a negative impact on growth, it is politicized and used to legitimize a comparatively passive stance towards an ambitious climate policy that is independently motivated – i.e. more than a relabeling of national energy policies. The Chinese media gives credibility to the frame by not only citing domestic officials, but also routinely referring to authoritative figures like Yvo de Boer, the former head of the UNFCCC or United Nations Secretary General Ban Ki-Moon and many others. There are hardly any direct assertions of a contradiction, but statements like “[when it comes to mitigation] we have to consider that developing countries need room for economic development” (Kong 2007) nevertheless suggest this. In the light of this framing, it is not surprising that in all reporting connected to climate change in China during the period covered, international absolute emission reduction targets for China are bluntly rejected with references to the country’s right to economic development, e.g. “during the period when the economy starts to take off, mitigation usually comes at the cost of development” (Deng 2007). This frame depicts mitigation in China as something that is not in the country’s self interest, and low carbon development as something costly (even if ultimately desirable). It concentrates on GHG mitigation as policy purely for the purpose of avoiding global climate change, introduced through the international negotiation process. As of 2011, a substantial shift has appeared, suggesting that mitigation activities coincide with the energy policy needs of the country rather than depicting it as something forced onto China by the international community (see 3.4.5).

### 3.4.2. Moral responsibility of the developed countries

As China has put forward a coherent climate policy since 2007, the government's views on historical responsibility for this problem and China's role have become manifest in various official documents and submissions to the UNFCCC processes (see for example China NDRC 2007a; China MOFA 2008). Likewise in the media, the UNFCCC principle of 'common but differentiated responsibilities' is referred to in a majority of news reports, especially those that are based on sources disseminated by the Chinese state news agency *Xinhua*. The focus of this general principle – i.e. the parameter by which to differentiate responsibilities (as in future duties) – in the Chinese discourse is generally twofold: historical responsibility (as in accountability) for past greenhouse gas emissions and moral responsibility (as in blame) for high per capita emissions, although the former is much more commonly found than the latter. Climate change in this frame is discussed as a moral issue and not primarily as a problem demanding scientific environmental management as in the west.

With the moral principle of 'common but differentiated responsibilities', the concept of historical responsibility for climate change is placed at the heart of the Chinese climate change discourse by the media, at least when it comes to the Chinese position in the international negotiations. Newspapers attribute legitimacy to their claims and increase the relevance of the frame by citing an authority like the UNFCCC executive general or UN secretary general who stated that it plays a "very important role at the climate conference in Bali" (Lin 2007). On numerous occasions, these officials and also European Union representatives, heads of multilateral development banks, and delegations to the UNFCCC are likewise cited, conceding that any agreement must take this principle as a central point (Liu 2008).

Moral responsibility is also derived from the higher per capita levels of emissions in industrialized countries compared to China's, which stand roughly at world average (Höhne et al. 2007). Reporting on this topic commonly concentrates on the high emissions intensities of others and ignores China's domestic performance (see for example Chen 2007). While per capita emissions figures are commonly discussed as an indicator of moral responsibility, a differentiation between countries with high and low GHG emissions per unit of economic activity is nearly non-existent. The omission is noteworthy, as China's bad performance on this indicator would contradict the general theme of the moral responsibility frame that is so dominant in the Chinese discourse and would question the country's self-proclaimed high moral ground in this regard.

The moral responsibility frame supports a certain narrative that on the one side is common to the official position that China takes internationally, and the representation of climate policy dynamics in the media on the other side:

<b>Developed countries</b>	<b>China / developing countries</b>
Responsible Immoral emitters	Not responsible Morally superior
Have not taken enough action Have to increase mitigation	Already undertakes a lot of efforts <sup>15</sup>
Have to increase finance and technology transfer	Pardoned for inaction until others' support is sufficient
Actions have to be monitored, reported and verified	Should not receive outside interference

**Table 3-3. Narrative enshrined in the moral responsibility frame.**

<sup>15</sup> One of only three articles in the print edition of *People's Daily* during the Bali conference in 2007 for example had Ban Ki-Moon praising China for its successes in avoiding greenhouse gas emissions. CNKI. (2010a). "China academic journals full-text database." from <http://china.eastview.com/kns50/Navigator.aspx?ID=CJFD>.

Clear subject positions and resulting duties are distributed in this narrative that is based on the underlying moral framing of climate change in China: “Ethical mitigation: the West must lead” (Doulton et al. 2009). This is also evident from Chinese academic literature, where the authors concentrate mainly on direct historical contribution of countries to the main greenhouse gas – that is CO<sub>2</sub> emitted through the use of energy (He et al. 2000; Zhao 2007; Xu et al. 2008). An analysis that goes beyond directly equating contribution shares to historical responsibility is lacking, and the level of depth largely stops at the developing/developed country divide.<sup>16</sup> Comparing current (1990-2010) with historical contribution shares, Chen et al. conclude for example that China’s interests would not be served if it were singled out from the group of developing countries in analysing historical responsibility (Chen et al. 1999).

Without questioning the validity of the claims made about the role of historical responsibility,<sup>17</sup> it is central to grasp the actual importance of this storyline in the Chinese discourse that is also stressed by Chinese policy makers and people in academia, although some admit it to be a bargaining chip in the negotiations (Interviews 15, 18 and 33). This importance does have consequences for international cooperation in climate change mitigation. While the EU for example has been pushing for talks on future reduction targets and mechanisms, China has been pushing to review to which degree the developed country Parties had fulfilled their commitments that stem from their historical responsibility. As a result, two

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<sup>16</sup> For a deeper analysis of this topic see Ma, X. (2007). Panjiwen chengzan Zhongguo zhengfu jianpai chengguo. *People's Daily*. Beijing: 1.

<sup>17</sup> On the contrary, not only NGOs argue for a stronger presence of this kind of moral discussion in western debate, e.g. Ellermann, C., N. Höhne and B. Müller (2011). Differentiating historic responsibilities for climate change: Exploring the case of China. *China's responsibility for climate change. Ethics, fairness and environmental policy*. P. Harris. Bristol, Policy Press.

different discourses lead to a situation in which it is difficult to find a common language on the issue (Moder et al. 2004).

### 3.4.3. 'Ecological imperialism'

At the core of this frame is a generalized assumption among policy makers, many researchers and much of the media that international climate policy as practiced under the UNFCCC serves developed country purposes:

“Europe [...] has comparative advantages in greenhouse gas mitigation because of its stable or decreasing population size, its mature and steady economy, modern technology and administration and relatively saturated energy demand. Strongly promoting progress on climate change and maintaining the leading role in [related] international affairs matches its political strategic interests.” (Chen 2007)

Chinese leaders are regularly cited as concerned about global warming itself, but climate change as a political field is usually framed as an arena of power politics, as in this motion to the National People's Congress (NPC) and Chinese People's Political Consultative Conference (CPPCC):

“On the one hand, some developing countries want to make the climate change problem into a tool and method to suppress the development of China and other developing countries. On the other hand, climate change has negatively affected the development of China's economy and society.” (China NPC and CPPCC 2010)

'Ecological imperialism' constructs climate change as a strategic topic. Unlike in ecological modernisation, the focus is not on how to manage climate change efficiently and effectively, but it is used as a tool in the strategic considerations of international powers. The Chinese government has been acting accordingly in the international negotiations and has for example placed great importance on stressing commonalities with other developing countries and on the use of alliances. This approach is also reflected in the public media discourse:

“China also actively plays a coordinating role among the ‘Group of 77 plus China’ and promotes the unity of the developing country camp.”  
(Chen 2007)

In the media, relatively little direct analysis of Chinese positions and interests in international climate policy can be found. A lot of attention is however given to the concerns of other individual developing countries or the developing country block as a whole. Particularly in press organs closer to the government, direct quotes abound of developing country representatives who express their concern over (economic) suppression by developed countries.

While it is appropriate to understand this reporting as association of China with a bigger group of developing countries for a certain purpose, it is also necessary to read a bit further between the lines. Chinese journalists do not feel at ease to make statements about China’s role as contributor or provider of solution to the problem that go beyond the official government line (Interviews 5, 16 and 26). Instead, they frequently let ‘substitute stakeholders’ speak, especially those from the same, developing country ‘camp’ (Interviews 16, 25 and 27). When for example the Indian prime minister complains in a China Daily article about undue pressure from developed countries (Zhou et al. 2007), we can safely assume that the average reader understands this as official support and sharing of the sentiment of this statement.

The ‘ecological imperialism’ frame is manifest in many articles which contrast *what they (the developed countries) demand [subjectively]* with *what is reasonable [objectively]* (e.g. Ren et al. 2008). Even though climate policy has evolved greatly domestically in China and new targets, programmes and activities have been promulgated since 2007, the framing of climate policy as power politics with undue pressure from the outside has seen little change during this period.

“[They] do everything in their power to escape their duties, escape from their historical responsibility. And they do everything in their power to shift off the burden and responsibility to developing countries.” (Cao 2009)

In the context of this frame, it is also useful to remember the Chinese understanding of access to the atmosphere. As has become manifest in the case of domestic CDM regulation, the Chinese government regards mitigation opportunities in the country as well as access to the atmosphere over its territory as a natural resource, and resources are by constitution generally property of the people. International policies that amount to interfering with China’s sovereign rule over its natural resources therefore have to be rejected (Ellermann 2007). The framing of climate policy as ‘ecological imperialism’ is therefore not only based on a common collective memory and history,<sup>18</sup> but also follows an established legal tradition.

#### 3.4.4. Technological fixes

The central idea that permeates this frame is an understanding of climate change rendered as something technically manageable that just needs to be fixed. In a country that is prone to natural disasters and fragile environments, climate is one among multiple environmental hurdles that are to be overcome. In this frame, which is prevalent in the current leadership generation dominated by engineers and natural scientists (Li 2008), nature is seen as posing problems to human societies, and attempts should be made to solve them by means of engineering.<sup>19</sup> China has a long record of huge technological projects for solving problems of resources, traffic, or agriculture, and Chinese leaders have never hesitated to massively transform nature through gigantic technical schemes (Elvin 2004).

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<sup>18</sup> I discuss this further in Chapter 4.

<sup>19</sup> Mao even called for a “war against nature” to confront the physical environment as an enemy. See Chapter 4.

Climate change impacts are managed through tremendous projects such as dam building and nation-wide afforestation. The so-called great green wall reaching over dozens of provinces is hailed by official sources to stop the Gobi desert from growing towards southern areas (China 2009a). This huge project, which is not without its serious critics in China, is "increasingly used as a defence against accusations of climate change irresponsibility" (Watts 2009). Canals are carved across the country to transport water from the relatively humid south to the north-eastern metropolitan regions, in which the climate is getting more arid (Berkoff 2003). In a lengthy report on how climate change impacts forest fires in the Tibetan areas in western China, the central instrument mentioned is artificial rainfall provoked by cloud seeding artillery. More than 400 scientists and engineers were engaged in research for modifying clouds and rainfall prior to the Olympics in 2008, and according to news reports, in related nationwide programs more than 37,000 people are employed at a cost of \$63 million a year (Jacobs 2009).

Compared to much of the western debate over climate change, we need to note the relative absence of a 'catastrophe' or 'crisis' discourse in the Chinese. The fact that the frame of technological fixes is still nearly unquestioned may be one important reason. Visions of imminent danger and extreme urgency have been prominent in western media, and they have arguably helped the politicization of the topic – i.e. turned climate change into a matter that (however difficult) must be tackled by political decision making (Weingart et al. 2000; Doulton et al. 2009; von Storch 2009). Whilst Greenpeace and others have successfully been invoking climate change as an eventual doomsday issue in the West (Hulme 2009), the idea that a catastrophe is about to threaten human civilisation is fairly absent in the Chinese

context. The notion of technological fixes – not only in China – mirrors a highly modern idea of controlling and exploiting nature and belongs to a period, in which politicians, engineers and scientists agree on the aim to “master nature” (Shapiro 2001b).

#### 3.4.5. Low carbon economy

“In 2010, low carbon has already become one of the keywords in China’s economic development” (Hu 2010), and with it ‘low carbon economy’ has become a key frame of Chinese climate change discourse. As in the case of ‘technological fixes’, the more recent framing of climate change as an opportunity for the development of a ‘low carbon economy’ shares a belief in the ability of the government to plan and control. While in the frame described above fixes are of a technological and engineering nature, ‘low carbon economy’ relies on a massive transformation of economic activity and, in a way, engineering a new way of development. Developing a ‘low carbon economy’ is actually framed not primarily as a matter of climate change, but as an important vehicle supporting economic restructuring, which is at the heart of government planning:

“Strategically, China has to develop a low carbon economy not only to deal with climate change and control GHG emissions, but at the same time it is a necessity of sustainable development, energy security and environmental and ecological protection.” Pan Jiahua, head of the Urban development and Environment Research Centre of the Chinese Academy of Social Sciences, as interviewed in (Xie 2010); own interview on 14 October 2010

In the media and in public debates, developing a ‘low carbon economy’ is now generally presented as factually necessary and as something valuable. Its value is strongly supported with a wide range of reasons given, as seen above. The discourse interestingly does not follow the argumentation that is more prominent in the West,

in which the need for climate change mitigation makes economic restructuring necessary (which can also have other benefits like green jobs and reduced environmental pollution). In China, the key element in this frame is not climate change as a global phenomenon, but rather a mix of industrial and energy policy prerogatives.

With the promotion of green technologies as well as renewable energies, politically the ‘low carbon economy’ frame places climate change in a broader context of the ‘limits of growth’ discussion. The context of this frame is the ever-broadening debate around the official paradigms of a ‘circular economy’ and green accounting, evaluation of party cadres based on environmental performance, and efficiency campaigns in the big polluting industries, which received an initial thrust by the Chinese promotion of green GDP accounting methods that were introduced by the State Environmental Protection Agency in 2006 (Jiang 2007b).

In high level internal debates in recent years about what sustainable development should look like in China, proponents of traditional growth models have been increasingly faced with important and powerful actors who stress the immense losses that its negative environmental externalities have produced (Gu et al. 2007; McBeath 2010), and see less fossil-fuel reliant pathways not only as compatible with growth, but also an important opportunity for economic restructuring (Interviews 59 and 60). An important part of the intensive government campaign to promote ideas of a ‘low carbon economy’ was the announcement of a new target of reducing the carbon intensity of the Chinese economy before the UNFCCC conference in Copenhagen. Carbon dioxide emissions from energy use per unit of GDP are to decrease by 40 to 45 per cent by 2020 compared to 2005. This domestic target was also submitted to

the UNFCCC as a unilateral ‘nationally appropriate mitigation action’ (NAMA) in early 2010 (UNFCCC 2001). Notwithstanding the increasing media coverage and its prominence in official speeches, the fate of the Chinese ‘low carbon economy’ was not completely certain until October 2010, when the “Opinion of the CPC Central Committee on Establishing the 12th Five Year Plan” and Premier Wen Jiabao’s related explanations were published (CPC Central Committee 2010; Wen 2010). In the first half of 2010 China Youth Daily however already reports that for example the concept of ‘low carbon cities’ – which clearly fits the ‘low carbon economy’ frame – has risen in importance much faster than the notion of global warming as such. The newspaper finds this both in the topic’s presence in (online) media as well as in the political arena, citing that it held a share of 10 per cent of motions submitted to the National People’s Congress (NPC) and the Chinese People’s Political Consultative Conference (CPPCC) in 2010 (Lin 2010). Mostly since 2010, climate change through the lens of the ‘low carbon economy’ frame has indeed received a lot of attention by way of reporting on ‘low carbon cities’ and in particular on the low carbon building sector (Wang et al. 2010a; Wang et al. 2010b; Yuan 2010 and many more). Using this frame, journalists find it relatively easy to connect climate change to people’s realities of life (at least of the urban population). This is because city development in general, and developments in the real estate market in particular are considered rewarding topics and easy to place with editors (Interview 63).

The elevation of ‘low carbon economy’ as one of the key parts of national policy has allowed – and even asked for – increasing focus of the media on this reading of the question of climate change. Chinese media outlets not only adhere to reporting restrictions of the government, but also follow the overarching agendas set by the top

leadership in their reporting. Outlets closest to the state have been at the forefront of this development. Largely since 2009, and strongly increasing in numbers in 2010, China Daily has featured articles framing climate change in this way, with topics and words used touching on a wide range of issues:

- Low carbon economy/development
- Low carbon city/district/village
- Low carbon industry/agriculture
- Low carbon product
- Low carbon real estate
- Low carbon transport
- Low carbon transformation
- Low carbon employment
- Going out low carbon
- Low carbon investment
- Low carbon finance
- Low carbon society
- Low carbon ecology
- Low carbon travel
- Low carbon life
- Low carbon future

Its reporters have even managed to turn it into a verb, in an article titled “Have you already low-carboned today?” (Sun 2010) The near inflationary use of low carbon as an attribute links it to themes of ‘scientific development’ and improvement of both the economy as well as people’s livelihood. Figure 3-2 and Figure 3-3 show the

dramatic increase on media attention to the ‘low carbon economy’ frame, both in absolute terms as well as relatively to ‘climate change’.

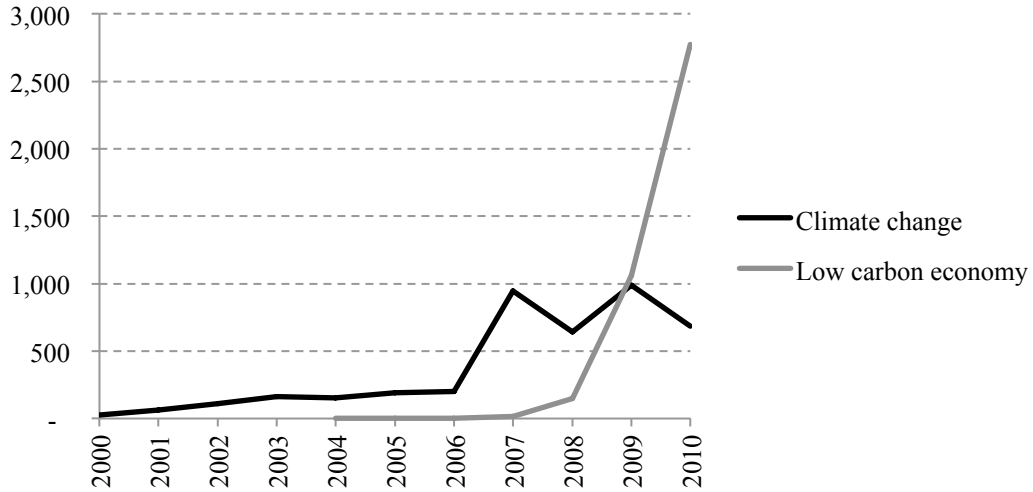


Figure 3-2. Mention of ‘climate change’ (*qihou bianhua* or *qihou biannuan* or *quanqiu biannuan*) and ‘low carbon economy’ (*ditan jingji*) in newspaper article heading.

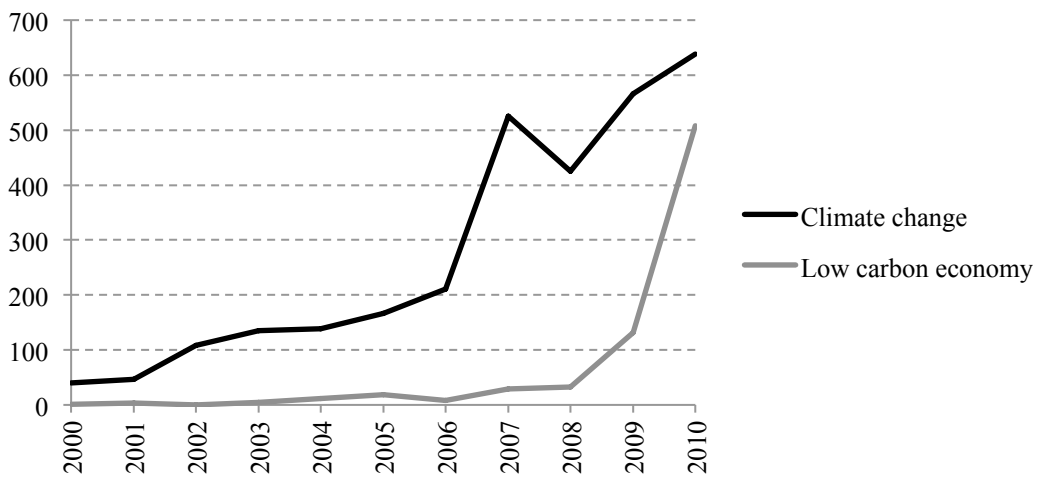
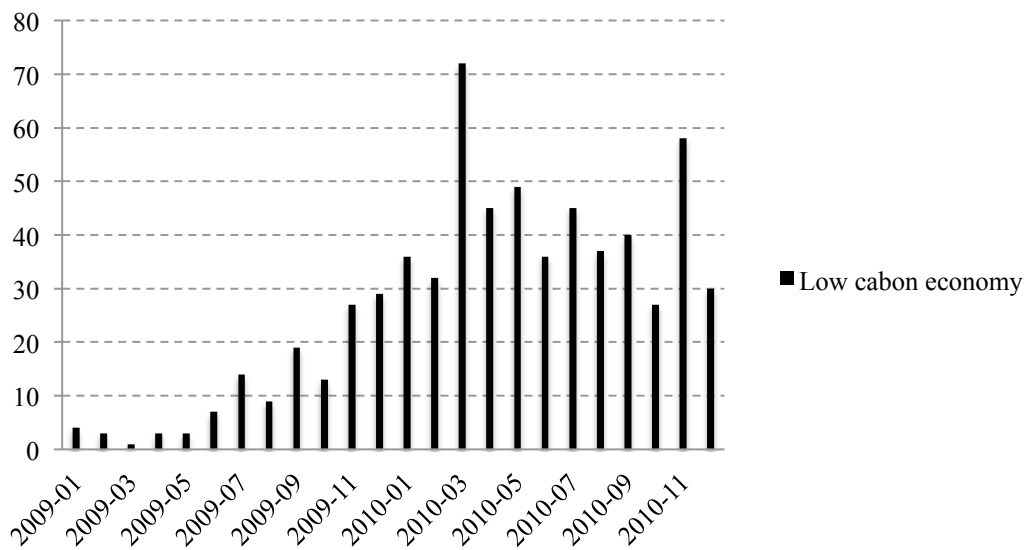


Figure 3-3. Mention of ‘climate change’ (*qihou bianhua* or *qihou biannuan* or *quanqiu biannuan*) and ‘low carbon economy’ (*ditan jingji*) in in *People’s Daily* article full text.



**Figure 3-4. Mention of ‘low carbon economy’ (*ditan jingji*) in *People’s Daily* article full text in years 2009 and 2010.**

As Figure 3-4 shows more narrowly for the years 2009 and 2010, the number of articles mentioning ‘low carbon economy’ has drastically increased since the second half of 2009 and spikes with more than 70 articles around the time of the NPC and CPCC meetings in March 2010 and nearly 60 articles around the main international event in 2010, the COP negotiations in Cancun in December. These numbers corroborate the general impression that through the framing of climate change as ‘low carbon economy’, it has been transformed into a domestic issue and the international dimension is (at least relatively) losing in importance (Interviews 60 to 62).

“It is a major strategy in China’s economic and social development to actively face climate change, and this is also a major opportunity to more quickly change the mode of economic development and structurally readjust the economy.” (NDRC 2010)

This quote from a legal provision on low carbon testing sites illustrates some of the language that is central in relating climate change with the ‘low carbon economy’ frame: active participation, economic development and opportunity. *Caijing* urges

that “companies must seize the huge business and transformative opportunities of the low carbon economy”, which it sees in clean energy supply, decarbonisation of transport, low carbon buildings and decarbonisation of industry (Tang 2010). Climate change through the lens of ‘low carbon economy’ is also thoroughly monetized, but no longer in terms of mitigation or adaptation cost, but in terms of market size. The *Oriental Morning Post* for example estimates that “the Chinese low carbon market will reach a volume of 7 trillion US dollars by 2015”, directly linking international company’s “China order books” to the country’s latest climate policies like the 40 to 45 per cent reduction target in carbon intensity (Kan 2010).

### **3.5. Shifting subject positions**

Contradictions between the first frames (especially the very first one) and the last one are apparent. Over the past years we have however been witness to dramatic changes to what climate change means in China. The frames of ‘mitigation hurts economic growth’, ‘moral responsibility of the developed countries’ and ‘ecological imperialism’ evolved around China’s position in the international climate negotiations. In them, the country has a passive or defensive subject position, climate change means *reacting* to demands of the industrialized western nations. While topics like historical responsibility are still part of the discourse found around the UNFCCC negotiations, the prevalence of these frames has decreased strongly during the time frame covered in this paper.

<b>Frame</b>	<b>State of China</b>	<b>Origin and motivation</b>	<b>Trend of frame (2007-2010)</b>
<b>Mitigation hurts economic growth</b>	passive/defensive	international	strongly decreasing in importance
<b>Moral responsibility of the developed countries</b>	passive/defensive	international	decreasing
<b>‘Ecological imperialism’</b>	passive/defensive	international	strongly decreasing in importance
<b>Technological fixes</b>	active	domestic	unchanged
<b>Low carbon economy</b>	active	domestic	strongly increasing in importance

**Table 3-4. Characteristics of climate change frames in China and their respective trends.**

Instead, the focus of the Chinese climate change discourse has for the most part left the international stage, shifting China’s subject position to an active role in, motivated entirely by domestic concerns and opportunities seen in the development of a ‘low carbon economy’. In climate change framed this way, the country is now an economic entrepreneur in sustainable development. Greenhouse gas mitigation is embedded in its own ambitions to restructure and ‘green’ the economy, and it attracts industrialised countries’ interest through related business opportunities. The ‘low carbon economy’ frame has strongly increased in importance and nearly completely dominates the discourse since 2010.

Although *doing something in a low carbon way* means little different than *mitigating greenhouse gases*, the ‘low carbon economy’ frame is much less politicized than the other mitigation-centred frames of climate change and exclusively carries positive connotations. In a way, it has freed the subject position of China with regard to

climate change and turned dealing with climate change into something positive, where China can and should be active, and which it does out of its own, domestic motivation, a new little ‘opening and reform’ of its own.

### **3.6. Conclusions**

One of the central reasons for the current deadlock at the UNFCCC is to be found in diverging national framings of climate change, which defy an objective or common definition (see for example Hulme 2009; Hulme 2010). Analysing the climate discourse in China reveals the evolution of country-specific understandings of climate change, which are rooted in cultural and historic narratives. This suggests that framings crucially matter for international climate politics. Climate change cannot simply be reduced to a factual matter of the natural sciences; it is also a fundamentally social construct. Consequently, we have to look beyond the assumption of pure strategic considerations or the impact of objective epistemic knowledge to grasp global divisions and struggles. We also have to move beyond the pure concentration on climate policy as a matter of international governance. Climate change is a “matter of nature” (Fitzsimmons 1989), which is at the same time deeply localized, embedded in the country-specific understandings and practices of the environment, which are formed by culture, history, and not the least forces of the political economy (Robbins 2012).

Opening the black box by thoroughly studying Chinese climate discourse may not “solve differences in perceptions of the problem and its possible solutions” (van Bueren et al. 2003) completely, but it is a worthwhile exercise for at least three reasons. Firstly, our study of the climate discourse goes beyond a pure analysis of media reports. It builds the ground for a deeper analysis into the dynamics of framing

and the consequent meanings of climate change in China. Qualitative discourse analysis can be of great value to the field of China studies. The coexistence of rather opposing frames as the 12th Five-Year-Plan was being formulated likely reflected an internal struggle in the government over the future development strategy of the country.

Secondly, understood in this broad sense, it reflects the range of currently acceptable behaviour for the actors concerned with climate policy in China (Hajer 1997), and therefore may also hint to the limits of possibly successful inter-action at the practical level. Discourse studies are therefore also an additional valuable approach to understanding Chinese positions in the international negotiations under the UNFCCC. International agreements and action on climate change mitigation or adaptation not only need to focus on technologically or economically optimal solutions for a natural science problem; they equally need to take into account *what climate change means* in different places. As noted above, the most important qualitative difference between the Chinese and western discourses in the first instance lies in the dominance of moral framings of climate change, i.e. frames of historical and moral responsibility as well as climate change as ecological imperialism. This compares to a general discourse of ‘spaceship earth’ and of climate change as manageable (or to be managed) through markets (ecological modernization) in developed countries.

On the other hand, the Chinese media rarely doubt the nature of climate change. The existence of global warming is generally presented as a scientific fact, and the attention is moved to moral framings. Similarly, the anthropogenic origins of global warming are generally not doubted in the Chinese discourse (Interviews 1, 2, 5, 25

and 40).<sup>20</sup> This is in spite of the fact that the underlying science – especially in the earlier periods up to the 1990s has originated mostly in developed countries, with only some involvement of Chinese scholars in the production of the IPCC reports for example. As is obvious from scientific publication activity, science in China has mainly concentrated on the (domestic) impacts of climate change. Especially compared to the United States, this is an important and noteworthy difference. There, the existence and anthropogenic nature of climate change are at the centre of the discourse (Boykoff et al. 2004).

Thirdly, as knowledge constantly evolves, the state of the current Chinese discourse can be used as a baseline to identify any future changes or the appearance of new access points for political cooperation. Frames can at times be of rather contradictory nature, potentially leading to diametrically opposed templates for action – a facet that only supports the importance of studying climate change from a social science perspective. Since late 2009 and 2010 for example, climate change as manifest in the frame of developing a ‘low carbon economy’ has by far overtaken the framing of mitigation hurting economic growth.

Underlying this change is a shift in the subject position of China vis-à-vis the problem: From a defensive position focusing on international politics to an active position cantered on domestic more sustainable economic growth and opportunity. Tracking and examining changes in these frames helps shed a light on the evolution of particular understandings of nature, which fundamentally underlie any political action on the challenges that environmental change – here in the form of climate change – poses. Using this lens, the meaning of climate change in China in 2011

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<sup>20</sup> Wide reporting of the two “scandals” involving the IPCC that came to light around the time of the 2009 climate conference in Copenhagen is one of the few exceptions to this.

seems dramatically different from what it was back in 2008. Given the dialectical relationship between humans and the environment, this could open up the possibility for future changes in the political economy of climate change as well (Bryant 1998).

### 3.7. List of interviews

*(Combined list of interviews for Chapters 3 and 4)*

	Type / affiliation of interviewee	Location	Date
1	Journalist (China, print)	Bali	2007-12-03
2	Journalist (China, print)	Bali	2007-12-03
3	Journalist (China, print)	Bali	2007-12-03
4	Journalist (China, television)	Bali	2007-12-05
5	Journalist (China, television)	Bali	2007-12-05
6	NGO (China)	Bali	2007-12-05
7	NGO (China)	Bali	2007-12-05
8	Journalist (China, print)	Bali	2007-12-06
9	Journalist (China, television)	Bali	2007-12-06
10	NGO (China)	Bali	2007-12-06
11	Journalist (China, print)	Bali	2007-12-07
12	Journalist (China, print)	Bali	2007-12-07
13	NGO (China)	Bali	2007-12-09
14	Government delegation (China)	Bali	2007-12-09
15	Journalist (China, print)	Bali	2007-12-09
16	Journalist (China, print)*	Bali	2007-12-09
17	Government delegation (China)	Bali	2007-12-10
18	Journalist (China, print)*	Bali	2007-12-10
19	Journalist (China, television)	Bali	2007-12-10
20	Journalist (China, print) *	Beijing	2008-10-15
21	Journalist (China, television)	Beijing	2008-10-16
22	Journalist (China, online)	Beijing	2008-10-16
23	Journalist (China, print) *	Beijing	2008-10-23
24	Journalist (China, print)	Beijing	2008-10-27
25	Journalist (China, print)	Beijing	2008-10-28

26	Journalist (China, print)	Beijing	2008-10-31
27	Journalist (China, print)	Beijing	2008-11-14
28	Journalist (China, television) *	Beijing	2008-11-15
29	Journalist (China, print) *	Poznan	2008-12-02
30	Journalist (China, print)	Poznan	2008-12-02
31	NGO (China) *	Poznan	2008-12-02
32	Government delegation (China)/university	Poznan	2008-12-02
33	Government delegation (China)/university	Poznan	2008-12-02
34	Journalist (China, television) *	Poznan	2008-12-05
35	Journalist (China, television)	Poznan	2008-12-05
36	NGO (China) *	Poznan	2008-12-05
37	Journalist (China, print) *	Shanghai	2009-02-20
38	Journalist (China, print) *	Shanghai	2009-02-20
39	Journalist (China, print)	Shanghai	2009-02-20
40	Journalist (China, print)	Shanghai	2009-02-21
41	Journalist (China, print)	Shanghai	2009-02-21
42	Journalist (China, online) *	Beijing	2009-02-24
43	Journalist (China, print) *	Beijing	2009-02-24
44	Journalist (China, television) *	Beijing	2009-02-24
45	Journalist (China, print) *	Beijing	2009-02-26
46	Journalist (China, print) *	Beijing	2009-02-26
47	Journalist (China, television) *	Beijing	2009-02-27
48	Journalist (China, television) *	Bonn	2009-06-05
49	Journalist (China, print)	Bonn	2009-06-05
50	Journalist (China, print) *	Bonn	2009-06-05
51	Journalist (China, print) *	Copenhagen	2009-12-09
52	Journalist (China, print) *	Copenhagen	2009-12-09
53	NGO (China) *	Copenhagen	2009-12-09
54	NGO (China)	Copenhagen	2009-12-09
55	Journalist (China, print)	Copenhagen	2009-12-10
56	Government delegation (China) *	Copenhagen	2009-12-10
57	Government delegation (China) *	Copenhagen	2009-12-10
58	Researcher (China/UK) *	Oxford	2010-09-10

59	Gov. delegation (China)/university *	Beijing	2010-11-16
60	Journalist (China, television) *	Beijing	2010-11-17
61	NGO (China) *	Beijing	2010-11-17
62	Journalist (China, print) *	Copenhagen	2010-11-17

\* Repeat interview with previous interview partner

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**Chapter 4: Paper 2: Climate change with Chinese characteristics.  
Knowledge production, discourse coalitions, and  
national identity**

*Christian Ellermann, Maximilian Mayer*

*ABSTRACT*

Analysing the country-specific interactions of nature, politics, science and media, we map out the genesis and evolution of the Chinese climate change discourse. Alternative public and official views and attitudes in China (as well as in other countries) do not only stem from a strategy to gain more from the international negotiations, but also from socially and culturally embedded knowledge and its production. We see discourse as both a tool in, as well as an effect of real power struggles over knowledge, and highlight this process from three different angles: the co-production of climate change knowledge by politics and science; the influence of coalitions between government, science and the media; and the formative power of national identity and history. We reason that such detailed insights into specific discursive struggles over, and constructions of nature in different countries need to be central to considerations of effective global and local carbon governance.

**4.1. Introduction**

Societies construe climate change in dramatically diverging manners. In contrast to the tacit assumption within the international climate science community, few central

facets and dimensions of the climate issue are commonly agreed. Using the People's Republic of China – the world's biggest greenhouse gas (GHG) emitter since 2007 (MNP 2007) – as a case study, we explore how climate change becomes differently comprehended and framed, in order to shed light on the question of how country-specific scientific debates and public framings evolve into something akin to 'national climate cultures' (Strauss et al. 2003; Crate et al. 2009). We argue that alternative public and official views and attitudes in China (as well as in other countries) do not only stem from a strategy to gain more from the international negotiations, but also from socially and culturally embedded interactions and knowledge. This research concentrates on the genesis and evolution of the dominant frames through which climate change is understood in China.<sup>21</sup>

Based on the objective facts of physics and chemistry, there is no doubt that in all societies climate change can be understood, explained and tackled in the same way<sup>22</sup>, following from an understanding of nature often discussed under the term 'ecological modernisation' (Bäckstrand et al. 2006) and in a resulting *global* political order (Miller 2004). In our related paper we argue that climate policies however come to existence in the presence of (national) discourses that render climate change comprehensible as a problem and further suggest certain problem solutions before others. There we assert that the climate change discourse in China is structured around a few recurring frames and examine which subject positions they provide for the country, its government and other actors involved and how particular frames of climate change have developed and changed over time (Chapter 3).

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<sup>21</sup> I describe and analyze the content of these frames in Chapter 3.

<sup>22</sup> The IPCC reports provide an example of an attempt to create globally objective (or at least consensus) knowledge of climate change (Chapter 3). For further discussion of this issue also see IPCC (2007). Fourth assessment report. Climate change 2007: Synthesis report. Summary for policymakers. Geneva, Intergovernmental Panel on Climate Change.

Despite the claims of the Intergovernmental Panel on Climate Change (IPCC) to universal consensual knowledge, different framings and understandings have ultimately contributed to the slow progress of the international climate change negotiations (Hulme 2009). Here we reason that detailed insights into specific discursive struggles over and constructions of nature in different countries need to be central to considerations of effective global and local carbon governance (Hulme 2009), and we explore them for the case of China.

This argument is based on an understanding of climate change as part of socially constructed or “humanized” nature (Greenberg et al. 1994; Forsyth 2003), against the backdrop of a political ecology theoretical framework of this paper (Robbins 2012), as discussed in the introduction of this thesis. This framework, building the intersection of political economy, material nature and human agency, will be used to uncover some of the formative forces at play in the human-nature interaction and construction of climate change in China. Discourse is an instrument, as well as an effect of the use of power in this realm (Foucault 1998), ultimately determining the possible range of action in domestic and international policy-making in climate policy itself (Robbins 2000; Oels 2005; Bäckstrand et al. 2006).

The argument developed in this article proceeds as follows. After a short discussion of the conceptual tools we analyse in detail i) how scholars and politicians in China have become intertwined in ‘producing’ (in the discursive sense) climate change as a political matter of concern; ii) whether the Chinese media have worked together with scientists, experts, and politicians possibly fostering public and official awareness and leading to increased political pressure; and iii) how climate change becomes

narratively enshrined in national identity – altogether resulting in a *climate change with Chinese characteristics*.

#### **4.2. Theorizing national climate cultures**

In the West, climate-related social science research on China has generally concentrated on assessing official policy-making (e.g. Heggelund 2007; Teng et al. 2007; Qian 2008; Hallding et al. 2009) and following the Chinese negotiation position at the United Nations Framework Convention on Climate Change (UNFCCC) using perspectives of international relations studies (e.g. Lewis 2007; Bosetti et al. 2009). Inevitably, these studies rely on sources such as government plans, laws, regulations and statements by officials and often relate them to the challenging political and economic circumstances. This important work has unquestionably contributed to a much better understanding of the issue, but in essence, this research is looking at the country from the outside, without asking the question what climate change means in China and to the Chinese. “[... V]ery little attention has been paid to the cultural politics of scientific practice and its consequential role in framing and, in that sense, constructing for us the problem of global warming.” (Demeritt 2001) The idea of national climate cultures is based on the assumption that, although the transnational epistemic community may share a common understanding of objective climate science, this knowledge is not evenly spread in different societies and has by far not been unequivocally accepted (Malone et al. 2001). Differing institutions of political representation, cultures of risk and deeply routed discourses of nature, among other mediating forces, lead to enormous discrepancies (Grundmann 2007).

The central theoretical assumption of this paper is that, instead of being strictly separated spheres, there is always a mutual influence and co-evolution between scientific research, political decision-making (Jasanoff 1995; Pielke 2007) and media representation. This does not come as a surprise to followers of political ecology and science studies, who have demonstrated that the environment – including natural phenomena like climate change – is not simply a matter of fact, but is fundamentally a social and political construct (Watts 1983; Demeritt 2002; Forsyth 2003; Zimmerer et al. 2003). Discourse studies of environmental and climate politics – although meaning many different things in as many different places (Litfin 1994; Hajer et al. 2005; Bäckstrand et al. 2006; Pettenger 2007) – commonly point to struggles over or the social production of the natural. In other words, the two practice fields of science and politics are inextricably intertwined (Latour 1993). The majority of this work owes much to the writings of Michel Foucault and is concerned with the connection of writing/speaking as a social practice and the (re-)production of systems of knowledge, the embedded social actors, the rules and resources on which this process is based and its consequences in society (Fairclough et al. 1997; van Dijk 1997a; Oels 2006; Keller 2007).

Foucault's encompassing notion suggests a much broader application of discourse studies than to concentrate on speech acts only (Foucault 1998). We therefore define discourse as an assemblage of interrelated practices and utterances. Discourses constantly produce meanings of social – and in this particular case environmental – issues, respective rational solutions and specific subject positions for involved actors (Fischer 2003; Epstein 2008). Accordingly, discourses on climate change may be contested in different parts of the world. Controversies can appear between groups of

Parties to the United Nations Framework Convention on Climate Change (UNFCCC) as well as inside a country like China itself.

The main research questions that arise from this discursive approach ask: How do different social, cultural, scientific and practical contexts produce the meanings of climate change in China, and what consequences does this have?

Building upon the above-mentioned diverse body of literature, we apply three methodological approaches to shed a light on these questions from slightly distinct angles:

1. Firstly, through the lens of *co-production* climate change is analysed as being produced at the nexus of politics, science, technology, and nature. We follow Jasanoff in understanding “natural and social orders as being produced together.” (Jasanoff 2004) We interpret scientific knowledge (production) primarily from a viewpoint of how it is embedded in political and institutional orders, in order to highlight the role of power and changing relations of authority. How has scientific research on climate change developed in relationship to political imperatives? How do China’s positions in international politics influence its perceptions and actions on climate change?
2. Secondly, drawing on Hajer’s work, *discourse coalitions* between the media, politicians, and activists are highlighted.<sup>23</sup> These can play a critical role in establishing and promoting a particular common understanding of environmental topics. The analysis consequently “aims to understand why [and how] a particular understanding of the environmental problem at some point

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<sup>23</sup> “A discourse-coalition refers to a group of actors that, in the context of an identifiable set of practices, shares the usage of a particular set of story lines over a particular period of time.” [http://www.maartenhajer.nl/index.php?Itemid=19&id=17&option=com\\_content&task=view#discourseco](http://www.maartenhajer.nl/index.php?Itemid=19&id=17&option=com_content&task=view#discourseco)

gains dominance and is seen as orthodox, while other understandings are discredited.“ (Hajer 1995b) Compared to other political debates, why has climate change for long been of lower prominence in China? How does the trias of the media, nongovernmental organizations, and scientists relate to climate change?

3. The third analytical angle is to understand the climate change discourse as *culturally organized knowledge* (Shi-xu 2005; Verweij et al. 2006). Climate change like other issues of social concern is, according to this perspective, phrased and discussed in terms of narratives of (national) history and identity (Rayner et al. 1998). How has climate change been discussed in relation to Chinese (political) identity? In which ways does the discourse on climate change reflect Chinese collective memory and national identity as promoted by the government?

Together, these approaches provide entrance points for an interpretative environmental policy research aimed at understanding the forces at play in shaping the discourse in China, in determining the uniquely Chinese characteristics of climate change.

#### **4.3. Co-production of climate change and the role of science**

As Miller argues, the global political order of climate politics has been strongly influenced by an understanding of climate change developed by climate modellers and later the IPCC, and given this setup it is thus co-produced by science and politics (Miller 2004). With a dominance of developed country expertise, this particular co-production had relatively little exposure in China in the early stages. The domestic ontology of climate change – i.e. the origins, evolution shape of the climate

discourse in the Chinese ‘knowledge community’ – has been very different from its western, industrialized country counterparts. Apart from its actual content (see Chapter 3), this distinct evolution goes a long way towards explaining the differences in the framing of climate change between China and western developed countries. While indigenous knowledge production on the anthropogenic and dangerous nature of climate change stimulated the political and popular debate in western industrialized countries, the debate was carried to China largely from the outside through foreign policy channels and the need to engage with this topic internationally (see also Economy et al. 2004). Concerns over climate change largely appeared in China since the country started to participate in the scientific work of the IPCC in the late 1980s, led by the China Meteorological Administration (CMA). The topic’s importance was upgraded in 1998 – after the passing of the Kyoto Protocol – when responsibility to coordinate climate policy was shifted to the State Development Planning Commission, now named National Development and Reform Commission (NDRC) (Heggelund 2007). In the beginning, the climate change discourse in China thus largely originated out of the necessities of international politics, and those parts of the discourse in which ownership of the topic is rejected, still reflect this origin today (Zhang 2003).

The construction of climate change as an issue of sovereignty (for example rejecting internationally mandated mitigation action by China) and the position of the Chinese scientific community to support this notion is therefore a good example of an alignment of science and politics, and the co-production of the meaning of climate change as a result. It supports frames concentrating on moral questions of climate change, and also stresses its strategic importance. The setup does not lend itself to

support concepts of ‘spaceship earth’ and ecological modernisation, which are based on a global view of the problem and prescribe solutions at the international level. We can therefore explain the prominence of certain frames not only because of their content, but also through examining the evolution of the discourse in China.

How has scientific research on climate change developed in relation to political imperatives? Since the 1990s Chinese research institutions have played an increasingly important role in providing the kind of background knowledge that the government needs to effectively participate in the international negotiations on climate change. *Tsinghua University*, *Beijing University*, *Renmin University*, the *Chinese Academy of Social Sciences* and the *Energy Research Institute* are host to much of the brain power behind Chinese climate policy, and as a consequence their research agendas have developed in line with the needs of the government: These research institutions act as government-run think tanks on climate change science and policy, and for a long time their research has concentrated on issues supporting the moral framings of climate change, based on the prerogatives of Chinese foreign policy vis-à-vis the international climate negotiations.

One example of this is the Energy Research Institute’s analysis of Chinese exports and related embedded carbon (Liu et al. 2008; Chapter 3). Another one is the work of the mixed group of scientists on the Chinese understanding of historical responsibility. In recent years, Chinese research institutions have been actively working on a method to account for historical responsibility. According to them, developed countries have emitted 77 per cent of CO<sub>2</sub> emissions between 1950 and 2000 and thus bear responsibility for climate change (Ellermann et al. 2011). He et al. (2000) argue for actively using the notion of developed country historical

responsibility to “protect China’s interests” and “refute arguments of ‘common responsibility’ and the like”. The main purpose of these activities seems to be to develop an effort-sharing scheme based on ideas of historical contributions to climate change. At the outset, the government had subscribed to a version of the Brazilian position that does not allow for global reduction commitments, but only differentiates reduction targets for Annex I countries by historical responsibility.<sup>24</sup> More recently, China has started to formulate its own position, a *cumulative per capita emissions convergence* approach that is supported by this research (Pan et al. 2009). Although Pan Jiahua of the Chinese Academy of Social Sciences at a Chinese-sponsored side event at the Copenhagen UNFCCC negotiations specifically stressed that “speakers and discussants [are] not politicians, not diplomats, purely academic, politically indifferent scholars” (Pan 2009), his group’s side event (sponsored by the Chinese delegation) can still be seen as part of an effort to strengthen the international take-up of a moral framing that has been predominant in China and has been supported by the government. The construction of this frame of climate change is therefore at least partially addressed to the International Community, i.e. other Parties of the UNFCCC, based on Chinese foreign policy needs.

Staff members of the main research institutions also serve as committee members for the domestic assessment of CDM projects, developers of new methodologies for carbon market mechanisms, they write drafts of provincial climate change plans and most recently help design provincial level emission trading systems. They are

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<sup>24</sup> For a discussion of the Brazilian proposal and the discussion of historical responsibility under the UNFCCC more broadly, see Mayer, M. and F. Arndt (2009). The politics of socio-natures: images of environmental foreign policy. *Environmental Change and Foreign Policy: Theory and Practice*. P. Harris. London, Rutledge: 74-89.

regularly invited to serve as members of the Chinese delegation to the UNFCCC and participate in its meetings for many years. While the government is in need of the intellectual capacity of the invited researchers, participation in the Chinese delegation also precludes other activities, like research on topics that contradict the government's stated interests or independent larger scale international research activities. In any case, not least the intensity of the workload steers these leading scientists away from their own independent research, towards activities closer to the position of the Chinese government (Interviews 33 and 34).

Access to essential information and *guanxi* (personal connections) are the reverse side of involvement in government endorsed research activities. The group of scholars that is intimately involved in the government's climate policy processes is a small yet privileged crowd of insiders with access to the political apparatus, and due to their status they are the prime target of international research and consultancy cooperation. Other researchers – regardless of their academic qualification – are outsiders “who are not really part of the game” (Interviews 33 and 34). As primary access points due to their political status, the insider scientists play an important role as gatekeepers of knowledge, and thus ‘co-produce’ the understanding of climate change in China (and how it is seen on the outside). It is therefore possible to understand climate change as being produced at the nexus of politics, science, technology, and nature, albeit in the Chinese case with a clear leadership role for politics.

Climate modelling is a further field in which the meaning of climate change is co-produced. The Chinese government has made significant efforts to build up indigenous capacity for climate modelling, with a focus on scenarios and climate

impact modelling. They are motivated by the need to independently produce knowledge on climate change and not rely on international modelling activities, and at least partially by mistrust of the information generated by those (Interview 15). Chinese climate modelling has already had its formative effects on the Chinese discourse and understanding of the topic. Model results are often interpreted as supporting an adaptive approach to climate change: “We favour strong growth at this development stage. Then later we are in a position to selectively adapt if it is needed.” (Interview 15, and echoed by interview 46). The cost-benefit modelling that has been conducted by experts of the Ministry of Agriculture led by Lin Erda showed that in sum, China as a whole will neither experience big losses nor major benefits from changes in ecological systems caused by climate change (Interview 33 and 46). On a more local scale as well, climate change impacts have been assessed with the help of computer models, however focusing on economic opportunities with regards to tourism and agriculture, rather than dramatic negative shifts (Interview 33). Since 2009, the government has relentlessly promoted ‘low carbon economy’ as a new paradigm of development for China through official statements and related reporting in state controlled organs of the media. This alternative frame of climate change, largely focused on the agenda for domestic (sustainable) growth and economic restructuring, entered the climate change discourse strongly and abruptly (Chapter 3). It has also dramatically reshuffled the activities of the major research institutes and their climate (social) scientists. As of 2011, most of their work revolves around implementation issues raised by the new 12th Five-Year-Plan and related regulations, i.e. for example methods and examples of low carbon cities and regions as well as domestic emissions trading systems. In the provinces, local

capacity to work on these topics is limited, and most conceptual work is outsourced by the government and given to the central research institutions. They again play a central role in shaping what climate change means in China – this time in the form of a low carbon economy. The driving forces of the co-production of climate change by politics and science in this case again can be found in the capacity limitations of the government on the one hand, and its need to scientifically underpin the current prerogatives on the other hand.

#### **4.4. Discourse coalitions – politics and the media**

*Discourse coalitions* between the media, politicians, and activists can play a critical role in establishing and promoting a particular common understanding of environmental topics. To illuminate this point, it is helpful to briefly look at other discourses on the environment in China, for example air or water pollution.

Sensationalism on related environmental disasters exists in wide variety in the Chinese media. For years water spills have been depicted as series of events with clear causes and effects on the everyday life of ordinary people. *Localized pollution* has become an issue that is discussed as an urgent *task for local governments* as well as the country as a whole. Climate change is increasingly framed through its impacts in China, and droughts and floods have been attributed to global warming in the media. The relationship has however mostly been depicted as a scientific matter, noting its uncertainty, and the media have so far refrained from presenting a more generalized ‘catastrophe discourse’ on climate change that would be comparable to other environmental issues of localized pollution or the comparable discourse in the West (Weingart et al. 2000).

That fact that the frame of technological fixes is still nearly unquestioned in China may be one important reason (see Chapter 3). Visions of imminent danger and extreme urgency (e.g. “climate catastrophe”) have been prominent in western media, and they have arguably helped the politicization of the topic – i.e. turned climate change into a matter that (however difficult) must be tackled by political decision making (Weingart et al. 2000; Doulton et al. 2009; von Storch 2009). Chinese media increasingly stress the importance of climate change as a topic. This is, however, for the most part done by citing speeches of senior officials, which is not necessarily a method that renders climate change accessible to the public. There has been an increasing use of visuals, for example images of polar bear on lone ice floes or “soon-to-be-extinct turtles” in Bali (Interviews 17 and 19), as Chinese journalists “try to make the topic interesting and touching” (Interview 19). Such imagery has so far also not had the power to turn a scientific hypothesis into a certain catastrophic event that is of concern to everyday life in China. Overall, the Chinese media have not “translat[ed] climate change into a *sequence of events*, and into *concrete and relevant everyday experiences*,” which require urgent political action, as happened for example in the European case (Weingart et al. 2000). We therefore do not consider them an important, independent actor that would be influential in creating climate change through a discourse coalition with politics.

Given the level of control over the media by the government, it is appropriate to ask for reasons for the lack of ‘catastrophe discourse’. Encouraging (or at least not discouraging) media coverage of local environmental disasters can be seen as a strategy of the central government to extend supervision of this problem to the wide areas of the country where institutional enforcement of environmental regulation has

been weak. Media reporting has in this way been instrumental to putting pressure on local governments to improve environmental governance (Interviews 53, 54 and 55). In the case of climate change, journalists however contend that it is hard to find an angle in climate change that would stir their readers' interest, and that "sensationalism on this topic doesn't serve anybody" (Interviews 22, 27 and 43). It has therefore not been translated into an issue in need of concrete and immediate action, but was still rather an "object of routine political regulation" (Weingart et al. 2000) domestically as well as of international diplomacy.

Journalists of China's Xinhua news agency, the big newspapers and television channels have been travelling to the Conferences of the Parties (COPs) of the UNFCCC for years, but reporting on the topic has, until 2009, largely remained an event-based affair with spikes in media activity during the December COPs, to a much lower degree at the annual June meetings in Bonn, and on special occasions such as the release of the latest IPCC report (Weingart et al. 2000). As one journalist said on the side lines of the 2007 Bali COP, "most of us don't have a deep knowledge of this topic yet", and others similarly noted that the level of understanding of the topic in the media could be improved, especially when it comes to following the complex international processes, countries' negotiation positions and the underlying science (Interview 3 as well as 1 and 2). As a consequence, journalists who have been assigned by their editor to write on the topic often have to rely on 'guidance' from the state run news organisations, and statements by Chinese leaders and negotiators. This naturally contributes to the construction of climate change through frames that are relatively close to the preferred messages of the government. Apparently, there have not been any official and concrete internal

guidelines on what and how to report on climate change, and what to omit. State guidance has rather been soft, by having much of the media rely on the officially crafted pieces of news (Interviews 1, 2, 3, 28, 29 and 40). This form of agenda setting, i.e. the guidance of the media and eventually public opinion in a relatively indirect, flexible and subtle way, has been at the core of China's media policy since the 1990s (see for example Chan 2007).

A young generation of journalists concerned about the environment has still been committed to provide more active, independent and well-informed reporting on climate change in China. In interviews with Chinese journalists at the COPs it became apparent that a number of them had had to work hard to get internal approval from their editors or managers to participate in the events. In fact, in many cases they had to convince their superiors to pay any attention to the topic at all (Interviews 4, 29, 38 and 39). Their persistence has led to some of the most comprehensive reporting on the topic, like the Oriental Morning Post's coverage of the UNFCCC conference in Bali. Each issue from 3 to 16 December 2007 carried a coloured double page special containing news, background information and editorials, for the most part supplied by two ambitious young journalists. Just as there are these success stories, follow-up interviews with journalists also revealed that many of them were not able to secure the support of superiors or the necessary funding to participate in further conferences. The Oriental Morning Post for example did not repeat that kind of comprehensive coverage for the following conferences in Poznan or even Copenhagen, and the journalists have since been working on other topics (Interviews 4, 38 and 39).

Funding to be able to travel to climate related events and provide independent reporting has been a main challenge for journalists. Among others, the German Heinrich Böll Foundation realized that this barrier existed, and has been sponsoring a number of Chinese journalists each year to participate in the COPs, providing them with preparatory sessions on the science and politics of climate change. Activists have naturally identified reporting on climate change as formative for the wider public discourse. Employees of the Chinese branches of well-known international environmental NGOs are well connected with young journalists and provide them with information and international contacts (Interviews 6, 7, 8, 10 and 12). Trainings covering the basics of climate change science and politics have been organised by different organisations for Chinese journalists. Aware of their need to expand knowledge in order to provide professional coverage, journalists working on climate change for a while also maintained an internal website to act as a forum to exchange ideas with each other (Interviews 25 and 35).

In spite of these activities, the media discourse on climate change is dominated by state news, i.e. recollections of positive activities related to climate change, praise of Chinese domestic efforts for mitigation or the ambitiousness of the Chinese government policies. Newspapers give purely factual accounts of conferences, visits by foreign heads of state where the topic was addressed, but few reflections beyond the official positions. Differences in the media landscape are however becoming more visible, as for example in the assessment of the Copenhagen Agreement and conference of 2009. *People's Daily* and *Xinhua*-based media outlets covered the participation of premier Wen Jiabao at the conference in detail, and generally praised its successful conclusion and the resulting Copenhagen Agreement, e.g. "China made

important contributions to the outcome of the Copenhagen conference” (Jiang 2009). Media with more independent reporting power on the topic covered the Copenhagen conference in a much more differentiated way, noting the inability to reach any agreement leading to substantive improvements in the way global warming is tackled internationally, and describing “Copenhagen’s unfinished business” (Qian 2009). Discourse coalitions can serve the interests of the government as well as the media in a mutually beneficial way – the radius of action and influence is enhanced on both sides. While the government has been interested in guiding public opinion on climate change and supporting certain frames, this use of the media has been akin to a one-way street.

The buzzword ‘low carbon economy’ has provided journalists with new ways and topics to report, in essence, on climate change mitigation. It is easier to connect this topic to people’s realities of life, e.g. through discussions of what low carbon cities can or should look like, low carbon business opportunities and how to lead a low carbon life. Interestingly, in 2009 and 2010, even this more active journalism on the topic in a way that is closer to the life of the common Chinese, still appeared to be strongly led by media outlets closest to the state, in promoting the idea as a core element of the most recent Five-Year-Plan (see Chapter 3).

Chinese reporting on the relationship of climate change mitigation and economic development has been curiously divided between the frame of ‘mitigation hurting economic growth’ and seeing the development of a ‘low carbon economy’ as the future direction of China, both with respectively very different subject positions for the country (see Chapter 3). We interpret the rather passive and undecided role of the media between 2007 and 2009 as indicative of an underlying debate in the Chinese

government over the appropriate interpretation of the challenge or chance of climate change for the Chinese economy, and only as of 2010 the latter side has appeared as a clear winner.

We understand the earlier predominant framing of climate action as contradictory to economic growth as a discursive element akin to ‘killer phrases’ that are discussed in management theory.<sup>25</sup> By linking a way of thought to a certain negative outcome, their aim is to prevent any further discussion in this direction. We assert that utterances like “mitigation will destroy growth” or “the energy bill is a job-killer” are translations of this concept into the practice of climate change discourse.

Leading China scholars generally assume that the assurance of strong economic development and a relatively stable social environment is a precondition for the sustained and uncontested rule of the Communist Party in China (see for example Saich 2004). Given the Chinese context (i.e. the severity of the threat, the uncertainty surrounding the asserted linkage and the high level authority of those making the claims), it is not surprising that in all reporting on climate change in China during the period covered, international mandatory, absolute emission reduction targets for China are bluntly rejected with references to the country’s right to economic development, following the official Chinese foreign policy line. “During the period when the economy starts to take off, mitigation usually comes at the cost of development” (Deng 2007) was a very typical statement until at least 2009, before the advent of the (domestically motivated) ‘low carbon economy’.

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<sup>25</sup> See for example an early practical example in Friman, M. (2007). *Historical responsibility in the UNFCCC*, Centre for Climate Science and Policy Research, Linköpings University. Killer phrases like “It’s against policy,” “It won’t work,” “We’ve never done it before,” are found as discussion stoppers in every day life.

We see the lack of a Chinese equivalent of the Stern Report as one explanation for the comparative persistence of the former frame in China. With the authority of an acclaimed scientist, the report helped to construct a discourse around the opportunities of mitigation (or rather the opportunity cost of not mitigating climate change) in the western knowledge community and media. Its content – a scientific cost-benefit analysis of climate change mitigation – has however not seen a significant direct uptake in the Chinese climate change discourse. While there have been government-sponsored preparations of a similar endeavour in China, it is “unsure when and if there will be a public release and what the core messages will be” (Interview 58). Indigenously and independently produced knowledge of climate change economics in China could play an important part in leaving the trap of the killer phrase ‘mitigation destroys economic growth.’

More recently though, we see China increasingly interested to position itself in an active role, grasping the growth opportunities of a green economy. So, conversely, these endorsements of the great business opportunities and enhanced life quality in a ‘low carbon economy’ amount to a complete reversal of the judgement on climate action, allowing nearly no opposition, as it is hard to argue with growth, particularly if it is green. Why are the kind of goals and the whole notion of a ‘low carbon economy’ also acceptable in the Chinese discourse and reproduced by the media?

The answer on the one hand seems to lie in the unilateral and domestic nature of the goals – i.e. they are not forced onto the country for the sake of international climate policy – and they coincide with the needs of domestic energy policy. Government officials and members of the Chinese delegation insist that the quantified “GHG emission reduction target is very strict and only possible to achieve at high cost”

(Interview 57), and the official media has picked up on this theme. On the other hand, ‘low carbon economy’ is promoted widely and regarded as a promising strategy that aligns economic development needs with opportunities of a low energy economy with its environmental co-benefits (Interviews 49, 52 and 54). It is in this way rather independent domestic industrial and development policy, albeit with strong possible effects on mitigation.

Our interviewees suggest that Chinese policy circles and the think tanks that advise them have for a long time been deeply split in their assessment of the effects that strong action on climate change would have on the Chinese economy. Parts of the government and their senior advisors subscribe to a view of China as the future leader of a new green world economy, and they also fear constraints in energy supply if the current path of energy intensive development is followed for much longer. In their scenarios, ambitious climate policy would have net positive effects on the economy, especially when taking into account the co-benefits of reduced localized environmental pollution and increased energy security. Other parts of the government have supported a more traditional approach to economic development that relies on utilizing the major domestic non-renewable resource coal, and following e.g. the transport patterns exemplified to them by the majority of industrialized countries. In their view, employing strict measures to reduce carbon emissions will reduce the dynamic of Chinese economic growth and societal development (Interviews 33, 34 and 37). Pioneered by high-level voices like the Chinese Academy of Sciences 2009 report on sustainably development supporting a ‘low carbon economy’ in China (China CSR 2009), in 2011 the pro *green* growth ‘camp’ seems to have won over the support of the highest echelons of government,

and consequentially all levels of government – and the media – have taken over the official ‘low carbon economy’ rhetoric.

The undecided stand of the Chinese media – i.e. reproducing quite opposite frames – corroborates the views of interview partners who alluded that there was an internal struggle in the government over the interpretation of the relationship of climate change mitigation and economic development in 2008 and 2009. Here, discourse studies can provide valuable insights into current internal government debates. It also shows the generally passive role of the media in forming the public debate – at least not as part of an established discourse coalition with the government on this particular topic, but rather guided by it.

Carvalho (2007) and Weingart et al. (2000) describe how in industrialised western countries a *discursive coalition* of media and science was key in forming the public understanding and knowledge of climate change. “Scientists were the uncontested central actors and exclusive definers of climate change” (Carvalho 2007) and provided the media with a topic exhibiting novelty and controversy. A mutually beneficial relationship ensued, and it can be seen as the starting point for the western discourse that focuses on environmental management, GHG intensity stabilization goals, scenarios, etc.

We assert that this kind of discursive coalition between the media and science has not existed in China. The main reason for this lack is that a discourse on climate change has only begun to grow much later in China than in the developed countries. At the time it was picking up momentum in China, ‘scientific closure’ of the most contested questions had already been reached, e.g. on the relationship between GHG concentrations and global temperature or the anthropogenic nature of climate change.

Most of climate science has also not been endogenously produced, and instead has come to China from the outside. Chinese media report factually about the science behind the issue, and in instances call upon domestic scientists as mediators for their understanding of the scientific and political debates (Geall 2011). But media and science in China have no established sets of practices for sharing particular storylines or frames of climate change, and thus have not been in a position that is formative for the discourse as a whole and how the public at large relates to climate change.

#### **4.5. Climate and national identity**

Another way of looking at the dominant frames of climate change in China is in terms of their psychological or narrative construction in relation to national identity. Two different cases are examined in this section. Firstly, the ideals of ‘harmony’ and ‘scientific development’ that underpin the promotion of ‘low carbon economy’, and secondly, the long-standing narrative of ‘victimhood’ that is at the base of China’s moral stance on climate issues.

Around 2005, the Confucian ideal of a ‘harmonious society’ was (re)created by the current power elites in China. Since then, it has been the dominant macro-level government maxim, and leading politicians have been promoting a narrative of harmonious relations between humans and nature (in the context of moderate pursuit of human wealth) calling for a new normative vision for society and politics (Fan 2006).<sup>26</sup> Chinese leaders explicitly included the environment in order to promote a stable social, economic and political development when theorizing this ‘harmony’. With regard to the envisioned role of nature, it is fruitful to explore the images used in the state media. A 2007 front-page article in People’s Daily about the “mutually

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<sup>26</sup> A collection of relevant government statements can be found at Clark, C. H. (1958). *Brainstorming, the dynamic new way to create successful ideas*. Garden City, N.Y., Doubleday.

harmonized path of economic development and environmental protection” (Min 2007) displayed a representation of nature that seems strangely at odds with the current environmental conditions in China. Surely not coincidentally, it depicts the harmonious world – as a beautiful composition of landscape, houses, boats and men (Anonymous 2010) – in a way very similar to ancient traditions of Chinese calligraphy.<sup>27</sup>

This Confucian perspective on the environment is not restricted to national discourses about a righteous relationship with ‘nature’. Mirroring remarks by Chinese President Hu Jintao and former President Jiang Zemin about the role ‘harmony’ plays in international relations, according to Jie Zhen, vice-director of the NDRC, the ultimate solution to the challenge of climate change requires:

“... preserving harmony between men and nature, seeking a balance between economic development and environmental protection, preserving harmony between peoples, seeking balance between poor and rich peoples, seeking harmony between the generations, and in the future, looking for balance between presence and future, preserving harmony between nations, seeking equilibrium between differing interests.” (Ren et al. 2007)

The Chinese narrative of a ‘harmonious society’ renders climate change as part of internal and international relations among humans that have to be handled in a proper manner in order to solve this issue once and for all. Obviously, such discourses of ‘balance’ and ‘harmony’ are unlike the western developed country mainstream climate discourse, which is dominated by natural science, economics and thus a calculus of “rational climate management” (Byrne et al. 2005). However lofty and ambitious the Chinese government paradigm of ‘harmonious society’ sounds, one

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<sup>27</sup> Weller (2006) analyzes the concepts and practices of Chinese natural parks and shows that an American Yellowstone-like vision – consisting of pure, de-humanized wilderness – never gained a foothold in the People’s Republic. Anonymous. (2010). "Goujian shehui zhuyi hexie shehui." from <http://politics.people.com.cn/GB/8198/70195/index.html>.

should not underestimate the importance of this macro-level concept in guiding Chinese policy at the highest levels. We therefore regard it as an important aspect in shaping the nature of climate change in China.

Another facet can be found in international climate change politics. This is an arena in which the Chinese media and politicians relentlessly promote not only a moral viewpoint, but also actively construct China's identity as belonging to the 'other group', namely the group of developing countries. Similar to Chinese academic views and the official line, China is firstly positioned as a developing country; and it is secondly stressed that developing countries have little responsibility for climate change.

This discursive strategy is clearly comparable to other areas of foreign policy, as discussed for example by Suzuki (2007) using the case of the Sino-Japanese relations. The promotion of 'otherness' is more pronounced in media closer to the state, like *People's Daily* and others that base their reporting on feeds from the *Xinhua* network. Articles tend to focus on the weaknesses and responsibilities of other countries – even in the developing country group, while ignoring China (Zhang 2007a). More independent-spirited news outlets like *Caijing Magazine* have at times taken very different angles, for example by featuring an article by former UN secretary general Kofi Annan, applying historical responsibility only to questions regarding least developing countries. He is quoted as citing the Bangladeshi environmental minister:

“The USA and other developed countries need to take up the majority of responsibility. Of course India and China also have to take up responsibility. Bangladesh however does not have any responsibility.”  
(Annan 2009)

Two years earlier it was apparent that newspapers which had sent their own reporting staff to the Bali negotiations paid much less attention to the moral frame that so closely resembles official policy. Although the question of ‘otherness’ generally, and historical and moral responsibility more specifically, is important in all of the Chinese discourse on climate change, its reproduction and thereby revalidation is particularly frequent in closely state-controlled parts of the media.

Also not to be underestimated, past experiences – history – are the main fabric for constructing common identity. According to Eller (1999), collective memory acts as the bond that glues a people together, and forging this collective memory is an integral part of nation building (Podeh 2000). Recent research on China looks into the question how “histories of the national past and national identities in the present are mutually constituted” (Gries et al. 2011). The Communist Party is acutely aware of the power of history, and has been known to rewrite it for ideological purposes, for example in Maoist times through re-education campaigns that cemented a “victor narrative” of winning national independence (Harrison 1973). The later “Patriotic Education Campaign” since 1991 has “called upon the entire nation to study China’s humiliating modern history,” with the main goal being the installation of a (at times nationalistic) “‘victimization narrative,’ which blames the ‘West’ for China’s suffering.”

“Modern historical consciousness in China is largely characterized by the ‘one hundred years of humiliation’ from mid-1800s to mid-1900s when China was attacked, bullied, and torn asunder by imperialists.” (Wang 2008)

Suzuki (2007) similarly notes that “modern China’s national identity has been characterized by an acute sense of ‘victimhood’ arising from its turbulent interactions with International Society.”

Aside from nation building, the collective memory of a people lends itself to be part of a discursive strategy, and the application of such a strategy, led by the government and its media outlets, is apparent in the Chinese discourse on climate change, at least in the more outward-focused frames of climate change that dominated until at least 2009. What we have called the frame of ‘ecological imperialism’ in our related paper (see Chapter 3), builds on the historical notion of humiliation of China by the developed West. International climate policy is therein described as a tool of the developed countries to suppress China, and to hamper its legitimate efforts to grow as a nation, both economically as well as an international political power (see Chapter 3). This frame recalls and activates the modern historical consciousness of ‘victimization’ and ‘humiliation’ that has been constructed over the past two decades. At the same time, the application of this discursive strategy strengthens the underlying patriotic narrative and contributes back to the overarching goal of nation building.

The discourse on climate change therefore plugs in very well with the ‘victimization’ narrative and is prone to trigger a generally defensive response to international climate policy. It is linked to the assumption of (imposed) mitigation having negative consequences for China, and a struggle, with a moral undertone, between China (and other developing countries) as victims, and ‘the others’ who want to contain the country’s rise. In the political context of *power politics*, the purpose of this kind of coverage is the formation of a clear subject position for China. Firstly, given the framing of climate change as a part of power politics, China clearly associates itself with one block – that is the developing party ‘camp’. By association with the representatives of many Least Developed Countries (LDCs), an image of

‘victimhood’ is strengthened and China in effect leverages on the less favourable circumstances of countries that already feel climate change impacts most directly. The ‘Group of 77 plus China’ has helped China balance its power against the developed countries – on the one hand in practice, in the negotiations, and on the other hand discursively, as China is constructed as belonging to a group of countries with the same interests (which might not be so self-evident in reality). “Developing countries like China” is the most commonly found subject position for China in all climate change reporting concerned with international negotiations.

Prominent figures like Pan Yue, the former vice minister for environmental protection who has otherwise become internationally famous for his unusually direct criticisms of China’s environmental situation, directly linked the “developed nations’ climate problem” to the notion of colonialism (Pan 2006; Pan et al. 2006). At around the time of the conclusion of the Copenhagen UNFCCC conference at the end of 2009, the Eastern Morning Post of Shanghai used a telling allegory out of the sphere of power politics. The article claims that efforts to set mitigation or burden sharing targets between developed and developing countries “[...] must remind people of the ‘Washington Naval Treaty’ that the United States, United Kingdom, Japan, France and Italy signed in 1922 to set limits for the total gross tonnage of marine capital ships for each of the five countries” (Chen 2009). It goes on to note that military can be constrained this way, but not economic development,<sup>28</sup> and that history has proven that in this case the military constraint in the end did not work either. Naval superiority of quasi-imperialistic western powers has played its important part in the

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<sup>28</sup> Note the jump from setting mitigation targets directly to constraining development.

Chinese ‘century of humiliation’, so this form of allegory obviously supports the ‘ecological imperialism’ frame of climate change.

Outside pressure combined with a prevailing patriotic mood in China inevitably leads to calls to resist international interference. Just as we have elaborated on the discussion-stopping discursive element “mitigation destroys growth”, “interference with internal affairs”, “imperialistic behaviour” is another case. It is used to preclude consideration of an international agreement that possibly includes binding and absolute emissions targets for China. When internationally coordinated mitigation activities are labelled ‘ecological imperialism’, it is difficult for a (global) ecological modernization discourse to exist in China at the same time. Instead, attention is often deflected to other actors who are not living up to their responsibilities (Pan et al. 2006; Zhang 2007b), and other effected stakeholders are used as proxies, e.g. African countries or UN secretary general Ban Ki-Moon (Zhan 2009; Zhang 2009).

#### **4.6. Conclusions**

Ever since the issue of global warming has become a worldwide concern in the late 1980s, often fundamentally different (national) discourses of climate change have evolved. A closer look at these discourses, their genesis and evolution shows that a purely global perspective of *environmental management* is not firmly rooted in the complex realities on the ground. This communication barrier is one major cause that has inevitably produced failures and blockades of internationally coordinated climate mitigation. Conversely, the recent history of global climate politics does not mainly point to political global unity to solve a common problem of mankind, but to various processes of nationalization and re-contextualization of an international scientific discourse. This is because climate change is not only a factual matter of the natural

sciences and technical measurements; it is also a fundamentally social and political construct (Hulme 2009).

Our analysis of the Chinese discourse shows how deeply the meaning of climate change is determined by country specific circumstances, i.e. elements of humanized nature and the local political economy. Cultural knowledge and the dominant collective understanding of history for example influence the direction that discussions take, and to a certain degree they provide templates of possible (re)actions and acceptable behaviour. We firstly understand climate change as co-produced at the nexus of politics, science and nature, a process that has happened much differently in China compared to the industrialised countries. Secondly, compared to the climate change discourse in the developed west, where ‘discourse coalitions’ of the media and science, and media and politics have shaped its evolution, we note that these types of coalitions have for the most part been absent in China. Politics-media relations on the topic have instead been shaped by strong state guidance e.g. through agenda setting by the government. Thirdly, we find that elements of what can be summarized as ‘Chinese national identity’ have played an important role in determining the climate change discourse, and in particular the setting of the country’s subject position vis-à-vis others in the international negotiations.

Discourse studies are an additional valuable approach to understanding Chinese positions in the international negotiations under the UNFCCC, compared to a strategic focus on national interests alone. They also point to the importance of country-specific understandings of climate change, and environmental issues in general. International agreements and actions on climate change mitigation or

adaptation consequentially not only need to focus on technologically or economically optimal solutions for a natural science problem; they equally need to take into account *what climate change means in different places*. Apart from strategic interests, differing discourses are surely a leading cause for misunderstandings in the international climate negotiations.

Climate change in China is however more than a necessary product of history and culture. The government has been translating the country's strategic interests as defined by the current party leadership into terms that resonate with and reproduce other discourses. We found, for instance, that the basis of what kind of framing of climate change the government promotes and at times mandates, has classically rested in its needs to justify and support China's foreign policy vis-à-vis the international climate change negotiations. The observable refocusing towards the 'low carbon economy' frame is likely based on the necessity to provide a backdrop for a change in the direction of less resource intensive, more sustainable development models. It has also started appearing at the same time that elements of victimization of China have become less internationally tenable, given the countries' growing economic and political strength, and parallel growing share in global GHG emissions. It is beyond the scope of this paper and the theoretical framework used herein to explain in more depth the underlying forces for e.g. the shift from a foreign policy focus towards a sustainable development focus in which kind of framing of climate change is promoted by the Chinese government. Our post-structuralist approach to the environment does however explain how the government employs its power to co-produce climate change at the nexus of science, politics and nature. As for example the one framing of climate change as a matter of historical responsibility

shows, the Chinese discourse is indeed largely shaped in terms set by the government and – when necessary to support its claims – co-produced by the scientific community. While the role of media in shaping the public understanding of climate change in China should not be underestimated, it has largely reacted to and reproduced the official government take on the topic. Starting in 2009, the topic of climate change has seen an immense discursive shift, away from outward-focused frames of ethics and power politics, towards domestically motivated, active industry politics in developing a ‘low carbon economy’. We have shown how this shift has been constructed largely by the government, lacking discourse coalitions of politics and media or media and science which have been formative in the developed west. Because the national discursive construction of climate change is so important, the global community is well advised to engage China along the lines of its newly dominant frame of climate change as ‘low carbon development’. In fact, this Chinese discourse might eventually even have motivating effects on the United States, the second biggest global greenhouse gas emitter. Arithmetics of burden sharing under the UNFCCC and scientifically underpinned cost-benefit analyses have not been able to convince the US to join the global fight against climate change. Competition over the leadership of a *global* low carbon economy might however have a chance to achieve just that – at least some lead media there have started building a discursive coalition with parts of the political establishment in challenging the country to step up investments in green technologies to counter China (see for example Woody 2010; Rosenthal 2011).

#### **4.7. List of interviews**

*See 3.7 (combined list of interviews for Chapters 3 and 4)*

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## **Chapter 5: Paper 3: Differentiating historic responsibilities for climate change**

*Christian Ellermann, Benito Müller, Niklas Höhne*

### *ABSTRACT*

Historical responsibility is one of the main lines of argument underlying the principle of common but differentiated responsibilities for climate change, and global solutions to this problem are unlikely to be crafted, or to be stable, without some broad conception of what is fair. It is also one of the main features of the domestic Chinese discourse on climate change. Using a political ecology framework to explore the intersection of material GHG emissions with the important notion of equity, this paper applies different concepts of responsibility – from pure contribution to moral responsibility to two hypothetical cases – to China’s actual past greenhouse gas emissions. It thus contributes to a better understanding of responsibility for climate change, and to how China fares under these different concepts.

### **5.1. Introduction**

Climate change has strong ethical dimensions, and global solutions to this problem are unlikely to be crafted, or to be stable, without some broad conception of what is fair (IPCC 1996; Stern 2006b). There is a burgeoning literature on these dimensions (Müller 2001; Gardiner 2004; Brown et al. 2006; Klinsky et al. 2009), with part of

this work focusing on historical responsibility for climate change (Botzen, Gowdy et al. 2008; Friman and Linnér 2008; Klinsky and Dowlatabadi 2009). The notion of historical responsibility for climate change of ‘Annex I’ (i.e., developed-country) parties to the United Nations Framework Convention on Climate Change (UNFCCC) has been regularly invoked by developing-country governments. Historical responsibility is also one of the main lines of argument underlying the principle of common but differentiated responsibilities for climate change, and the polluter pays principle more generally. Political ecology is “a field that seeks to unravel the political forces at work in environmental access, management, and transformation” (Robbins 2012), with climate change being one of its prominent topics of research (Tschakert 2012). It therefore provides a good theoretical framework and starting point for an analysis of the methodological questions associated with the attribution of historical responsibility for climate change and its numerical manifestations. The issues addressed in this chapter resonate strongly with two of the main themes present in much of political ecology research, i.e. the struggle over property rights and notions of the conflict between the developed and developing world over access to a limited resource (Bryant 1992), i.e. here the atmosphere. The question of country historical responsibilities for climate change is essentially a question over property rights (i.e. the right to the remaining shares of pollution) and their distribution among emitters, i.e. across countries or especially between developed and developing countries. Discussion on equity – a political-economic approach to historical responsibility (Friman 2007) – have been widely present in the Chinese debate on climate change. It is indeed one of the main discursive elements in China’s official position (Ellermann et al. 2010), framing understanding of the country’s ethical

position vis-à-vis developed countries and the rest of the world. In this chapter, we examine the Chinese position on responsibility for climate change by drawing upon the results of the Ad-hoc Group for the Modelling and Assessment of Contributions of Climate Change (MATCH), a group that was created in 1997 following a proposal from Brazil (UNFCCC 1997). The MATCH group has concentrated on the causal attribution of historical greenhouse gas (GHG) emissions to countries (Ito et al. 2008; Prather et al. 2009; Höhne et al. 2010).

## **5.2. Contributions versus responsibility**

Climate impacts, whether anthropogenic or due to natural variability, will inevitably have a multitude of causes. The moral responsibility for climate impacts will typically be shared by a number of actors. There is a link between a moral agent causally contributing to an impact and being (partly) morally responsible for it, but that does not mean that the two are the same. The MATCH project modelling focussed on determining the *causal contribution* of greenhouse gases covered under the UNFCCC to certain climatic impacts, in particular to changes in mean global temperature. The message from the project is that we cannot accurately discuss causal contributions to climate change per se, at least not if one is intent only on specifying numerical shares thereof, because such calculations require making normative decisions. One of the key normative decisions is the way in which emissions are associated with particular countries. It is one thing to say that a series of emissions has contributed a certain percentage to the increase in global mean temperature over the twentieth century, for example, and quite another to say that China has done so. The former is purely scientific, whereas the latter involves a normative decision of how to identify ‘the emissions of China’ at a given time.

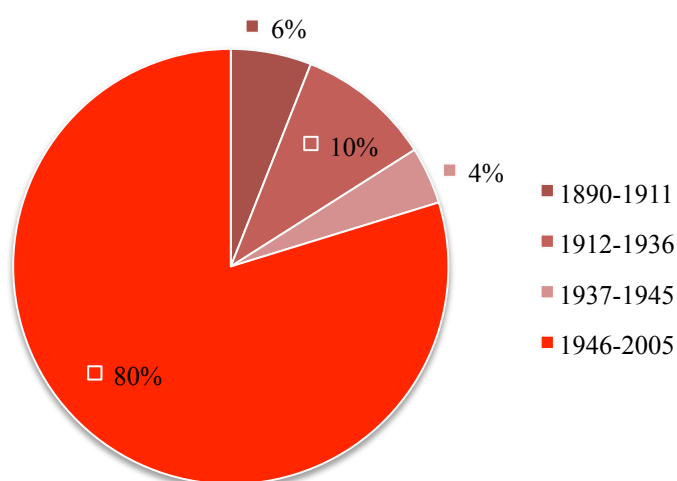
The implicit assumption of the MATCH team was that anthropogenic emissions associated with a particular country for a given period of time are those emitted from within its sovereign territory, and that the sovereign territory is changing over time. There are a number of problems with this traditional conception, not least that it does not lend itself easily to accommodate ‘bunker fuel’ emissions from international travel and transport. Another, lesser known problem with this sort of traditional sovereignty-based definition is that it does not lend itself to take account of joint contributions and responsibilities, short of pooling the sovereignty of the territories in question. This shortcoming shall be discussed briefly in the context of Article 4 of the UNFCCC, which can be interpreted as implying joint North-South responsibility for the increments in emissions in developing countries since the convention was signed in 1992.<sup>29</sup>

The normative issue of identifying the sovereign emissions of China is not completely straightforward because the sovereign territory of the People’s Republic of China has changed through history. In this chapter we rely on the decisions regarding the attribution of the emissions made by the MATCH team. The data recorded for China are largely dominated by emissions from fossil-fuel combustion, as recorded in Marland et al. (2005), for ‘mainland China’ (i.e., excluding Hong Kong, Macau and Taiwan). Figure 5-1 displays emissions during different historical periods. Until 1911 China was under the rule of the Qing Dynasty, but during some of this period parts of the country were occupied by foreign powers. However, there was no major colonial rule over China that would warrant a deep discussion of the attribution of emissions during that time, which amount to 6% of total emissions

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<sup>29</sup> In this chapter the traditional definition of countries’ ‘anthropogenic’ emissions, namely that from their sovereign territory, shall be followed, both for determining their relevant causal contributions and moral responsibilities.

between 1890 and 2005. The period from 1912 to 1937 saw major domestic conflict, with warlords fighting over regional rule in the Republic of China. There should be little question over the attribution of emissions during this time, which amount to 10% of China's emissions from 1890 to 2005. In contrast, major parts of China were occupied by Japan from 1937 to 1945. Marland attributes all emissions during this period to China (mirroring similar decisions about other countries, such as the attribution of pre-independence emissions throughout current Indian territory to India, rather than to the colonial power, the United Kingdom). In spite of the rapid industrialisation and deforestation during this time, the share of these nine years amounts to only 4% of total Chinese emissions.



**Figure 5-1. China's emissions of greenhouse gasses during different historical periods**

From 1946 on, sovereign rule over all of mainland China again became clearly Chinese. This historical period contributed 80% of the emissions from 1890 to 2005. While the question of Chinese sovereign emissions is not absolutely straightforward, the contribution during historical periods that could be contentious (1890-1911 and 1937-1945) make up only 10% of total Chinese emissions. In practice, therefore, the

relevance of the normative debate surrounding this issue is limited. It may be safe to assume that this applies to most countries that have not seen major changes in territory since 1945.

### **5.3. Types of responsibility**

To be responsible for something harmful is to be worthy of blame for it.<sup>30</sup> Aristotle contended that blame and praise are bestowed on *voluntary* actions, while involuntary ones are pardoned (Aristotle (1908: III.1-5, 1110a-1111b4). The key to responsibility for actions is thus their voluntary status, for which he gives two necessary conditions:

- First, there is a control condition: the action or trait must have its origin in the agent. That is, it must be up to the agent whether to perform that action or possess the trait — it cannot be compelled externally.
- Second, Aristotle proposes an epistemic condition: the agent must be aware of what it is she is doing or bringing about. (Eshleman 2004)

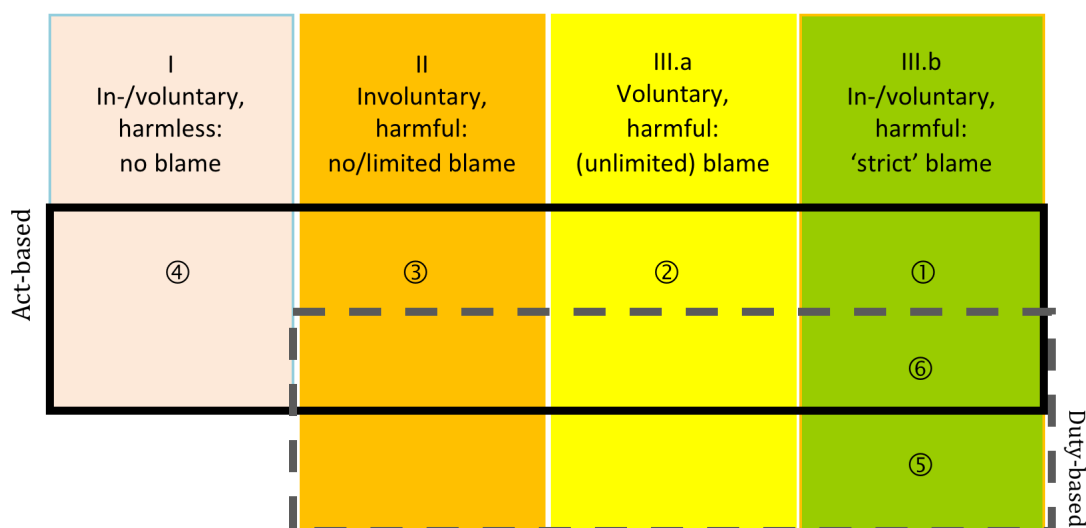
However, ignorance *per se* seems to be slightly too easy for pardoning, which is why the condition is usually strengthened insofar as the agent *could have reasonably been expected to know*.

Aristotle's conception of 'responsibility' is based in his theory of virtue, which concerns 'passions and actions.' But there are other theories which see the concept in the context of duties, in particular in derelictions of duty, which are not (necessarily) actions but equally liable to give rise to blame. Figure 5-2 is an attempt at representing the interplay between the distinctions of voluntary/involuntary, harmful/harmless, agency-/duty-based, and type/level of blameworthiness

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<sup>30</sup> Strictly speaking it is either blame- or praiseworthy, but in the present context the former suffices.

(responsibility). Aristotle’s conditions on assigning blame to actions (and to agents) are about whether they are carried out voluntarily or involuntarily. However, as illustrated in Figure 2, blame can also be assigned or withheld regardless of this distinction. If, for example, the effects of an action are *harmless* (category I), then clearly no blame should be attached to it, even if it was voluntary. Moreover, there are situations where, contrary to Aristotle’s conditions, ‘strict’ blame (responsibility) is handed out simply because the effects are harmful, regardless of whether the harm was done voluntarily or involuntarily (category III.b).



**Figure 5-2. Categories of blame/responsibility.**

In the context of climate change, blame/responsibility is usually seen as applying to certain acts, namely the emissions of greenhouse gases; thus, blame is act-based. For example, if someone drives a car, and if the emissions resulting from this act are deemed to be harmful, then they may be judged to deserve unreserved blame just because the emissions are harmful (strict blame, ① in Figure 2), or because they drove voluntarily, in the full knowledge of the harmfulness of the emissions and without coercion (unlimited blame, ②). If, however, they can plead reasonable

ignorance or coercion, then they may get a (limited) pardon (no/limited blame, ③). Finally, if the emissions in question are classified as harmless, then no one can justly be blamed (no blame, ④).

What is not usual is to consider blaming someone for certain harmful emissions, not because they were actively engaged in emitting them but because they had a duty to prevent them. Thus, if two individuals, say Jane and John, enter a contract stating that Jane is to reduce her emissions and that John is to bear her additional costs, then it can be argued that they both have a joint-duty to reduce Jane's emissions, and that if the reduction does not occur they could be jointly blamed. The blame may, of course, not lie equally. Jane may have wished to reduce emissions but did not receive the money to do so, or John may have wished to pay for Jane's emissions reduction but Jane had no inclination to undertake that reduction. The point is that John might have to take responsibility for a certain amount of emissions even though those emissions were not actually emitted by him (⑤), while Jane may not have to take responsibility for the whole of the emissions increment she failed to reduce because there was a joint dereliction of duty (⑥).

#### **5.4. Differentiating contributions and responsibilities**

The methodology of the MATCH project was designed to establish the relative causal contributions by countries to changes in global average temperature. The MATCH percentage figures for countries' shares in contributing to these changes are determined by the anthropogenic emissions that have historically been emitted from their sovereign territory. These percentage shares are themselves relative to the type of impact, and they depend on the sequential order of the emissions series in question. However, to simplify calculations for this chapter, it is possible to use the

sum of historic emissions (or their relative size) as a reasonable approximation for relative causal contributions (den Elzen et al. 2005b; Hope 2008). Here we use aggregate historic country emissions emitted between 1890 and the present (2005) – using 1995 Global Warming Potentials (GWPs) for different gases consistent with the Kyoto Protocol – as determinants of responsibility.<sup>31</sup> Using GWP factors can only be considered an approximation they ignore the feedbacks and long-term changes in global warming potentials. Marginal damage from a unit of emissions is smaller today than it was at the beginning of industrialisation. For simplicity, we assume that emissions at all times are weighted equally by using constant GWPs (see Höhne and Blok 2005).

The problem with either aggregate (i.e., country-wide) or per-capita emissions measures is that, while they may capture some facet of the relevant notion of ‘responsibility,’ they both fail in capturing other facets. The percentage shares derived from the aggregate figures clearly capture the causal-contribution aspect of responsibilities, but they cannot, by definition, reflect other potentially relevant country aspects, such as population size. Per capita emission figures, on the other hand, do reflect population size, but they are unable to reflect causal contributions. For example, they would assign the same responsibility to both China and Latvia, with 0.8tC/cap in each country, despite there being a 500-fold difference in aggregate emissions (WRI 2009).

There is no general answer to whether responsibility should be measured in absolute (single-parameter) or in relative (multi-parameter) terms. There are cases of emissions-based responsibilities, which should be quantified in absolute terms (i.e.,

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<sup>31</sup> As Müller et al. (2009) emphasize, the methodologies could easily be adapted to be used with the full MATCH modelling techniques.

in terms involving only one parameter, namely physical emissions). In other cases, it may be necessary to ‘relativise’ these figures in terms of other relevant parameters, such as population sizes (when talking about group/country responsibilities) or wealth and economic production. Traditionally, these relativisations have been operationalised by simple parameter divisions, such as per capita and per-unit-of-economic-output (GDP) measures. For example, Baer et al. (2008) name “cumulative per capita CO<sub>2</sub> emissions from fossil fuel consumption since 1990” as a “reasonable” definition of responsibility. Research institutes close to the Chinese government have in recent years undertaken significant work in a similar direction; they promote “cumulative per capita emissions ... as an indicator for equity” (Pan et al. 2009).<sup>32</sup>

Aggregate country or regional responsibility for climate change (impacts) should be relativised in the sense that it has to be measured in multi-parameter terms, including – apart from emissions – the size of (certain) populations. The traditional operationalisation in per capita terms over-simplifies the situation. Instead in this chapter we use a bottom-up, allowance-based methodology. This generalises both the traditional absolute and per capita measures. The idea is that allowances may be allocated to emitters, which they can use against their emissions in calculating their level of responsibility. It is, in general terms, analogous to the system of tax allowances used in most countries in differentiating tax burdens. There can be different kinds ‘climate change responsibility allowances’ depending on the (moral) justification for why they should be allocated. For example, if a certain level of greenhouse gas emissions is deemed to be harmless, then one would have to allocate

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<sup>32</sup> Ultimately, however, they use countrywide emission contributions, adjusted for measures of income distribution in the population, to calculate global responsibility shares because it is impossible to express the percentage responsibility of a per capita share.

what we call ‘basic allowances’ to cover these harmless emissions, on the grounds that no person should be held responsible (blamed) for a harmless activity.

Other allowances could be allocated on the basis of basic needs, in turn justified by way of the Aristotelian ‘control condition’ that one cannot be held responsible for what is not in ones control. This kind of allowance has been implemented by looking at ‘subsistence allowances,’ based on the assumption that poverty eradication is an overriding moral aim, and that in present circumstances it can only be achieved through activities that generate greenhouse gas emissions. There may be other basic-needs-based allowances that might have to be considered, such as the need to keep temperatures within certain boundaries in order to ensure people’s survival. The Aristotelian epistemic condition that one should not be held responsible for actions which one could not have reasonably been expected to know were harmful – mere ignorance is not sufficient – could also be used to justify the introduction of what might be called ‘epistemic allowances.’ The main difference between these Aristotle-based allowances and the above-mentioned basic kind is that while the latter can be seen as ‘certificates of harmlessness’, the former are merely ‘responsibility wavers’ applied to emissions that would otherwise have been counted as harmful and blameworthy. The main consequences of this is that, while basic emissions should be transferable, these ‘responsibility wavers’ should not. The latter ought to be used only as ‘back-up’ to the former, should both be issued, and not as complement.

Apart from the question of what sort of allowances should be counted against one’s responsibility for climate change, a key issue with this sort of methodology is how to allocate them. In the case of basic and subsistence allowances, we believe that a ‘bottom-up’ approach to country allocations – a definition of country allocations in

terms of personal ones – is most appropriate. In the case of epistemic allowances for operationalising Aristotle’s epistemic condition, there is no need to take recourse to such a bottom-up approach to country allocations, particularly if one adheres to the traditional definition of country emissions. All that is necessary, on either the personal or the country level, is to ensure that all emissions occurring in justifiable ignorance of their harmfulness be covered by allowances. Personal basic allocations should be allocated on an egalitarian principle for the same reasons that support the per capita allocation of global emission permits.<sup>33</sup> The bottom-up methodology then implies that countries can disregard some of their emissions in responsibility calculations, using this formula:  $b \times p_i$  (where  $b$  is the global per capita figure of harmless emissions, and  $P$  is the population of country/region  $i$ ). Population figures enter allocation-based country responsibility measures, which is quite different from traditional per capita measures.<sup>34</sup>

The difference becomes even more marked if other population-related allowances are considered. While there are arguments for a differentiated allocation (according to particular needs) in the case of subsistence allowances, it is clear that if emissions are equally allocated they would normally not be allocated to the whole population of a country, but rather to those who are living below a set poverty line. In other words, it is possible that the allocation of subsistence allowances to a country is dependent on population size, thus generating a population-relative responsibility measure.

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<sup>33</sup> Note, however, that the two are *not* the same. To be allocated an emission permit *per se* is not tantamount to being given a responsibility allowance for the specified amount of emissions, in the same way that being given the legal licence to produce tobacco does not give one immunity from the consequences of tobacco use!

<sup>34</sup> For example, if it is agreed that all the emissions in question are harmful, then the basic global per capita allocation would be  $b = 0$ , implying that the resulting basic country allocations are zero for all countries regardless of their population size, and thus that the allocation-based responsibility measures are independent of population figures. In contrast, per capita measures by definition reflect population size.

However, unlike in the traditional per capita methodology, the populations in questions are not *all* inhabitants but rather only special-needs groups, for example the country's poor. The proposed allowance-based methodology thus manages to reflect certain population sizes in establishing country/regional climate change responsibilities without the danger of unjustifiably diminishing in-country responsibility differences – by letting the responsible, ‘carbon rich’ people hide behind their carbon-poor compatriots – as can happen in the case of the traditional per capita methodology.<sup>35</sup>

### **5.5. The Chinese discourse on historical responsibility**

Historic responsibility for climate change has been discussed in Chinese publications, with authors concentrating mainly on direct historic contribution of countries' CO<sub>2</sub> emissions from energy use (He et al. 2000; Zhao 2007; Xu et al. 2008). According to a number of Chinese authors, developed countries bear responsibility for climate change because they have emitted 77% of CO<sub>2</sub> emissions from fossil-fuel use from 1950 to 2000.<sup>36</sup> He et al. (2000, p. 2) argue for actively using the notion of developed-country historical responsibility to “protect China's interests”. To corroborate their point and “refute arguments of ‘common responsibility’ and the like”, they calculate that developing country annual emissions

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<sup>35</sup> The calculations that follow are based on data coming from a variety of sources (Weller, R. P. (2006). *Discovering nature : globalization and environmental culture in China and Taiwan*. Cambridge, Cambridge University Press. UNFCCC. (2007). "UNFCCC website." Retrieved August, 2007, from [http://unfccc.int/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/items/3929.php](http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/3929.php).; Marland, Boden et al. Ibid.; USEPA 2006; Klein Goldewijk and Battjes 1995; ). See Höhne, N., H. Blum, J. Fuglestvedt, R. B. Skeie, A. Kurosawa, G. Hu, J. Lowe, L. Goharg, B. Matthews, A. C. N. de Salles and C. Ellermann (2010). "Contributions of individual countries' emissions to climate change and their uncertainty." *Climatic Change*: 1-33 DOI: 10.1007/s10584-010-9930-6. for a detailed discussion of the emissions dataset.

<sup>36</sup> This number is in the same range of the MATCH results for the same type of emissions and time period (72.3%). Taking all Kyoto gases into account, the Annex I share for this time period drops to 54%.

will surpass Annex I emissions only in 2037, and cumulative emissions only in 2147.<sup>37</sup> An analysis that goes beyond directly equating contribution shares to historic responsibility is lacking from these analyses, and it is usually restricted to the developed-developing country divide. However, Chen et al. (1999) analyse the topic starting with the Brazilian Proposal of 1997 (UNFCCC 1997), using that proposal's underlying concepts and calculations of national contributions to climate change. Comparing current (1990-2010) with historic contribution shares, Chen et al. conclude that China's interests would not be served if it was singled out from the group of developing countries in analysing historic responsibility (Chen et al. 1999).

#### 5.5.1. The official view

What is China's official view on responsibility for greenhouse gas emissions? The Chinese government first put forward a coherent climate policy in 2007. Its views on the application of historical responsibility for climate change have become manifest in various official documents. For example, government ministries have declared that:

- Both developed and developing countries are obligated to adopt measures to decelerate and adapt to climate change. But the level of their historical responsibilities, level and stage of development, and capabilities and ways of contribution vary. Developed countries should be responsible for their accumulative emissions and current high per-capita emissions, and take the lead in reducing emissions. (China NDRC 2008)

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<sup>37</sup> According to the MATCH calculations, non-Annex I annual emissions (all gases) surpassed non-Annex I emissions in 1992, and developing country cumulative historical emissions (all gases) will have surpassed developed countries by 2024.

- According to the principle of ‘common but differentiated responsibilities’ of the UNFCCC, the Parties included in Annex I to the Convention [developed countries] should take the lead in reducing greenhouse gas emissions. For developing countries with less historical emissions and current low per capita emissions, their priority is to achieve sustainable development. As a developing country, China will stick to its sustainable development strategy ... and make further contribution to the protection of [the] global climate system. (China NDRC 2007a)
- Developed countries shall take responsibility for their historical cumulative emissions and current high per capita emissions to change their unsustainable way of life and to substantially reduce their emissions and, at the same time, to provide financial support and transfer technology to developing countries. ... Given their historical responsibility and development level and based on the principle of equality, developed countries shall reduce their GHG emissions in aggregate by at least 40% below their 1990 levels by 2020 and take corresponding policies, measures and actions. (China NDRC 2009)
- Climate change is primarily caused by developed countries’ historical emissions over many years. (China MOFA 2008)

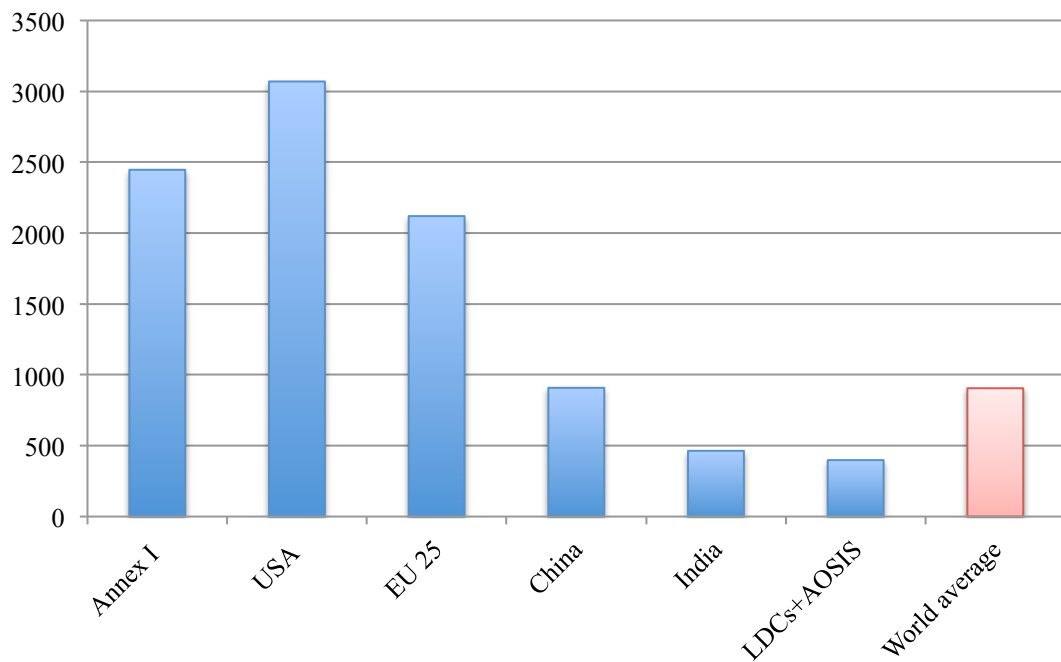
Similar to the Chinese academic views, the official line is that firstly, China is a developing country, and secondly, developing countries have little responsibility for climate change. While low per capita emissions are discussed directly for the case of China, in the case of historic responsibility, China is not mentioned individually but generally as a member of the group of developing countries with little responsibility overall.

The Chinese position on historic responsibility has become more clearly defined over time. A main purpose now seems to be to develop an effort-sharing scheme based on ideas of historic contributions to climate change. For some time China subscribed to a position, shared by some other developing countries, that does not allow for global reduction commitments, but instead differentiates reduction targets for Annex I countries by historic responsibility. More recently, however, China has started to formulate its own position, a ‘cumulative per capita emissions convergence’ approach. It does not focus on historical responsibility shares as we do here, but instead bases responsibility on egalitarian grounds that require equality of cumulative historical and future country emissions divided by the population at the time of the target year (2100 in a Chinese proposal).<sup>38</sup> Figure 5-3 shows this calculation based on MATCH data. A more recent refined version of this approach works with ‘per capita emissions entitlements’ (which only at first sight appears to be similar to our allocations) that would lead the world towards a global atmospheric concentration of 470ppmv CO<sub>2</sub> in 2050. Emissions budgets are then used that either run a surplus or deficit in 2005, depending on the sum of a country’s emissions above or below its population’s ‘entitlement’ each year; equal cumulative per capita emissions over time (operationalized as a budget of zero) are required in 2050.<sup>39</sup>

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<sup>38</sup> Based on the Chinese presentation at the AWG-LCA Shared Vision workshop at COP14 in Poznan in 2008. This simplified metric circumvents the problem that there is no logically meaningful expression of average per capita and per year emissions.

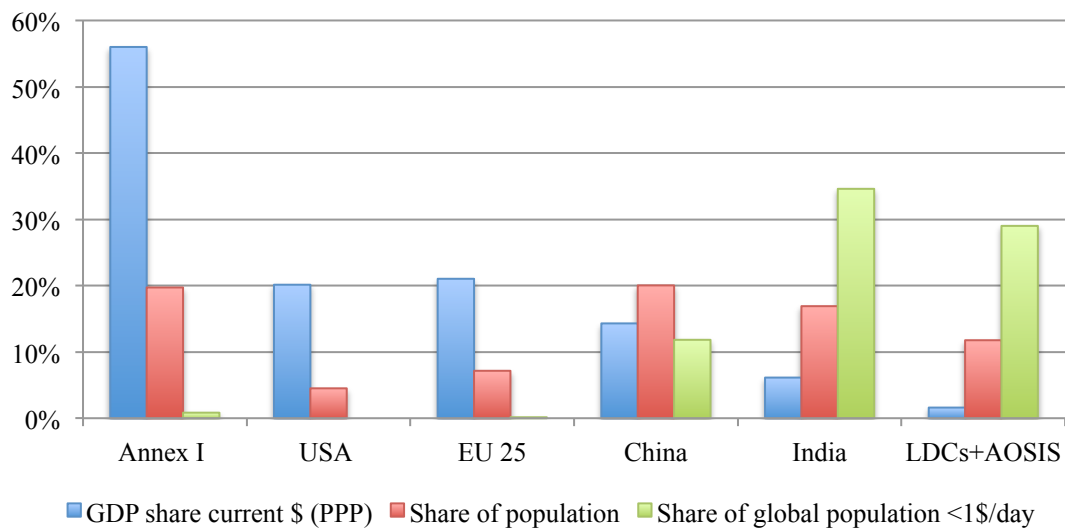
<sup>39</sup> Based on a side event at the 15<sup>th</sup> Conference of the Parties to the UNFCCC in Copenhagen 2009 (Pan, Luo et al. 2009). Note that Chinese researchers are generally working only with energy CO<sub>2</sub> emissions rather than all gases and sectors in the Kyoto Protocol. We assume they did the same here.



**Figure 5-3. Cumulative emissions per capita in 2100 using MATCH data**

## **5.6. Context**

For this chapter, causal contributions to climate change were calculated for all countries, but in the remainder of the chapter we will focus on three individual countries – the United States, India and of course China – and three groups of countries – the group of industrialised countries listed in Annex I of the UNFCCC, the European Union after the 2004 enlargement (the so-called ‘EU25’ countries), and the Alliance of Small Island States combined with the Group of Least Developed Countries (AOSIS+LDC, totalling 76 countries).



**Figure 5-4. Economic and demographic context (2005)**

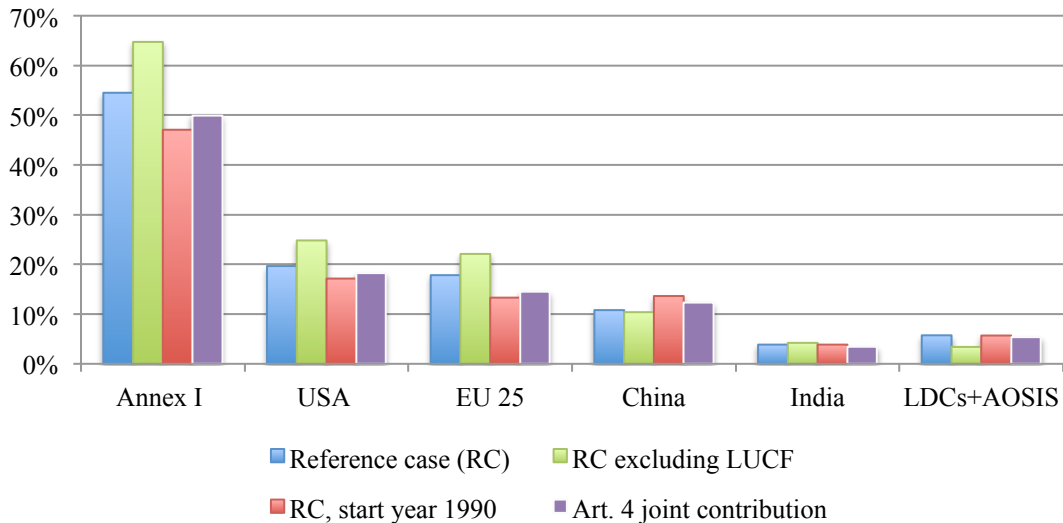
Figure 5-4 depicts three non-emission parameters for the year 2005 (the last year of observed emissions in the MATCH dataset) that are of interest in discussing of the contribution to, and responsibility for, climate change by these countries and country groupings, in particular their share of (1) global wealth (defined in terms of current GDP purchasing power parity [PPP]), (2) global population, and (3) global poverty (measured in terms of the number of people living on \$1 or less per day). Not surprisingly, the developed and developing world (Annex I/non-Annex I; North/South) are not the same with respect to these three dimensions: While the 20% of the world population that lives in Annex I countries produces 56% of global wealth, the non-Annex I countries are home to 99.2% of the world’s very poor people. These proportions have some impact in our responsibility calculations. For example, consider the fact that in 2005 China’s global share in abject poverty of 12% translated into 129 million people, and India’s 35% into 377 million, while the population of those living below \$2 (PPP)/day was 454 million in China, and a staggering 881 million in India.

According to our simplified methodology, the share of a country's (or a group of countries') contribution to climate change is determined by their share in the global warming potential of their historic greenhouse gas emissions. However, to be able to calculate these shares, some further parameters need to be specified, such as the time frame, the types of emissions, and the countries or groups of countries to be considered. For the purposes of this chapter, the chosen time horizon begins in 1890 and the emissions are those considered under the Kyoto Protocol.<sup>40</sup> Historically, industrialised countries (as listed in Annex I of the UNFCCC) have contributed the majority of greenhouse gases to the atmosphere, namely 54.5%, a figure which in the present simplified methodology represents their share in the causal contribution to the climate change problem. The causal contribution shares in detail, as represented in Figure 5-5, are (in descending order of magnitude) the United States (19.7%), EU25 (17.8%), China (10.8%), AOSIS+LDC (5.7%) and India (3.9%). These proportions can vary significantly depending on the sorts of gases and sources/sinks that are taken into consideration. For example, if emissions from land use, land use change and forestry (LULUCF), which are relatively uncertain, are excluded, Annex I contributions increase by almost a fifth (+10.2 percentage points), most of it absorbed by the US (+5.2%pts) and the EU (+4.3%pts), with chief beneficiaries Brazil (-2.3%pts, not shown here), Indonesia (-2.9%pts, not shown here) and AOSIS+LDC (-2.3%pts). The Chinese contribution does not change drastically (-

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<sup>40</sup> The data before 1890 is much less complete. Roughly 10% of the effect of total aggregate emissions is left out when starting in 1890 instead of 1750, the year normally identified as start of industrialisation. See Höhne and Blok Marland, G., T. A. Boden and R. J. Andres (2003). Global, Regional, and National Fossil Fuel CO<sub>2</sub> Emissions. *Trends: A Compendium of Data on Global Change*. O. R. N. L. Carbon Dioxide Information Analysis Center, U.S. Department of Energy. Oak Ridge, Tennessee., U.S.A. Available online at: [http://cdiac.esd.ornl.gov/trends/emis/meth\\_reg.htm..](http://cdiac.esd.ornl.gov/trends/emis/meth_reg.htm..)

0.4%pts), meaning that its share of emissions from LULUCF in total emissions is not very far from the global average.



**Figure 5-5. Causal contribution to climate change**

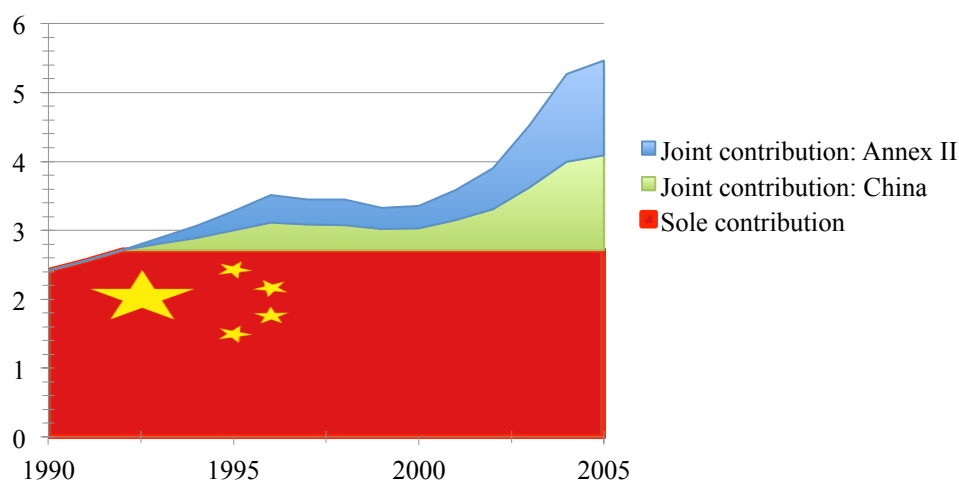
### 5.7. Differentiating causal contributions

Certain emissions, even when emitted over the sovereign territory of one country, should result in joint responsibility among more than one country. An example can be found in impact of China’s exports:

“[T]he extent of ‘exported carbon’ from China should lead to some rethinking by government negotiators as they work towards a new climate change agreement. It suggests that a focus on emissions within national borders may miss the point. Whilst the nation state is at the heart of most international negotiations and treaties, global trade means that a country’s carbon footprint is international. Should countries be concerned with emissions within their borders (as is currently the case), or should they also be responsible for emissions due to the production of goods and services they consume?” (Wang et al. 2007b)

Embedded carbon is a very complex and politically loaded question, that has been researched for example at the Chinese Energy Research Institute (Liu et al. 2008), as well as outside China (Wang et al. 2007b). In this chapter we accommodate this shared responsibility by introducing ‘joint contributions’, implemented as a 50:50

split between Annex II countries and China for the emissions above a 1992 baseline, the year of the establishment of the UNFCCC with its notion of common responsibilities. Figure 5-6 depicts the joint contributions of China.



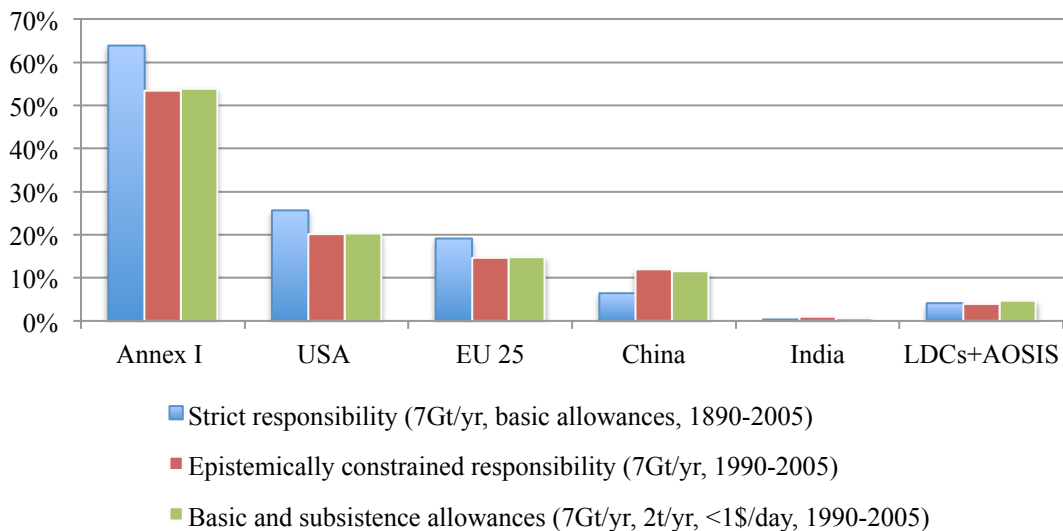
**Figure 5-6. China's joint contribution with Annex II countries**

In order to have any significant variance from the sovereign country measures at all, the time horizon has also been limited to start in 1990. For the industrialised world, the switch to this sort of 50:50-joint contribution would mean an increase of 3 percentage points since 1990, most of it going in roughly equal to the US and the EU (+1%pt each), and benefiting mostly China (-1.3%pts). These differences would practically disappear if one were to use the Reference Case (beginning in 1890). On this basis, and given the complexity of the question of calculation and attribution of embedded carbon that is beyond the scope of this chapter and does not fit the sovereignty concept generally applied, it was decided not to proceed along these lines.

## 5.8. Differentiating moral responsibilities

### 5.8.1. Strict Responsibility

Strict responsibilities are determined by the level of aggregate historic emissions – representing causal contributions – and a per capita allocation of the global total of harmless emissions according to the allowance-based approach outlined above. There has been some debate in the literature as to how much could be globally emitted without imposing harm, particularly in the context of defining what has become known as ‘ecological space.’ Commonly used values range between 2GtC [7.3GtCO<sub>2</sub>] per year for oceanic sinks alone (Agarwal et al. 1999) and 4GtCeq [14.7GtCO<sub>2</sub>eq] that also include terrestrial sinks (Monbiot 2007, Retallack 2005, MacGregor 2006). 7GtCO<sub>2</sub> as the global total of basic allowances has been adopted here, for the present purposes to be allocated on a per capita basis.<sup>41</sup>



**Figure 5-7. Moral responsibilities for climate change**

<sup>41</sup> Strictly speaking, we should also have allocated basic allowances according to the terrestrial sinks capacity of the respective sovereign territory, but given the uncertainties on how much these are, we decided to err on the side of caution and just consider oceanic sinks.

As can be seen in Figure 5-7, numerically, this choice implies an overall industrialised country (historic) climate change responsibility of 64%. The largest single country share is that of the US with 25.6%, followed by the EU (19.1%), China (6.4%) and finally a number of countries with low if not negligible responsibility: AOSIS+LDC (4.1%) and India (0.3%). While it will not be surprising that individual SIDS and LDCs have really no historic responsibility for the climate change problem (on average 0.05%), what may be less expected is to find India at the very end of our responsibility spectrum. The reasons for the extremely low Indian responsibility share are its relatively modest causal contribution share of around 4%, and its rather large share in global population share (16.9%) which determines the allocation of allowances.<sup>42</sup>

#### 5.8.2. Limited Responsibility I: Epistemic Constraints (EC)

There has been a robust difference of opinion – mostly along the developed/developing country divide – whether it is fair to use strict historic responsibility, or whether countries should be granted mitigating circumstances, such as ignorance of the effect of one’s actions. This epistemic constraint of full responsibility has been implemented here by excluding emissions before 1990 from the calculations, on the grounds that after that year, which saw the beginning of the UNFCCC negotiations and the publication of the first IPCC reports, no government could reasonably plead ignorance of the problem.

This implementation of ignorance as a mitigating circumstance does shift the burden of responsibility significantly from industrialised to developing countries, with

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<sup>42</sup> The position of Japan in this strict responsibility scale (2.8%) also suggests that burden sharing according to responsibility alone may not really be tenable, and that it would have to be complemented with some ‘respective capacity’ component, as referred to in Article 3.1 of the UNFCCC.

Annex I as a whole losing 10 percentage points. The US (20.1%) and the EU (12.3%) both lose over a fifth of their responsibility relative to their historic strict responsibility shares, while China (12%) picks up about the same number of percentage points. For China this means almost a doubling of responsibility relative to the strict measure. This is certainly due to the much later onset of large GHG emission quantities, following the rapid economic development in the past two to three decades. On the whole, a limitation of responsibility by considering only post-1990 contributions benefits industrialised countries.

### 5.8.3. Limited Responsibility II: EC with Subsistence Allowances

As mentioned earlier, Aristotle's conditions on limiting full responsibility lend themselves not only to justify these epistemic dispensations, but also aOne may argue for a certain dispensation of allowances for subsistence emissions, or rather emissions needed to overcome (abject levels of) poverty. For the purposes of this chapter, pre-1990 contributions continue to be disregarded in this context. This leaves two parameters to be determined: who should be eligible for the subsistence allowances, and how much should they be. The most readily available data are listed in the World Bank Development Indicators, which contains figures for people living on less than \$1 and \$2 per day. Our decision was to allocate 2tCO<sub>2</sub> per poor inhabitant per annum – equivalent to current non-forestry per capita emissions of the developing world – to be subtracted from the aggregate historic emissions (instead of the basic allowance). In this case of 1\$/day as 'poverty threshold', the annual subsistence allowance of 2tCO<sub>2</sub>eq. (which is larger than basic allowance per capita level) is therefore used instead of the basic one for each inhabitant with an income of less than 1\$ per day, e.g. 129 million people in China in 2005.

The results benefit developing countries more than developed ones. The shift of half a percentage point in responsibility towards Annex I (53.8%) does however not make up for the shift in the other direction due to ignoring pre-1990 emissions. The US gains 0.2 percentage points relative to the epistemologically constrained case, while India and China jointly lose nearly one. And the situation does not differ significantly if one moves the poverty threshold to 2\$/day. In other words, the choice of poverty threshold is not a particularly sensitive one, especially not in comparison to the effects of the chosen epistemic constraint, or the overall level of basic allowances.<sup>43</sup>

### **5.9. Mitigation through population control?**

Since the end of the 1970s, China has taken extraordinary measures to curb the growth of its population. Based on the undoubted achievements of the policies that were implemented, Chinese politicians have repeatedly argued that population control is one of the most successful strategies to curb emissions and coin it as one of the key mitigation efforts of China. The underlying assumption is that the increase in emissions would have been faster with higher population growth.<sup>44</sup>

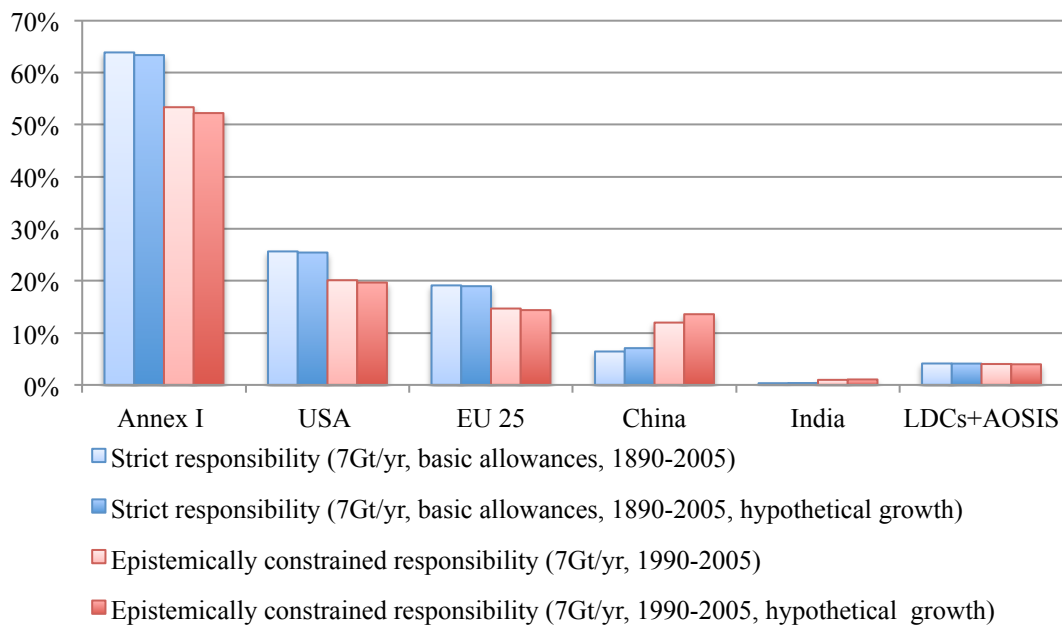
Estimates vary on the size of the current population in absence of the policies that were implemented, and there is not any single number that is more correct than any other when looking at this hypothetical case. To simplify, we extrapolate 1978 population figures to 2005 at the growth rate of the population from the founding of the People's Republic in 1949 to 1978, leading to a hypothetical population of 1.62

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<sup>43</sup> See Müller et al. (2009) for a full sensitivity analysis for varying choices of Basic and Subsistence allowances.

<sup>44</sup> It can be questioned if the difference in hypothetical to actual emissions growth would have been the same as the difference in hypothetical to actual population growth. Economic growth, industrialisation and modernisation since the end of the 1970s could have rather been hampered by overpopulation, leading to an elasticity lower than 1.

billion instead of the official 1.3 billion in 2005. We then calculate the hypothetical emissions for the years 1978 to 2005 by multiplying actual emission with the factor of actual to hypothetical population of each year, which results in hypothetical Chinese emissions of 8.7GtCO<sub>2</sub>eq. instead of 7GtCO<sub>2</sub>eq. in 2005.



**Figure 5-8. Hypothetical responsibility with faster Chinese population growth**

Figure 5-8 shows the new responsibility shares for a higher Chinese population and emissions growth under the assumptions outlined above. Note that the increase in the allocated share of basic allowances for its hypothetical population offsets part of the increase in responsibility for China. Shares in strict responsibility and epistemically constrained responsibility for Annex I countries (-0.5/-1.1%pts.), USA (-0.2/-0.4%pts.) and EU25 (-0.2/-0.3%pts.) are lower in this hypothetical case. Interestingly the responsibility shares of India increase by roughly one tenth (but still less than 0.1%pt.) because in relation to its low emissions the country profits most from the allocation of basic allowances, part of which are diverted to China due to a higher share in world population. The share of China’s strict responsibility increases to

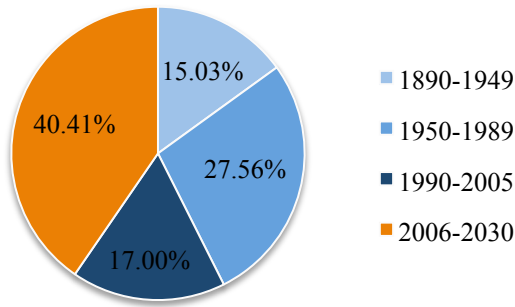
7.1% from 6.4% and for epistemically constrained responsibility (emissions from 1990 only) to 13.6% from 12%. With all the caveats noted regarding the assumptions underlying this calculation, it can be claimed that China hypothetically reduced its responsibility for climate change by 10% and 13.5%<sup>45</sup> respectively by means of population control.

#### **5.10. Projecting responsibility into the future**

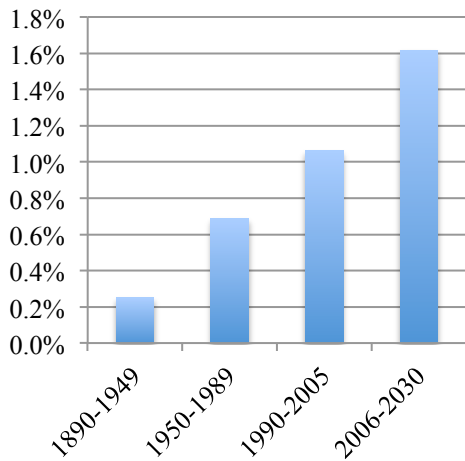
China has undoubtedly started to implement numerous policies that have a climate change mitigating effect (Ellermann et al. 2009a). In the deliberations of the coming 12<sup>th</sup> Five-Year-Plan for China's development strategy, a general consensus exists for a more sustainable development path. However, proponents of a low-carbon future for China face opposition by others who suggest that China should focus on unrestrained business-as-usual development until 2030 before worrying about (unilateral domestic) climate change mitigation. The 12<sup>th</sup> Five-Year-Plan plan covers the years 2011 to 2015 and will among other things provide guidance for economic restructuring and major investments in infrastructure and capital with long turnover rates like energy generation and heavy industry facilities. Decisions made this year therefore predetermine to a large degree China's general emissions trajectory over half a century or so to come. A careful look into the future (up to the often-cited year 2030) and its potential responsibilities – including historical (pre-2005) and new emissions – therefore seems to be warranted. Figure 5-9 and Figure 5-10 corroborate this point, as in the MATCH data set emissions between 2006 and 2030 make up the largest part of total emissions since 1890, with an average annual contribution of over 1.6% after 2005.

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<sup>45</sup> Note: per cent, not percentage points.



**Figure 5-9. Total contribution during different time periods (MATCH data)**



**Figure 5-10. Annual contribution during different time periods**

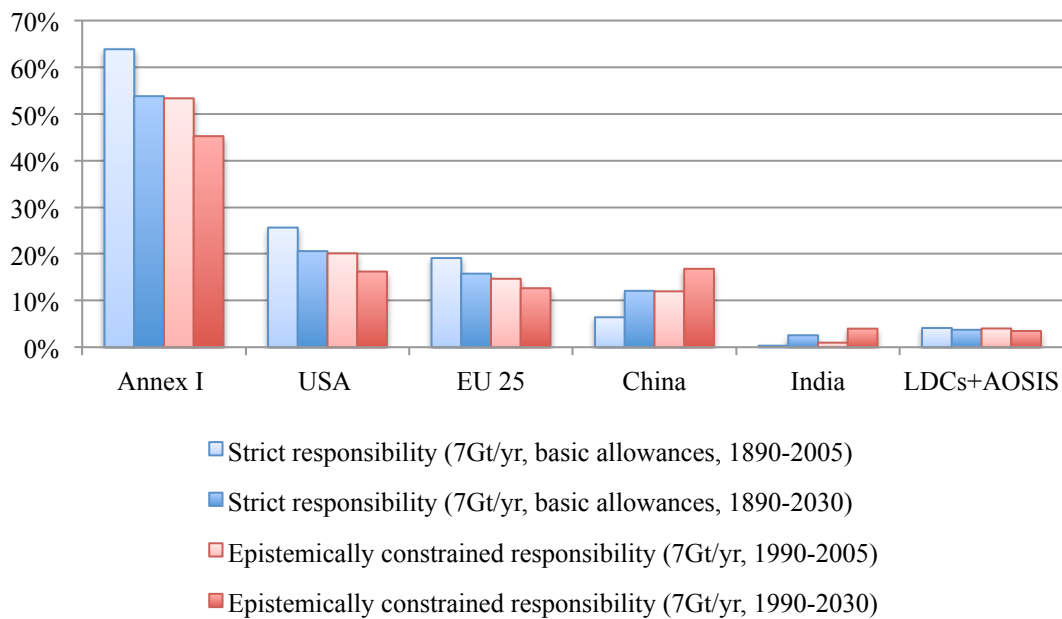
We are mindful of the difficulty of predicting future emissions and rely directly on the MATCH calculations. The MATCH group used latest available emissions data (2005) and extrapolated country emissions using an average of the six basic IPCC SRES scenarios for 17 world regions, avoiding a judgement on the probability of any single scenario to be more “correct” than others. The point of this chapter here is *not* to come up with a reliable number of future emissions, but to illustrate the potential future direction of responsibility for climate change. In contrast to the previous

sections, this chapter cannot provide a clear ethical argument for the metric used (and as a consequence the use of the results), as it builds the sum of *actual* historic emissions and *potential* future emissions, complicating the interpretation of the results. The numbers provided are therefore simple results of a calculation based on the scientific consensus of the IPCC over future emissions, but lack the power of an ethical analysis of future historical responsibility.<sup>46</sup>

The look into the future reveals potentially significant shifts in the shares of responsibilities of countries and regions (Figure 5-11, lighter colour shows actual historical responsibility, darker colour shows “potential future responsibility”). Strict responsibility of Annex I countries would be 53.8% (-10.1%pts), epistemically constrained responsibility would be 45.2% (-8.1%pts.). The shares of the USA would decline by 5%pts. to 20.6% and 3.9%pts. to 16.2%, and EU25 to 15.8% and 12.6% respectively (-3.3/-2.1%pts.). China’s share of strict responsibility would rise sharply to 12.1% (plus 5.7%pts. or 88.3%) and epistemically constrained responsibility would increase by 4.8%pts. (or 40.4%) to 16.8%, overtaking the potential shares of the USA and the EU25 and potentially amounting to more than a third of Annex I total by 2030. India’s potential responsibility shares rise to 2.6% and 4% respectively (2.3%pts./3%pts. and a drastic relative increase).

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<sup>46</sup> The question of the use of future emissions – modelled in emission scenarios – to calculate the historic responsibility at an end year that lies in the future should be an interesting research topic in this field. An argumentation could perhaps start in this direction: In the case one considered pre-2030 emissions completely predetermined by today’s decisions on energy strategy, etc. and considered the modelled emission scenario an accurate description of future development, these future emissions could already be assumed to be historic today. Then they could be summed up with actual historic emissions.



**Figure 5-11. A scenario for future (historical) responsibility for climate change**

The direction of these numbers – which as noted before should not be interpreted as an ethical analysis of future historic responsibility, but merely as a calculation based on commonly agreed emission scenarios – could potentially have significant implications for the ethical debate surrounding climate change. They point to the use of future emissions scenarios as an important research topic when looking at projected responsibility.<sup>47</sup> So far there is no ethical concept for combining actual historic responsibilities and potential future responsibilities, and the calculations here cannot be used for their absolute numerical results. Their direction however suggests that by 2030 responsibility shares could be distributed quite differently from today, changing the force of the principle of “common but differentiated responsibility” for some major players. China could by 2030 potentially become similarly responsible for climate change as the USA or the EU25, and India’s responsibility could surpass

<sup>47</sup> Chen et al. (1999) early on pointed out the changing trend of contribution shares, comparing pre-1990 historical contribution with estimated contribution over the period of 1990-2010.

that of Germany or Japan. This does however not affect the argument of limiting capabilities of current developing countries to combat climate change.

### **5.11. Conclusion**

One aim of this chapter has been to put forward and discuss a methodology for the numerical differentiations of China's responsibilities for climate change as opposed to calculating causal contributions to climate change. For expository purposes, this was done on the basis of aggregate GWP-weighted historic emissions attributable to sovereign countries as a proxy. Moving to fully-fledged climate modelling techniques as used in MATCH would change the relative contributions and resulting responsibilities by at most 10% for most countries.<sup>48</sup> Our aim was not to engage in a debate over the two conceptions of responsibility – 'strict' or 'limited' – with the chosen parameter values is more appropriate, or whether the causality of developing country emissions should be partially attributed to Annex II countries, not least because the answer may well depend on what one wishes to do with the results. However, the order of magnitude difference in the responsibility of the two extremes of the scale under both conceptions is large. Further thought needs to be given how these calculations of historic responsibility can inform the debate around burden sharing, particularly given the discrepancy between the affluence and wealth of the exponents at either end of the spectrum of responsibilities we considered in this chapter.<sup>49</sup>

While the ethical argumentation for these two conceptions of responsibility are pretty developed and less contentious, it is still not very clear how future potential

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<sup>48</sup> Per cent, *not* percentage points.

<sup>49</sup> Affluence (GDP per capita, PPP, 2005): US = \$41,890, India = \$3,452. Wealth (GDP, PPP, 2005): India = \$3.8tr, US = \$12.4tr. Höhne, N. and K. Blok (2005). "Calculating Historical Contributions To Climate Change - Discussing The 'Brazilian Proposal'." *Climatic Change* 71(1): 141-173..

emissions can be incorporated into a responsibility concept to include the most likely emission scenarios for the coming one to two decades. It is very likely that the responsibility of countries in 2030 will look quite different from today, and China's share will be hard to ignore by that time. It is furthermore worthwhile considering linkages between the discussions of historic responsibilities and embedded carbon, as our choice of using emitted GHGs over sovereign territories to attribute responsibilities ignores the ethical dimensions of *carbon consumption*. Our ability to estimate the trajectory of future emissions today, and the recognition of the importance of embedded carbon in a more and more globalised world raises interesting epistemic questions and points to the need for increased research on these matters – on the future of responsibility.

#### **5.12. Data**

The full data set and applied calculations are available from the author upon request.

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**Chapter 6: Paper 4: Bringing international climate finance to the city. The case of transportation mitigation in Beijing, China**

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*ABSTRACT*

This paper examines possibilities for financing mitigation mechanisms in a global climate regime, for use in the local transportation sector. Using Beijing, China as a case study, three mitigation mechanisms in existence or under discussion under the UNFCCC are assessed as to their viability for bringing international climate finance to the city level. The Clean Development Mechanism, Nationally Appropriate Mitigation Actions and New Market Mechanisms entail stark differences with regard to the ‘political ecology’ of carbon finance: the material nature backdrop of GHG emission generation and their impact, scale, interaction with the multi-level governance nature of transportation policy, and their institutional requirements for implementation at the local level. The Beijing urban transportation case reveals that a new sector-based market mechanism seems most feasible for bringing international climate finance to advanced developing country cities.

**6.1. Introduction**

Transportation is an important and growing source of global greenhouse gas emissions (GHGs), responsible for roughly 15 per cent of GHGs. As a source

category it has outpaced the overall global emissions increase and is likely to continue to do so in the future. This is especially true for developing countries, while transport emissions in some developed countries are also growing, but more slowly.

	1990	1995	2000	2005	2006	Change
<b>World total</b>	38,922	39,623	41,527	45,780	46,671	+20%
<b>- Transportation</b>	5,024	5,463	6,051	6,714	6,813	+36%
<b>China total</b>	3,932	4,932	4,881	7,273	7,899	+101%
<b>- Transportation</b>	137	184	264	388	430	+214%
<b>- - Road</b>	66	105	149	229	254	+284%

**Table 6-1. GHG emissions (Mt CO<sub>2</sub>eq.). Data calculated as described in Höhne et al. (2007).**

Now being the world's largest emitter of carbon dioxide, China has seen a particularly strong increase in transportation emissions. The Chinese transport sector has grown tremendously in the past three decades. Following the opening of China's economy, the transport of goods has increased dramatically. Car ownership and air travel has become affordable to tens of millions of people in urban developed areas and they symbolize economic success and a new freedom for hundreds of millions more. Commercial and personal transportation emissions in the country combined have consequentially more than tripled between 1990 and 2006 (see Table 6-1), by far outpacing global total emissions growth and that of transportation globally (Höhne et al. 2007).

Despite the general availability of mechanisms to support developing country mitigation under the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC), little activity has so far taken place in the transport sector. Large amounts of climate finance have already been generated through the carbon markets and transferred to developing countries through the Clean

Development Mechanism (CDM), and available funding is very likely to grow further substantially. This paper therefore examines possibilities for financing mitigation mechanisms in a global climate regime that can tap these climate funding sources for the local transportation sector. Here, I analyse the case of transportation in Beijing, China, which by itself could have a mitigation potential of up to 2.4 MtCO<sub>2</sub> in 2015 and 6.1 MtCO<sub>2</sub> in 2020 (Ellermann et al. 2009b). As a large municipality Beijing can give important insights for other urban areas in the developing world. Understanding transportation policy in Beijing and three possible mitigation mechanisms through the lens of multi-level governance, I lay out the ‘political ecology’ of transport carbon finance that bridges the distance between the international climate regime and local implementation of mitigation actions. This may then point out ways of reconciling the design of mitigation approaches with the (historically) evolved institutional setup up of environmental governance of transportation in Beijing.

The paper is structured as follows: Following this introduction of the background and methodological concepts, section 6.2 provides an overview of current policies and measures that effect transportation GHG emissions in Beijing, i.e. the governance and institutions of transportation policy. They are analysed with questions of scale and organizational hierarchy in mind, i.e. who is responsible for the regulations, what is their process of implementation (or in other words the exertion of authority), and what is their territorial scope? Section 6.3 shifts the attention to the level of the international climate regime and discusses the approaches that are currently available or under discussion for mitigation in developing countries. The focus here is on the different governance structures of climate change that lie beneath them and the

resulting challenges and possibilities. Section 6.4 examines which mitigation approach(es) seem feasible in the light of the previous two discussions. The paper closes with remarks on the applicability of the theories used and gives an indication of a future research agenda in this area.

#### 6.1.1. International political backdrop

At the international stage, the UNFCCC negotiations over a follow-up agreement to the Kyoto Protocol have entered their final phase, with a follow-up agreement now expected in 2015. As suggested in the Copenhagen Accord, global temperature increase above 2 degrees Celsius is to be avoided (UNFCCC CP 2009), meaning that developed countries will need to reduce emissions 25 to 40 per cent below 1990 levels by 2020 (UNFCCC AWG-KP 2007). Like in other sectors, it can be expected that significant emission reductions are required in transportation activities, including reductions (at least compared to a business as usual (BAU) development) in developing countries like China.

A multitude of policy makers and stakeholders has responded to the challenge of broadening mitigation in developing countries. In the international climate negotiations options are currently discussed under the terms nationally appropriate mitigation actions (NAMAs) (COP 13 2007), new market-based mechanisms (AWG-LCA 2010) and submissions have been made for a reformed CDM (e.g. Sareen 2008; UNEP SBCI 2009). There is also an increasing awareness in the transport planning community of the need for new ways to scale up the mitigation activity in transportation and integrate it into an international post-2012 climate regime, and several initiatives have been started to address this issue (BTG 2010; SLOCAT 2010). In contrast to the importance of the sector as a source of emissions,

transportation has been underrepresented in this arena. The Clean Development Mechanism (CDM) for example has not seen a development in transportation anywhere near its success in other areas (e.g. renewable energy, energy efficiency in industry) (Fenhann 2010). What form can an approach take, which pragmatically builds on on-going activities in developing country transport planning and integrates them into an international mitigation finance regime?

A number of potential methodological ways exist to approach this main question of the paper. Given the focus of this paper on the interaction of the international with the local level, and the importance of already existing, institutionally enshrined mechanisms addressing transportation on the ground, I approach the research question through a combination of the lenses of multilevel governance on the one hand, and new institutionalism on the other hand. This paper adds to the debate by examining both the case of transportation in Beijing as well as three possible mitigation mechanisms through the lens of these approaches. It proves the value of this framework for generating insights that are significant for the on-going discussions the governance of greenhouse gas mitigation activities under the UNFCCC as of 2010.

#### 6.1.2. Political ecology and scale

Political ecology as applied in this paper provides a framework to analyse the dialectical relationships of the political economy of parts of the environmental governance in Beijing, China with a particular environmental problem, i.e. GHG emissions from the transportation sector; and it furthermore allows me to explore its possible linkages to the international climate change regime (Bryant 1998). This draws on political ecology literature concerned with the changes in the local social

and economic relations that can be caused by global environmental politics (Newell et al. 2012); and conversely it also asks how Chinese realities and “dispersed nature of climate change governance” at multiple levels affect the applicability and effectiveness of climate policy mechanisms “in order to determine where policy interventions are likely to have the most success” (Betsill et al. 2007).

Besides outlining the multi-level nature of environmental governance, and its existing institutional setup, I attach particular attention to questions of socio-ecologically produced scale (Brown et al. 2005; Paulson et al. 2005; Sayre 2005; Birkenholtz 2011), which for the purposes of this chapter understand less as a matter of territory, but as a result of choices in the design of possible GHG mitigation mechanisms and their boundary. My interest, in other words, lies in the “socio-ecological process through which particular social and environmental scales become constituted and subsequently reconstituted.” A GHG mitigation mechanism thus is a “scalar form of organisation”, which becomes feasible when it is embedded in existing “production and consumption systems” (Swyngedouw et al. 2003) or – in the terminology of this thesis – in the political economy of a particular location dealing with an environmental challenge.

### 6.1.3. Multilevel governance

Political science research of climate policy has traditionally been mostly concerned with the interaction between nation-states. Authors have used regime theories to provide insights into the processes of the UNFCCC and the Kyoto Protocol, focusing on the positions and struggles between member states (Luterbacher et al. 2001; Depledge 2006; Harris 2009; Okereke et al. 2009). More recently, non-state actors from NGOs to businesses to sub-national entities have received considerable

attention (Collier 1997; Deangelo et al. 1998; Schröder et al. 2009), and in the geographies of climate change, a new focus on multi-level governance questions of climate change has appeared, in particular by scholars of political ecology (Betsill et al. 2007). “Climate change is an issue that requires integrated action at multiple levels of government and within the spheres of politics, economics, and society.” (Okereke et al. 2009)

Governance broadly concentrates on the set of actors, processes, decisions, institutional structures and mechanisms that determine a course of action, including the division of authority and underlying norms. It therefore draws on theories of the state, the role of non-state actors (for example businesses and NGOs) and institutional organization. Multi-level governance stresses the particular importance of the interactions between actors and institutions, especially those at different levels of authority. As Bulkeley (2005) points out, theories of ‘global environmental governance’ with their careful consideration of scale, hierarchy and territoriality can provide important insights into problems of governing climate change.

City governments for example have considerable influence over transportation and thus the emissions from that sector within their jurisdictions. Indeed, Collier (1997) in one of the early works on multi-level governance applied to environmental problems identifies transportation as one of the main policy areas, in which climate policy has a local dimension. “It is often argued that the local is the most appropriate political jurisdiction for bringing about any necessary reductions in these emissions” (Betsill et al. 2006), and therefore in the case of transportation, a view at the local city level is warranted. While mitigation in the end always happens at the local level, the political, social and economic determinants are set at a variety of levels of

authority, spanning vertically from national to provincial to city government as well as horizontally from industrial to research to energy policy, and so on. A multi-level governance approach then captures the interactions, in which actors articulate authority and power across and between those levels, and the institutions that develop around these interactions.

#### 6.1.4. Institutions

Numerous policies and measures have been implemented in the Chinese urban transport sector driven by concerns over the social costs that transport inefficiency (congestion) and local pollution entail (Creutzig et al. 2009), but they also have an energy saving and GHG mitigating effect. The institutional groundwork for the implementation of transportation policies as part of environmental governance is therefore well advanced. These institutions have been developed independent of outside pressure or concerns over climate change and are following Chinese/local interests.

March and Olsen (1984) convincingly argued that “the organisation of political life makes a difference” and with their work brought the new stream of ‘new institutionalism’ into life. However there has never been a single ‘new institutionalist’ approach, but the term rather comprises a range of developments that have since developed (Hall et al. 1996; Hall et al. 1998; Peters 1999). Their main differences can be understood in the way they conceptualize how and why institutions originate, how and why institutions change (Peters 1999) and how institutions affect the behaviour of individuals (Hall et al. 1998). ‘Historical institutionalism’ understands institutions as organisations as well sets of rules and conventions promulgated by formal institutions (Hall 1986; Ikenberry 1988; Steinmo

et al. 1992). It is put to use in this paper as it sees institutions to provide cognitive and moral templates for interpretation and action. They are thus relatively resistant to redesign, their evolution is strongly path-dependent and they condition policy by encouraging societal forces to organise along some known lines and opt for long-accepted solutions to problems (Krasner 1988; Jenson 1989; Collier et al. 1991; Pierson 1993). ‘Sociological’ or ‘normative institutionalism’ defines institutions as practices that are culturally specific, assimilated into organisational form and transmitted like culture (Meyer et al. 1977; DiMaggio et al. 1991). New “appropriate” institutions enhance the social legitimacy of an organisation or its participants, but are not necessarily efficient or strictly instrumental (DiMaggio et al. 1991; Jepperson 1991; Zucker 1991). Several authors have analysed institutional issues of environmental politics in China (Ma et al. 2000; Zhao et al. 2003; Gu et al. 2005; Carter et al. 2007; Li 2007a), and this work benefits from their insights.

#### 6.1.5. The choice of Beijing

While China’s urban population was a mere 18 per cent in 1978, it had risen to 36 per cent in 2000, and in 2008 urban residents made up 46 per cent of the country’s inhabitants, an official total of 607 million (Pannell 2002; China Statistics Press 2009). Urban wealth has been growing at a faster rate than country average, and it has entailed a rapidly growing transportation activity (Pucher et al. 2007; Henderson 2009; Zhao 2010). 1,200 cars are added each day to the streets of Beijing alone, and in this city “1% of China’s population drives 10% of China’s vehicles” (Creutzig et al. 2009). Local sulphur dioxide (SO<sub>2</sub>) emissions of and particulates have become a significant problem for urban areas. Since many industrial installations that were traditionally located in or near cities have been moved to the countryside, the

transport sector has become the largest contributor to urban smog (Cai et al. 2007a; Wang et al. 2009a). The drastic measures that the city of Beijing took to provide an acceptable environment for the Olympic Games in 2008 are based on an understanding that the adverse health effects of the local pollution originates largely from cars, etc. (Wu et al. 2008; Wang et al. 2009b).<sup>50</sup> The Chinese government has taken ambitious measures to improve energy efficiency and reduce local pollution from transportation. Measures include provisions to expand high-speed railways drastically and to largely expand public transport in urban areas. Market based mechanisms like fuel taxes are not yet widely applied, but China has for example adopted a strict timetable to phase in fuel efficiency standards for vehicles (NDRC 2008). In the case of Beijing, some of the activities affecting vehicular emissions are part of national planning, and some are of local scope. Following the attention that the city has received in the preparation of hosting the Olympic Games in 2008, they are among the most advanced in the country.

Instead of looking at the national level and cover the transport sector of the whole country, I chose to focus on Beijing municipality to address the questions posed in this research, as “sustainable solutions to transport policy need to first and foremost address the issue from the urban development perspective.” (Wittneben et al. 2009) The decision on a particular level follows the recognition that “new area-based power relations have emerged at the meso-scale of the city” in China (Bulkeley 2005; Ma 2005), and this focus on one city implies a number of choices regarding the boundary – i.e. what is meant when talking about the transport sector.

Transportation activity that goes beyond the geographical area of Beijing

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<sup>50</sup> For an opposing view that “Controlling only local sources in Beijing will not be sufficient to attain the air quality goal set for the Beijing Olympics”, see Streets et al. World Bank (2006). *World Development Indicators 2006*. Washington D.C., World Bank.

municipality has been excluded on the grounds that emissions would be difficult to attribute. This includes aviation, railway transport, transport on waterways and inter-province/city highway transport apart from the portion that occurs in Beijing municipality. In effect, this work concentrates on urban transportation and mitigation that can affect its GHG emissions. Data availability in Beijing can overall be considered good compared to other cities or provinces in China (Interviews 4 and 18), and the ability to monitor, report and verify (MRV) emission reductions and the use of related finance would be a key prerequisite of the implementation of any mitigation approach that can be linked to the international climate regime (COP 13 2007). Historical data can be found directly from the Beijing Transport Development Annual Reports, Beijing Statistical Yearbooks and China Energy Statistical Yearbooks. Additionally, previous studies, projects and modelling exercises on Beijing's transport sector can be constructive sources for providing supplementary data (e.g. Jiang 2004; Yan et al. 2009).

Regarding the availability of data and previous research, the Beijing municipality case is certainly special, and only comparable to other mega-cities in China, for example Shanghai and Guangzhou (Wang et al. 2008; Wang et al. 2009a). Given the particular importance of the sector for localized pollution and congestion, transportation in most larger Chinese cities has however been generally well covered in research, including its energy use, emissions and related policy making (Ng et al. 2005; Deng 2006; Cai et al. 2007a; Han et al. 2008; Yan et al. 2009). The diverse, multileveled nature of transportation governance observable in Beijing is certainly comparable to other municipalities (i.e. cities directly under central government control like Shanghai, Chongqing and Tianjin). Urban transportation in China is

mostly affected by city and national level regulation, and to a far lesser degree by the provincial level. In this regard, the present research approach – outlining the governance of transportation including its institutional setup and exploring options for its coordination with international carbon finance should be equally possible in the case of other large Chinese urban areas. It needs to be noted however, that other factors of the political economy – for instance the prominence of Beijing and Shanghai etc. as Chinese urban show-cases for (sustainable) development – would predestine these cities to be among the first to explore new, internationally linked mechanisms for carbon finance in the transportation sector, possibly with a gradual and staged phase-in in other large urban centres.

#### 6.1.6. Bridging the divide – what mechanism can work for Beijing?

As historically evolved, culturally normative and rational influences are understood to shape the origin and evolution of institutions in environmental governance, institutional arrangements between different layers of government that affect Beijing's transportation sector have developed over a long time. Beyond what is in existence already, there is considerable potential for further GHG mitigation. This research therefore asks: What are the features of mitigating activities in the Beijing transport sector as viewed through the lens of multi-level environmental governance? And building on this, what form of new mitigation mechanisms can make use of the existing institutional groundwork and possibly integrate transportation in Beijing into a global climate regime? Furthermore, how do choices in GHG mechanism design result in different scalar features, which are more or less conducive to linking international carbon finance to the environmental governance and its institutional setup in the Beijing transportation sector.

Examining three possible mitigation mechanisms detailed below, the hypothesis is that local factors of the political economy – that is environmental governance in Beijing in its current institutionalized form – play an important role in the feasibility of any new mitigation mechanism, which has to be designed (e.g. in terms of boundary) to allow, for example, for the calculation, measuring and attribution of GHG emissions and policy formulation at the corresponding scale. In this light, a sector-based programmatic approach, in the first instance concentrated on largest urban areas, could be more likely to be successful since it can make use of existing institutions for environmental governance in transportation and allows them to evolve in a path-dependent manner.

## **6.2. Beijing's transportation policy**

The expansion of transport activity in China has been most pronounced in the country's urban regions, resulting in a great increase in personal mobility as well as negative environmental impacts, for example in the form of particulate and SO<sub>2</sub> emissions as well as ozone concentrations (Shao et al. 2006; Cai et al. 2007a). 1,200 cars are added each day to the streets of Beijing alone (China Statistics Press 2008). Local environmental pollution has not only been the focus of most transportation research in China, alongside with efficiency (reducing travel time, etc.) it has also been the focus of government policy (Hao et al. 2006). Governments of all large cities have made efforts to manage transport expansion in their administrative regions and they enjoy considerable freedom to steer development in this sector in their preferred direction. Beijing's transport planning for example has received significant attention as the capital and one of the largest Chinese cities, as well as in the wake of the Olympic Games (Wu et al. 2008).

Below, I outline the current policies affecting emissions in the Beijing transport sector and discuss them from two different angles. The total of environment-related transportation policy in the city encompasses elements of national as well as municipal origin. In view of multi-level governance angle, here they are firstly differentiated by propagating authority. In the Chinese system of administrative organisation, Beijing is a municipality (*zhixiashi*) – i.e. a city with province level rank and administratively directly below the central government. There is therefore no additional set of province-level policies as would be the case for all other but four Chinese cities (Beijing, Shanghai, Tianjin and Chongqing).

A second way of categorizing mitigation activities in the transport sector is the bottom-up ‘avoid-shift-improve’ approach. The ‘avoid-shift-improve’ approach has been the cornerstone for example of much of the multilateral development banks’ environmental activities in transportation (Leather 2009; Schipper 2009). In this paradigm, transportation interventions are seen to focus either on avoiding travel, i.e. reducing the movement of persons or good, shifting travel to less emission intensive forms of travel, for example from personal passenger cars to public transport, or improving a transport mode’s efficiency, e.g. by higher standards for combustion engines, etc. Following from this approach, the so-called ‘ASIF’ methodology (**A**ctivity, **S**tructure, **I**ntensity and **F**actor) can be applied to decompose trends in emissions into transportation activity, modal structure or modal shares, energy intensity and fuel mix (Schipper et al. 2000) as displayed in Table 6-2. It splits total emissions into the parameters (A) total transportation activity expressed as freight or passenger travelling distance (ton-km or passenger-km); (S) modal structure, i.e. the shares of the individual transport modes; (I) efficiency of the

vehicles in each mode (modal energy intensity expressed as TJ/ton-km or TJ/person-km); and (F) the fuel emissions factor of each transport mode. GHG mitigation policies in the transport sector typically target one or rarely several of these parameters.

<b>GHG emissions</b>	<b>Activity</b>	<b>Modal structure</b>	<b>Intensity</b>	<b>Emissions factor</b>
CO <sub>2</sub> eq.	ton or person km	percentage share	TJ/person or ton km	kgCO <sub>2</sub> eq./TJ

**Table 6-2. 'ASIF' methodology, following Schipper et al. (2000).**

The remainder of this section examines Beijing's environment-related transportation policy in the light of these two angles, seeing them as a result of initiatives at separate levels of government and targeted at different parameters that influence the overall GHG emissions of the sector in the city.<sup>51</sup> Transport measures 1 to 6 have come into effect before the end of 2007, and the remainder thereafter. This can be an important distinguishing factor for a possible mitigation approach when a differentiation between *business as usual* (BAU) development and more ambitious planning is needed. Transportation measures in Table 6-3 below are characterized by their scope (National or Municipal) and by influenced parameter (Activity, modal Structure, emissions Intensity and emissions Factor).

- |   |   |   |
|---|---|---|
| 1. Fuel economy standards for small passenger vehicles implemented in two phases (1 July 2005 and 1 January 2008) aiming at an average reduction of fuel consumption by 10 per cent per kilometre (China 2004). | N | I |
|---|---|---|

<sup>51</sup> It is important to note again that the policies noted here have for the largest part not been passed and implemented to reduce the emissions of carbon dioxide. Although their main goal have been the reduction of local pollutants as particulate matter and SO<sub>2</sub> emissions, as well as the improvement of transportation performance (i.e. the reduction congestion), they also lead to reduced levels of GHGs. The list comprises the most important and influential policies and measures (Interviews 1, 2, 7, 8, 17, and 19).

2. Energy development and conservation planning under the Beijing 11 <sup>th</sup> Five-Year-Plan (2006-2010) with the target to reduce energy consumption per unit of economic activity (GDP) by 20 per cent (China 2006). Beijing's plan broadly envisages "environmentally friendly transport" and a concentration on smaller, more efficient vehicles (Beijing 2006b).	<b>M</b>	<b>A S I F</b>
3. Framework for Beijing transport development (2006-2010) including the expansion of bus priority lanes and bus rapid transit (BRT) routes; a goal that 40 per cent of personal travel distance should be covered by public transport; and an increase of the share of rail-based transit capacity in public transport from 10 to 25 per cent (Beijing 2006a).	<b>M</b>	<b>S</b>
4. Beijing infrastructure development under the municipal 11 <sup>th</sup> Five-Year-Plan (2006-2010) envisages a doubling of rail-based transit capacity in the city (Beijing 2006a).	<b>M</b>	<b>S</b>
5. Beijing rail transit development plan (2007-2015) focuses on adding eleven new subway lines to the existing 7 lines (Jiang 2007a; Li 2007b).	<b>M</b>	<b>S</b>
6. Limitation on inefficient passenger vehicles with less than 19 seats (1 September 2004) aims at phasing out inefficient vehicles that do not adhere to EURO II standards (China 2004).	<b>M</b>	<b>I</b>
7. New vehicle emissions standard (1 March 2008) moving to China IV standard, which is designed to result in 50 per cent less local pollutant emissions than China III standard. It is implemented in Beijing (and other cities) before nationwide implementation (China 2005; Zhang 2008).	<b>M</b>	<b>I</b>
8. Oil price reform (1 January 2009) to increase the tax burden on consumption of oil products (China 2008b).	<b>N</b>	<b>A I</b>
9. Restrictions on car travel on weekdays by last number of the license plate (early 2008). Around the Olympics in 2008, an odd/even scheme was implemented, aimed at halving the number of private cars (Beijing 2008). Since after the Olympics a fifth of private cars (e.g. end numbers 1 & 2 on Mondays, etc.) has to remain off the road, and the policy has been extended until 10 April 2012 (Beijing 2010).	<b>M</b>	<b>A</b>
10. Adjustment of consumption tax on passenger vehicles (September 2008) is to encourage the production and use of more efficient passenger cars by increasing the levy on vehicles with large engines (from 15 to 25 per cent) and reducing it for small-engine vehicles (from 3 to 1 per cent) (China 2008a).	<b>N</b>	<b>I</b>

11. Subsidy of highly efficient and new energy vehicles (January 2009) aims to promote more efficient cars and vehicles using new energy forms. Concrete targets are 1000 electric busses by 2010 and 1000 hybrid drive busses by 2011 (China 2009b), and Beijing has been selected as one of thirteen cities for implementation (Akiba 2010).	M	F
12. Revitalisation plan for the automotive industry (2009-2011) aims to phase out old models, increase the share of small vehicles, heavy load trucks and alternative energy vehicles. Concrete targets are: cars with less than 1 l engines to make up more than 10 percent, cars with less than 1.5 l to make up more than 40 percent, alternative energy vehicles more than 5 percent and heavy load trucks more than 25 percent of sales in 2011 (China 2009c).	N	I
13. Under the Medium to Long-term Renewable Energy Development Plan (September 2007), bio-diesel and bio-ethanol production is to be increased for blending use (China NDRC 2007b; Siang 2007).	N	F

**Table 6-3. List of the most important measures affecting GHG emissions in Beijing's transport sector.**

These policies and measures are unquestionably of very different nature and level of detail. The 'Five-Year-Plans' made for economic development by the Chinese national government for example contain macro-level and indicative goals and fewer concrete numbers. Despite the relative lack of absolute quantitative targets, their importance as agenda setters for the covered period should not be underestimated. National level policies in China include some examples of Pigovian tax-style market mechanisms in which activities resulting in negative externalities (use of fossil fuels, sale of inefficient passenger cars) are discouraged through higher tax burdens, and others (purchase of efficient vehicles) are encouraged through subsidies. Neither national nor municipal governments currently employ market mechanisms in the transport sector that would go a step further, for example in the direction of certificate trading, etc. Besides these examples, both the national as well as the municipal government either try to steer transport development through the use of

plans or by way of standard setting, similar to the general approaches of environmental governance in China (Carter et al. 2007).

Two types of urban transportation measures that are used in other cities should be noted here, as they have been deliberated in Beijing, but the municipal government does not plan to implement them:

- Congestion charging – i.e. demand management by road pricing as for example implemented in the city of London (Banister 2003) or Singapore (Goh 2002; Santos 2005) – has been considered by the Beijing municipal government (Creutzig et al. 2009). Despite the setup of Beijing with multiple ring roads that surround the city and could be the borders of a congestion charging zone, and the offer by London and Singapore to share their experiences, this type of measure was considered technologically too ambitious at the current stage. Furthermore, politicians were very concerned over the public's acceptance of a charging theme that could be seen as punishing the average city resident with a car, but not impacting those government officials and others who drive 'company cars' (Interviews 10, 14 and 15).<sup>52</sup>
- License plate auctions with a limited total number of registrations per year have been implemented to reduce congestion in Shanghai. Given the mixed results this measure has had in Shanghai (Economic Monthly 2004; Dong 2009), Beijing municipal government decided not to implement a similar policy that limits the number of new cars added to the roads of the city (Interviews 6, 11, 12 and 15).

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<sup>52</sup> Creutzig (2009) discusses how congestion charging in any case has little influence on the emission of GHGs.

Interestingly, both measures that have been rejected are of a type aimed at reducing transportation activity (besides of course inducing a modal shift to public transport). Anecdotal evidence of thousands of the more affluent Beijing residents buying a second car with a different license plate end number to circumvent the odd/even restrictions (measure 9 in the list) suggests a strong opposition to blunt activity-limiting policies and creativity in evading them (Interviews 9, 10 and 14). A policy currently under consideration nevertheless tries to influence similar parameters by focusing on public parking. Charges for temporary parking spots within the central urban area of the city are to be drastically increased, but details of this policy (and clarity whether it will ultimately be implemented) are not yet available (Interviews 19 and 20).<sup>53</sup>

	<b>Activity</b>	<b>Modal structure</b>	<b>Intensity</b>	<b>Emissions factor</b>
<b>National</b>	8		1, 8, 10, 12	13
<b>Municipal</b>	2, 9	2, 3, 4, 5	2, 6, 7	2, 11

**Table 6-4. Analysis of transport measures.**

Table 6-4 distinguishes the transport policies and measures that have been implemented by the level of the issuing authority and the parameter(s) they influence. It allows for an analysis of how processes and actors of differing scale shape transportation in Beijing, and thus the “local” environmental governance of this case study.

National policy covered here is largely issued by the National Development and Reform Commission (NDRC) and the State Council. These central policy-planning

<sup>53</sup> Some authors have discussed the effectiveness of such policy in general and compared it to congestion charging Streets, D. G., J. S. Fu, C. J. Jang, J. Hao, K. He, X. Tang, Y. Zhang, Z. Wang, Z. Li, Q. Zhang, L. Wang, B. Wang and C. Yu (2007). "Air quality during the 2008 Beijing Olympic Games." *Atmospheric Environment* 41(3): 480-492.

bodies of the state generally synthesize the input and weigh the interests of different topic ministries. Although it is outside the scope of this study to analyse the influence of individual ministries in transportation planning, central roles of the Ministry of Transport, the Finance Ministry, the Ministry of Housing and Urban-Rural Development (formerly the Ministry of Construction) and the National Energy Commission or National Energy Bureau are likely. The General Administration of Quality Supervision, Inspection and Quarantine furthermore issues standards applicable to passenger and freight vehicles. As decomposed by the ‘ASIF’ methodology, national level policy aims to influence transportation activity, transportation efficiency and emissions factors (see Table 6-4). Measures like efficiency standards that cover the whole automotive industry are naturally enacted at country level, as are market mechanisms that would exhibit leakage if implemented locally (e.g. number 8 and 10 in the list). Energy intensity of transportation (as in energy use per distance travelled) is therefore one main focus of national policy making.

In the case of Beijing (as for three other centrally administered cities), the municipal level government integrates the functions of the provincial and city level governments, and the municipality itself is subdivided into 16 districts and 2 rural counties. As Betsill et al. (2006) argue about the origin of GHGs, “it is often argued that the local is the most appropriate political jurisdiction for bringing about any necessary reductions in these emissions.” Beijing municipality has enacted policies and measures influencing all parameters covered in the ‘ASIF’ function of transportation emissions. The policy-making focus of the local level of authority

however clearly lies in influencing the modal structure of the transport sector (i.e. encouraging a shift to public transportation)

In spite of the simplicity of the differentiation into national and municipal level, the lens of multilevel governance helps shed a better light on the social, economic and political processes that influence the levels of GHG emissions in Beijing municipality. Here, national and municipal policy in some areas exist side by side; in certain instances municipal policy substantiates the macro-level planning guidance by the central state by adding a level of detail, formulating concrete targets and even strengthening target levels of policies. All in all, 'local' transportation policy as issued by a mix of national and municipal authorities has a substantive impact on GHG emissions. As of 2010, this impact had been independent of the environmental governance of climate change that is most often discussed at the 'global' level or more recently at the national level as it has entered the new 12<sup>th</sup> Five-Year-Plan development process.

### **6.3. International climate policy – possible ways to finance transport emissions mitigation**

The international community – including civil society, businesses and academia – is engaged in a debate about possible mitigation approaches that address developing country emissions and relate their reduction to climate finance. As of 2010, the only approach in function is the Clean Development Mechanism (CDM) under the Kyoto Protocol, which is project-based and allows for the generation of emission reduction credits that can be traded on the international carbon markets and used for Annex-I country compliance. Nationally Appropriate Mitigation Actions (NAMAs) were brought up as a complimentary approach and have been discussed since the

UNFCCC conference in Bali in late 2007. They are meant as a general vehicle to allow for international climate finance for sustainable development activities in developing countries, which have a convincing GHG mitigation effect, but they are most commonly not envisaged as linked to carbon markets. New market-based mechanisms are debated in the AWG-LCA<sup>54</sup> of the international negotiations. This approach is widely understood to focus on pure mitigation activities – for example based on sectoral boundaries –, which could be linked to the international carbon markets.

GHG mitigation in developing countries through the reduction of transportation emissions could be undertaken under any of these three approaches and thereby make use of international climate finance. This section analyses them in terms of three core parameters. These parameters are core to the applicability of any approach to transportation emission reductions in Beijing municipality. For a study of geographies of carbon finance for urban transport GHG emission reductions, they are here discussed as matters of scale, (multi-level) governance and institutions.

“Scale is about size, either relative or absolute, and involves a fundamental set of issues in geography. [... It] refers to the size at which human or physical earth structures or processes exist.” (Smelser et al. 2001) With regard to the three approaches analysed in this research, I mainly concentrate on the question of the scale at which mitigation is implemented in the host country. Bulkeley (2005) points out that in environmental governance, scale can have a broader meaning than pure territory. Climate policy is a good example of this, and in practice scale is mostly referred to as the *boundary* of a mitigation approach. Proposed boundaries cover a

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<sup>54</sup> AWG-LCA stands for the ‘Ad Hoc Working Group on Long-term Cooperative Action under the Convention’, the UNFCCC body that apart from the Kyoto Protocol Member States also includes the USA.

wide range: project level (e.g. an industrial site or a wind farm), ‘small-scale’ projects, ‘bundles’ of projects, ‘Programme of Activities’, policies, development plans, a city, cities, provinces, sectors, (sub-sets of) nations and global.

Governance “implies a focus on systems of governing” (Bulkeley 2005) for example by means of “authoritatively allocating resources and exercising control and co-ordination” (Rhodes 1996). As discussed in the introduction, governance exists at and spans multiple levels of authority, and it can build on *governments* of all levels. But it also extends to international regimes or manifests its control and co-ordination through networks. Similar to scale, questions of governance lie at the core of the setup of any GHG mitigation approach. Its design allocates authority between the various possible levels and structures their relationship, and I examine the three approaches in the light of these factors.

While there is a multitude of perspectives and interpretations of the term institutions, (e.g. see Hall et al. 1996) a definition as “formal and informal rules and procedures, such as those codified in the law or deployed by states and other bureaucratic organizations” (Campbell 1998) that provide cognitive templates for interpretation and action (March et al. 1989) covers the aspects of interest to this research. While the structural aspects of the mitigation mechanisms (i.e. the relations between multiple levels of authority and the international regime) are analysed in terms of governance, the institutional analysis focuses on the implementation in the host country, i.e. what institutions are needed to formalize and structure the governance of the approach. This question therefore for example refers to the (necessary) linkages of the approach to existing organisations, procedures, regulations and practices that

may or may not exist for a variety of historical, rational, cultural or economic reasons.

### 6.3.1. Clean Development Mechanism

As the only developing country mitigation mechanism in operation today, the geographies of the Clean Development Mechanism have been thoroughly researched. Designed as a project-based approach, the scalar attributes of the CDM are rather clearly defined. Less focussed on the geographical characteristics of size, the scale of a CDM project is most commonly set in terms of the greenhouse gas reducing project activities of a single site, either as a green-field project (e.g. building a wind farm) or a brown-field project (e.g. emission-reducing retrofit of a factory). Definitions of possible boundaries for the mechanisms are clearly laid out in the numerous ‘approved methodologies’ applicable to CDM projects. Nevertheless, issues of scale have surrounded the CDM from the beginning. Methodologies for ‘small-scale’ CDM projects have been designed to allow low-income communities make use of the approach (Boyd et al. 2007). Reforms to increase the scale to multiple projects have been explored (Broekhof 2004) and in the end implemented in one form through the possibility for the bundling of CDM projects. The Conference of the Parties in Montreal furthermore decided on the topic of scale in 2005 that “a local/regional/national policy or standard cannot be considered as a clean development mechanism project activity, but project activities under a program of activities can be registered as a single clean development mechanism project activity.” (CMP1 2005) The vast majority of the currently 2344 registered CDM projects however rely on the original simple project-based definition of the mechanism (Fenhann 2010).

The governance of the CDM is firmly enshrined at the level of the international climate regime. The UNFCCC ‘Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol’ (CMP) holds authority over all political decisions regarding the approach. It delegates control over technical questions to the CDM Executive Board, which for example governs the approval of methodologies, registration of DOEs and projects. Developing countries that host the projects are left with the governance of an approval structure that nominally revolves around the question of projects meeting the country’s definitions of sustainable development. In essence, the governance of the CDM is strongly determined at the level of the international regime, following its setup to ensure the environmental integrity of emission reductions for the use as offsets by means of standardized methodologies. Related to governance, in the case of the CDM, climate finance is allocated through the international carbon market to the project owners, and it is directly related to the mitigation performance of projects as verified through a standardized process. At the site of implementation in host countries, the CDM requires a number of specific institutions. A Designated National Authority (DNA) acting as the country’s focal point needs to be set up, including the regulations and processes for host country approval. Institutions develop around the interaction between government entities, project owners (typically in the form of businesses), their consultants or project developers as well as Designated Operational Entities (DOEs), which certify and verify project emission reductions. The approach can in general not easily draw on historically evolved existing institutions, but has high requirements for institutional innovation (Ellermann 2007).

### 6.3.2. Nationally Appropriate Mitigation Mechanisms – NAMAs

As can be expected for such a new approach, very little academic work has so far been undertaken on the topic of ‘nationally appropriate mitigation actions’ (Cheng 2010), but some policy papers exist (e.g. Ecofys 2010; Jung et al. 2010; Sterk 2010). Although NAMAs have been at the centre of many international climate discussions since 2007 and it is clear that they will play an important role, the design of the approach is not yet formalized.

Flexibility of scale is an important feature of NAMAs. In contrast to the CDM, in the case of NAMAs, scale or boundary is discussed in terms of ‘measures’, ‘programmes’ or ‘plans’. As a need-based approach, in which the actual NAMA is based on the demands by developing countries, its boundary terminology is akin to the way development cooperation is commonly implemented. It could take the form of a ‘measure’ similar to a project in the case of the CDM, a set of similar measures, a policy, a geographically defined plan at city, province or country level or even a sectorally defined plan (Ellermann 2010; Interview 21, 22, 23 and 24). NAMAs already proposed in developing country submissions to the UNFCCC (Dalkmann et al. 2010; Sterk 2010) as well as NAMA examples developed by climate policy advisors (Ecofys 2010; Jung et al. 2010) cover the whole range of boundary options. NAMAs therefore most likely constitute an increase in scale compared to project CDM.

The developing country prerogative to define each individual NAMA boundary is indicative of a governance understanding underlying NAMAs, which is radically different from the CDM. Like in the case of the CDM, participation in the NAMA approach is of voluntary nature; it is however up to the developing country to

develop a design based on its assessment of (sustainable development) needs as well as level of ambition, and the NAMA does not solely need to centre on a mitigation objective. NAMAs are linked to the international climate regime by the means of a registry as well as ‘monitoring, reporting and verification’ (MRV). Both are elements of control and co-ordination under the auspices of the international climate regime. A NAMA registry implies a “process [that] determines the eligibility of policies or NAMA options which could be registered and supported under a NAMA registry” (Cheng 2010). MRV equally applies to the actions undertaken by the developing country (not necessarily expressed in terms of emission reductions) as well as developed country support (COP 13 2007). Related provisions will need to be passed by the UNFCCC Conference of Parties (COP) and have already become the focus of the NAMA governance debate (Ellermann 2010; Interview 21, 22, 23 and 24). Likely forms of NAMA development, registration and MRV are in some ways similar to methods used in development aid in the Logical Framework Approach (Gasper 2000), with control over governance shared between implementing country and the international regime at different steps. Financial support in the case of this approach is the result of negotiations based on the country proposal and the MRV of actual achievements.

Developing country institutional requirements are largely confined to the implementation of MRV of proposed NAMAs. They follow the standards set at the international level and need to be implemented as new national regulations and concerned organisations. The action itself is by definition ‘nationally appropriate’ and therefore ideally relies on established, country specific institutional arrangements for development programs. Institutional design through capacity building can

furthermore be an integral part of a NAMA itself, where it is needed to ensure the successful implementation of mitigation actions (Ellermann 2010; Interview 21, 22, 23 and 24).

### 6.3.3. New market-based mechanisms

New market-based mechanisms are mentioned in the UNFCCC negotiating text under “Enhanced action on mitigation and its associated means of implementation”, somewhat encrypted as “various approaches, including opportunities for using markets, to enhance the cost- effectiveness of, and to promote, mitigation actions, bearing in mind different circumstances of developed and developing countries” (AWG-LCA 2010). Sector crediting mechanisms are being discussed as a manifestation of this approach. They are seen as one way of widening mitigation efforts and one possible path of evolution from the current CDM (Samaniego et al. 2002; Bodansky 2004; Baron et al. 2006; Sterk et al. 2006). Scale considerations are therefore at the core of developing new market-based approaches, and in this paper I concentrate on sectoral approaches in their most commonly discussed form (Interviews 21 and 22). Scale in this sense is not territorial, but of thematic and socio-economic nature – covering for example emission sources at all installations in a given industrial sector. Arguments for sectoral approaches are often based on technological as well as policy-making considerations, and consequentially sub-sectoral scales (e.g. only residential buildings instead of the whole building sector) or additional geographical delimitations (e.g. urban transportation) are thinkable (Ellermann 2009; Interviews 21 and 22).

‘Sector no-lose targets’ (SNLTs) is one possible mechanism that can be applied at the sectoral scale, at least for some sectors and some (large) developing countries

(Ecofys et al. 2008; Ellermann et al. 2009b). The approach works with non-binding emission targets that encourage sector-wide emission reductions. Developing countries voluntarily propose a sectoral crediting baseline (most likely in the form of an emission intensity of the sector in question), which is negotiated at the international level. Reductions below the baseline generate credits issued to the government, but no penalties occur if the target is not met for the whole sector. Sector crediting baselines are negotiated and set separately for each major sector and country. Any reductions beyond the baseline are credited to the government and can be sold on the international carbon market. The government in turn has to pass on the incentive to the companies and/or emitters at sector level, either directly or through its own choice of policy. This allows for an implementation of the actual mitigation measures that is tailored to the country-specific situation. As in the case of NAMAs, governance is split between arrangements at the international level and implementation at the local level. Provisions at the international regime level passed by the COP govern the requirements that SNLT proposals have to fulfil technically, for example by the use of templates that include standard ways of calculating and presenting emissions and scenario data. MRV of sectoral approaches would also be decided at the international level and implemented between the international and national government level, possibly with the use of private third-party verification as in the case of the CDM. Most importantly, country proposals for SNLTs are negotiated at the international stage, formalizing the link between international climate finance and sectoral mitigation in a developing country. The environmental integrity of credited emission reductions that can be used for offsets is ensured at this stage and not through standardized methodologies as in the case of the CDM. At

country level, governments may choose their own nationally appropriate governance structure to facilitate emission (intensity) reductions, for example through the use of administrative measures, taxes, subsidies or locally limited emission trading schemes. The individual governance and resulting effects of domestic actions that have led to the reduction of the emissions (intensity) is of no concern to the international community, but only the total mitigation effect realized in the sector. Unlike under the CDM, international governance does therefore not necessarily reach down to the implementation level (Ellermann 2009; Interviews 21 and 22; Ellermann et al. 2009b).

This important difference influences the institutional setup needed in the host country to implement this form of new market-based approach. The approach requires significant capacity to monitor, report and verify sectoral emissions, and responsible government entities, regulations, rules and reporting formats need to be developed. Depending on the experience with previous domestic mitigation or energy saving activities focusing on sectors, these kinds of institutions may or may not be present in developing countries. In contrast to the institutions required for MRV, the implementation of the actual emission reducing activities can be realized with an institutional setup inherited from existing efforts, for example to curb energy use or emissions in sectors, and evolve from there (Interviews 21, 22, 23 and 24). The approach is in this regard similar to NAMAs, and it has been suggested that capacity building on institutions can also be part of in international assistance ‘package’ to implement sectoral approaches (Schmidt et al. 2006).

Table 6-5 summarizes the characteristics of the three mechanisms analysed here with regard to scale (i.e. its scalar properties that are a result of its design choices, e.g.

with regards to boundary), multi-level governance (i.e. the interactions in which actors and institutions, especially those at different levels articulate authority) and institutions (i.e. the rules, practices and conventions bound into organisational form).

	CDM		NAMA		Sectoral	
	<i>Characteristics</i>	<i>Assessment</i>	<i>Characteristics</i>	<i>Assessment</i>	<i>Characteristics</i>	<i>Assessment</i>
<b>Scale</b>	Currently only project-based; most effective for point sources; efforts to 'broaden' scale through bundling or programmatic use	Misfit of scalar definition for the use in transportation, which consists of small and dispersed emission sources	Determined by developing country; from city scale project to policy/plan for a whole country	Flexibly adaptable to local situation; developing country need-based; similar to different focus scales of development aid	Sectoral scale which is practical for technological and policy-making reasons; thematic or geographical sub-scales possible	Suits practical needs since emissions are measurable at sectoral scale and can be influenced there
<b>Governance</b>	Decision power concentrated at the international level; strict control via methodologies; transaction cost high; limited governance function allocated to national level	Difficult to implement in transportation due to bottleneck in the form of lacking methodologies (int'l level); governance strong at city level and by policies – which is not possible in CDM	High authority at country level for design, proposal and implementation; approval for finance and MRV at international level; possibility to evolve from development aid or partnership governance	Similar to structure of development aid, in which (sustainable) transportation is a cornerstone; well-applicable in general, but unlikely that China will be NAMA recipient country	Split: decision at international level; proposal and implementation at local/national host country level; builds on environmental governance in the sector and can enhance it	Reasonable for implementation, as (multi-level) governance is well established; way of use (distribution) of funds domestically to incentivise mitigation is critical; link to int'l level is critical
<b>Institutions</b>	Host country institutions (regulations, administrative organisations, third party process) need to be specifically set up and follow international guidelines	CDM institutions exist, but focus on mechanism implementation industrial sources and renewable energy projects (e.g. verification rules, DOEs, methodologies)	Domestic implementation can build on institutions that are already established and progress along the same path	Can make use of existing domestic institutional setup for transportation governance or improve it by capacity building if necessary	Implementation can build on institutions that are already established and progress along the same path; new institutions needed to ensure measurement and verification of target	Can make use of or evolve from existing Beijing institutions; need for institution-building around data reliability, measuring and reporting

**Table 6-1. Characteristics of three mitigation approaches and their assessment for applicability for mitigation in Beijing's urban transportation.**

#### **6.4. Three mechanisms and the Beijing case of urban transportation – are they reconcilable?**

Following the characterisation of the possible international GHG mitigation approaches CDM, NAMAs and new market-based mechanisms, this section examines in how far they are reconcilable with the features of the case study city, Beijing, as outlined in section 6.2. It is very much a practical assessment (summarized in Table 6-5) of their feasibility based on the theoretical understanding of the importance that an appropriate fit to scale, multi-level governance and institutions has in shaping mitigation in urban transportation.

##### **6.4.1. Clean Development Mechanism**

The CDM has been successful in many sectors of the Chinese economy to reduce the domestic emissions of GHGs and improve energy efficiency. Of the roughly 929 registered projects currently implemented in China, however not a single one is in the transport sector. Six projects are under development (at validation stage) using methodologies for urban bus rapid transit (BRT) systems or biodiesel use in transportation. Globally, only three projects have been registered in the transport sector so far, and four methodologies have been applied in transport CDM development (BRT, biodiesel, small-scale modal shift, railway regenerative braking) (Fenhann 2010). The CDM generally favours large, single-point emission sources, where emissions can be clearly attributed and calculated. Applying for a CDM project is a tedious task with high transaction costs in most cases, and the challenges become near to insurmountable in the transport sector, which consists of a large number of small mobile sources. The scalar definition of the CDM as mostly single-site project type mitigation makes the approach “particularly ill-suited to

accommodate transport projects” (Sterk et al. 2006) and authors trying to reconcile transportation mitigation and international climate finance see the solution in a ‘scaling-up’ of the CDM to a sectoral level (Wittneben et al. 2009).

At the international regime level, changes in the basic setup of the CDM in this direction are unlikely, even as Programmes of Activities and bundling of projects are now possible. The environmental governance of the CDM is highly dependent on the use of approved methodologies, which is to ensure the correct calculation of baseline emissions in a pre-defined boundary (usually a single site) as well as to ascertain the (environmental and investment) additionality of the achieved GHG emission reductions (Asuka et al. 2004; Schneider 2009). This mode of governance is irreconcilable with a general structure of transportation mitigation as a function of policies and measures, passed at multiple levels of government, which influence at varying degrees transportation activity, modal structure, energy intensity and the fuel emissions factor. While in Beijing individual CDM projects could in general be conceivable, using methodologies for BRT or bio fuel use, even these are unlikely given a business as usual policy environment that already includes support of these measures. In any case, individual transportation CDM projects would in all likelihood lead to GHG reductions of only a fraction of the overall mitigation potential of the Beijing transport sector.

#### 6.4.2. Nationally appropriate mitigation actions

NAMAs allow for considerable flexibility in design and are therefore well suited to cover mitigation activities in developing countries’ transportation sectors, and multilateral aid organisations have recently funded the development of example NAMA case studies to explore their application (Ecofys 2010; Huizenga et al. 2010;

Jung et al. 2010). NAMAs that have been discussed cover the application of standardized baselines for BRT, implementation of transport management systems or the optimization of an urban bus system. With regard to scalar considerations, supporting the implementation of any combination of transport measures in Beijing municipality by international climate finance through a NAMA approach seems feasible.

The approach is furthermore generally reconcilable with the governance structure of Beijing's transport sector. For the purposes of proposing a NAMA, the levels of government that are involved in policy-making are of no importance, as long as transport governance is well coordinated and a NAMA can be coherently designed and proposed. Depending on the level of ambition, it may be feasible to compile a comprehensive (sustainable) transport development plan for Beijing and submit it as a NAMA. The Chinese government would in that case need to ensure the coordination of necessarily local (municipal) activities in transport planning with the national level domestic climate policy agenda and considerations of international policy. Coordination 'committees' on topics of importance – horizontally covering different ministries and vertically going from central to local governments – are common practice in the Chinese policy process (Lieberthal et al. 1988a; Saich 2004). A NAMA development process could be formed on this basis. At the implementation level, China would make use of the existing institutional structure to ensure achieving the concrete transport mitigation targets and would be able to develop institutions further in a path-dependent manner, using international climate finance to incentivize mitigation and sustainable development in transportation.

While a NAMA approach seems to be a good match for the scale, governance and institutions of urban transport mitigation in Beijing, two challenges are likely to be barriers to its implementation. Firstly, although China has been actively supporting the notion of NAMAs, the country's submission to the UNFCCC in this regard only includes the unilateral commitment to reduce carbon dioxide intensity of the economy, and targets for the share of non-fossil fuel energy and forestry (China NDRC 2010b). It is widely assumed that China itself will not ask for NAMA financing, and that furthermore there would be resistance among developed country Member States in the UNFCCC to fund NAMAs in China. This stems from a popular understanding of NAMAs as a rather 'soft' approach – similar to Development Aid, only with mitigation attached to it – making it more appropriate for less developed countries, but not for a 'major emitter', 'quickly developing economy' country like China (Ellermann 2010; Interview 21, 22, 23 and 24). Secondly, China has been weary of the MRV requirements connected to supported NAMAs. While the Chinese government has given up its outright opposition to the concept in the UNFCCC negotiations, the Chinese reluctance to go beyond proposing unilateral NAMAs is likely also a way to avoid international MRV of its actions at this stage (Interviews 18, 20 and 22). While Chinese research institutions are actively studying the possible forms and consequences of MRV systems (Teng et al. 2009), this seems to be in order to understand the concepts for domestic policy use, and proposals of supported NAMAs from China are not on the horizon. The Chinese hesitance to allow for a new approach to enter the country, which links domestic with international environmental governance, mirrors its resistance to implement the Clean Development Mechanisms at its inception. Only many years

after the passing of the Kyoto Protocol and after building an institutional base that localises important parts of CDM governance, that approach was allowed to gain a foothold in China (Ellermann 2007).

#### 6.4.3. New market-based mechanisms

New market-based mechanisms have been most commonly discussed for application at a sectoral level, and sub-sectoral or geographical delimitations are thinkable. For the case of transportation in the Beijing municipality, the government could propose a ‘sector no-lose target’ that comprises urban transportation within a geographical boundary. Transportation policies and measures as discussed in section 6.2 are passed at various levels of government, affecting parameters like activity, modal structure and energy intensity, and in the end resulting in a reduction of GHG emissions from transportation in Beijing. As much of policy-making authority for transportation is concentrated at the municipal level, this approach fits well the scalar characteristics of a sectoral approach, as long as it permits this form of geographical boundary. A few studies have analysed GHG emissions at this scale, suggesting that data collection and modelling for the case of Beijing is possible, albeit still posing some challenges with regard to completeness and data quality (Hao et al. 2000; Darido et al. 2010). Ecofys has adapted its ‘Sector Proposal Template’ for a sub-sectoral urban transportation scale, and tested it successfully for the Beijing case using data provided by the Energy Research Institute (ERI) of China. (Ellermann 2009). The study’s data suggests an annual emission reduction potential of 2.4 MtCO<sub>2</sub> in 2015 and 6.1 MtCO<sub>2</sub> 2020 for transportation in Beijing, of which 1.7 MtCO<sub>2</sub> and 3 MtCO<sub>2</sub> could be credit-generating in 2015 and 2020 respectively (Ellermann et al. 2009b). The volume of these potential GHG emission reductions

suggests that the municipal scale is worth considering the application of a sectoral approach for transportation. Widening the boundary to cover all cities above a certain size (e.g. all 13 cities above 4 million inhabitants or all 41 cities above 2 million inhabitants (China Statistics Press 2009)) would further increase the overall GHG reduction potential while leaving intact the scalar characteristics of the approach. A step-wise approach to implementation – i.e. a small number of pilot cities followed by a countrywide implementation in urban areas – would follow the precedence of other efforts of scaling up environmental governance in China. Governance and institutional issues are central to the design of any approach, and in the case of a new market-based approach at sectoral level (as in the case of NAMAs), there is likely to be a split between governance issues that concern the linkage of the international climate regime to Chinese domestic environmental governance as well as the implementation of mitigation activities domestically – for example in Beijing municipality. As noted above, Beijing has completed tests for using structured ‘proposal templates’ to present the case of transportation GHG emissions, including possible future pathways of sectoral emissions under different policy scenarios. In a pilot or real life application, the national and municipal governments would need to coordinate a process for developing an official proposal for international consideration and safeguard the quality and completeness of data presented therein. The same applies to the yet to be developed MRV process of ‘sector no-lose targets’ or other new market-based mechanisms, which ultimately link the domestic emission reductions to climate finance from the international community. MRV is however likely to rely on the same governance structures and institutions created for the *proposal* stage of the mechanism, with respect to scale MRV of emission reductions

in the urban transportation sub-sector seems feasible. The urban area geographical boundary of Beijing municipality is generally conducive to fuel-based emissions accounting methods, although leakage and the completeness of data may pose problems (Interviews 3, 7, 8, 15 and 17).<sup>55</sup> The same GHG models used in the mechanism's proposal phase can be used to double-check the viability of the fuel-based GHG emission results.

In total, governance of a new market-based mechanism based on a sectoral boundary of Beijing municipality will require considerable capacity and newly developed institutions for the proposal phase and MRV, which necessarily involve multiple levels of government inside China as well as linkages to the international climate regime. While this seems challenging, it has to be noted that this parallels in many ways the on-going developments of environmental governance of GHGs in China. China's 12<sup>th</sup> Five-Year-Plan that is currently being developed, in all likelihood foresees a role for provinces (and thus also Beijing as a province-level city) to monitor and control GHG emissions by sectors, which would require many of the same new institutions needed for a sectoral approach for transportation in Beijing (Interviews 18 and 19.). On the implementation side, the advantage of the sector no-lose target concept with regard to MRV is that the achieved emission (intensity) reduction of the sector compared to a crediting baseline needs to be MRVed – not the individual measures (e.g. policies, standards, internal trading, subsidies etc.) that have led to the decrease in the emissions (intensity). Taking up a sector no-lose target in the transport sector of Beijing would mean that sustainable transport strategies that are already implemented or planned today, at multiple levels of

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<sup>55</sup> This may especially be the case for the large numbers of government and company vehicles that are often refuelled at privately maintained gas stations.

government (expansion of mass public transport, vehicle efficiency standards, fuel taxes, etc.) can continue to be used and made more stringent. At the local level and during implementation, the approach can rely on a path-dependent evolution of institutions and the historically developed, country-specific multi-level governance of transportation in Beijing. Coordination is nevertheless required for the use of the funds received for credit-generating emission reductions, ensuring that the strengthened mitigation actions are adequately financed.

In the international climate negotiations, the Chinese government has opposed any new mitigation approaches with a sectoral scale, but internally, research institutions are actively analysing their implications (e.g. Tsinghua University et al. 2006; Wang et al. 2007a; Cai et al. 2008a). The policy study of Ecofys and the ERI that involved stakeholder input from government agencies and Beijing transport planners has furthermore shown that a scheme based on sectoral crediting below a business as usual scenario would be feasible, even expressed in terms of absolute emissions. In light of the large mitigation potential, the appropriateness of the scale, and the reliance on established forms of environmental, a new market-based mechanism incentivising mitigation in the transportation sector with international climate finance therefore seems well reconcilable with the prevailing conditions and ambitions of Beijing municipality.

## **6.5. Conclusions**

Greenhouse gas emissions from transportation are growing worldwide, and their growth is particularly pronounced in developing countries. Despite the importance of this source of emissions, a feasible mitigation mechanism for this source category is lacking under the international climate regime. This research lays out the multi-level

environmental governance of transportation in Beijing, China, focusing on activities that have a GHG mitigating effect. It shows that urban transport emissions are influenced by a mixture of policies and measures, which originate at national and municipal level, and which are designed to reduce activity, shift the modal structure of transportation, increase the efficiency (decrease energy intensity) and reduce the fuel carbon content. The environmental governance of transportation emissions in Beijing is well developed and constantly evolving; it is however not yet linked up with the international climate regime. Such a linkage would enable the flow of international carbon finance – either in the form of direct funding or through the use of carbon markets – to further incentivise mitigation action in Beijing’s transport sector.

Three possible approaches are currently available or under discussion in the climate negotiations under the UNFCCC: CDM or a reformed version thereof; nationally appropriate mitigation actions – NAMAs; and new market-based mechanisms such as a sectoral mitigation approach. They entail stark differences with regard to the ‘geographies’ of carbon finance: scale, most commonly discussed in the form of boundary of an approach; the multi-level governance implications; and their institutional requirements for implementation at the local level. The attempt to reconcile the characteristics of the three approaches with the particularities of the Beijing urban transportation case reveals that only a newly designed market-based mechanism – for example in the form of a ‘sector no-lose target’ for urban transportation in Beijing – seems feasible. It can combine an appropriate scalar focus on the urban transportation sector with a reliance on historically developed governance and institutional characteristics to implement the actual mitigation

activities, which are specific to the locality and country case. As can be expected, challenges for the design of such a new approach exist, for example in the governance of the proposal phase and MRV of a sectoral approach and related institutions. Nevertheless, it provides an opportunity of directing international climate finance to a sector that has so far been largely ignored, and to leverage the mitigation potential of urban transportation.

The present research approach – outlining the environmental governance of transportation including its institutional setup and exploring options for its coordination with international carbon finance should be equally possible in the case of other large Chinese urban areas, given the similar setup of transportation governance. The finding that a sectoral approach to mitigation would be the most appropriate mechanism with regard to scale therefore holds true for other Chinese urban areas as well. From a practical viewpoint however large differences in data quality and institutional capacity exist between for example Beijing, Shanghai and Guangzhou compared to other large urban areas in China. When implementing such an approach it may be possible to consider a staged widening – or ‘scaling up’ – of the approach to cover urban transportation of all major Chinese cities, possibly in the form of *governance through pilots* as currently explored in the case of domestic emission trading systems in China.<sup>56</sup>

The ‘geographies’ of GHG mitigation finance in the urban transport sector as analysed here are quite distinct from other sectors such as cement, iron and steel production or power generation. One other sector with a major share in global emissions that would however benefit from a similar analysis is the building sector.

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<sup>56</sup> This exploratory form of environmental governance is discussed in detail in Chapter 7: .

It shares important characteristics – in particular with regards to governance and institutions – with the transport sector. It has a large number of dispersed emission sources, where individual emission reductions are impossible to incentivise directly, leakage and competitive concerns are minimal, and there is a reliance on administrative measures like standards and public spending to realize energy efficiency gains.

Although the future of the analysed mitigation mechanisms is uncertain, an analytical focus on questions of scale, multi-level governance and institutional implications – combined with a clear understanding of the localities in which GHG emission reductions are to be achieved – is in any case appropriate when examining possible new approaches to mitigation.

#### **6.6. List of interviews**

	<i>Affiliation of interviewee</i>	<i>Location</i>	<i>Date</i>
1	Central government research institute	Beijing	2009-02-09
2	Local government agency	Beijing	2009-02-09
3	Local government agency	Beijing	2009-02-09
4	Local government research institute	Beijing	2009-02-11
5	Local government research institute	Beijing	2009-02-11
6	University	Beijing	2009-02-12
7	University	Beijing	2009-02-12
8	University	Beijing	2009-02-13
9	Local government agency	Beijing	2009-05-11
10	Local government agency	Beijing	2009-05-11
11	Local government agency	Shanghai	2009-05-13
12	Local government agency	Shanghai	2009-05-13
13	Central government research institute	Beijing	2009-05-14
14	Local government agency	Beijing	2009-09-02

15	Local government agency	Beijing	2009-09-02
16	Local government research institute	Beijing	2009-09-02
17	University	Beijing	2009-09-03
18	Central government research institute	Beijing	2009-09-03
19	Central government research institute	Beijing	2010-06-29
20	Central government research institute	Beijing	2009-06-29
21	International think tank	Copenhagen	2009-12-14
22	International think tank	Copenhagen	2009-12-15
23	Consultancy	Bonn	2010-06-01
24	Consultancy	Bonn	2010-06-01

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## **Chapter 7: Paper 5: Emission trading systems in China: Shaping the future of a low carbon economy, pilot by pilot**

*Christian Ellermann*

### *ABSTRACT*

China has started experimenting with domestic emission trading systems (ETS). In a policy development approach of governance through pilots, five cities and two provinces have been designated as test sites. They have been given broad freedoms to develop the institutional setup and technical design parameters of the ETS pilots and are meant to start local carbon markets in 2013. Using a political ecology framework, this paper explains the Chinese choice of ETS as the policy instrument for carbon emission regulation over command and control measures or a carbon tax by seeing it as part of the broader Chinese climate change discourse that stresses the development of a low carbon economy. It also highlights how its implementation grows out of the existing institutional setup of energy regulation, and fits the intentions of a new policy model of national level macro targets that are devolved to provincial and local level for realization.

### **7.1. Introduction**

China has seen tremendous economic growth in the past three decades, in the order of eight to ten per cent since 2000. The economic development has come with constantly increasing energy consumption, and thus emissions of greenhouse gases

(GHG) (IEA 2007). This trend has been an important topic in the international climate negotiations under the United Nations Framework Convention on Climate Change (UNFCCC), where China is under constant pressure from other large economies to contribute to reversing GHG emissions trend in order to avoid dangerous climate change. Indeed, a global commitment to limit the increase of the global average temperature to a maximum of 2 degrees centigrade implicitly leads to an absolute GHG reduction need also for China in the next decades, and a progressive involvement of the country in global mitigation efforts (Bosetti et al. 2009).

Domestically, Chinese policymakers are far from oblivious to the challenges that increasing energy consumption and emissions pose to its energy security, local pollution levels and its vulnerability to climate change impacts. For the past decade or so, they have developed and implemented a range of policies to reduce the growth of energy consumption and limit ever increasing GHG emissions, mostly through centrally administered command and control approaches.

This paper looks at new domestic responses to the climate and energy challenge in light of a changing Chinese climate change discourse, which calls for the development of a 'low carbon economy' (see Chapter 3). More specifically, I analyse recent Chinese efforts in developing and implementing market mechanisms – emission trading schemes (ETS) – to curb carbon dioxide (CO<sub>2</sub>) emission growth in the country, efforts presently not linked to the international climate negotiations. The very recent nature of developments in the area of Chinese emission trading system pilots makes it impossible to draw any definitive conclusions or present a full characterization of the political ecology of Chinese domestic emission trading.

Indeed, this is also the reason why besides a very limited number of policy studies (e.g. Han et al. 2012) and some reporting in professional media, hardly any academic work has been published on the Chinese ETS pilots. In some ways, this article can be seen as the start of, and a call for the social sciences including the modern China studies and human geography to engage with this topic, for example using tools such as political ecology to address, analyse and understand a multifaceted human-environment subject such as ETS in China.

This paper is based on a review and synthesis of news reports and Chinese government documents, complemented by interviews with key informants as well as insights gained from participatory observation in the Chinese policy development process. It uses a political ecology framework, as it understands the ETS in China as the result of a political process involving environmental change and human responses to it. These are expressed through political and economic forces, and shaped by social, cultural and historical factors (Blaikie et al. 1987; Bryant et al. 1997), manifested for example in the recent appearance of the ‘low carbon economy’ frame in the Chinese discourse on climate change, allowing – as I will show – for the exploration of ETS in China. I eclectically borrow from different schools of thought in order to come to a rounded and vivid appraisal of this complex topic and the unique formative factors in China at this time. Heilmann’s (2008b; 2008a; 2009) work on policy experimentation in China in particular provides a good starting point for understanding the dynamics of policy-making at the heart of ETS development in China.

I start with a summary of international and domestic climate policy developments that provide the basis for the current ETS pilot activity. Building on the basis of the

discourse (and thus local ‘reality’) of climate change that has come to existence in a locally formative environment of politics, science and media (see Chapter 4), I then explain how factors of the Chinese political ecology have been the basis of the particular choice of policy instrument to achieve GHG emission reductions. This is followed by a review of the status of ETS development in China. Local ETS pilot regions are the most recent manifestation of a *piloting approach to governance* that the Chinese government has been using at least since ‘reform and opening’ in the late 1970s. Their progress demonstrates the advantages, but also the limits of this governance approach in the face of an ever faster, and more results-driven policy process, path-dependent institutional evolution and a (not only technically) complex issue.

## **7.2. The Chinese climate policy background**

Outlining a picture of Chinese climate policy has long been a matter of collecting parts of different energy and environmental policies in a bottom up way and adding them up to an overall total (Heggelund 2007; Qian 2008). Indeed this is very much the impression that China’s National Climate Change Program (China NDRC 2007a) gives as well. This is in spite of the establishment of an inter-ministerial National Coordination Committee on Climate Change (NCCCC) in 1998, shortly after the conclusion of the Kyoto negotiations. In contrast to other countries, where environmental ministries and energy agencies took the lead in developing climate policy, in China the NCCCC is chaired by the National Development and Reform Commission (NDRC) – the overarching economic planning ministry. The importance of the issue was further reinforced when the National Leading Group to Address Climate Change was set up in 2007 under the chairmanship of Premier Wen

Jiabao. The Ministry of Foreign Affairs that represents China to the outside world at the UNFCCC talks constitutes the other cornerstone of Chinese climate policy making. The Ministry of Environmental Protection has not played any major role in this policy field from the outset. This setup has institutionally enshrined energy security and an emphasis on sustained (and sustainable) economic development as the drivers which determine China's climate politics. Due to this fact, most of climate related policies are located in the Five-Year-Plans, a series of comprehensive national planning documents that guide economic and social development. In June 2007, the NDRC published China's National Climate Change Program that synthesizes its climate policy strategy at the national level (China NDRC 2007a). Leading up to the UNFCCC negotiations in Bali, the Chinese government published a white paper on climate change in October 2008, for the most part reiterating the actions and targets manifest in the 11<sup>th</sup> Five-Year-Plan and the Climate Change Program (China NDRC 2008). Whereas for example in the EU emission reduction targets have been set as an overarching goal (at least since the introduction of the Kyoto Protocol) and are then for example distilled into energy efficiency and renewable energy policies, up to 2009 China has taken on many similar actions in a under these plans without an official overarching framework or goal, which however significantly contribute to a reduction from business-as-usual emission trends. The form in which climate policy is formulated and presented in China has seen big changes since 2009. Before the Copenhagen climate summit in 2009, China committed to unilateral mitigation actions leading to 40-45% reductions in the carbon dioxide intensity of the economy by 2020, which were later submitted as 'nationally appropriate mitigation actions' to the UNFCCC process (China NDRC

2009; China NDRC 2010b). This means that for the first time the country put a number as a target to the climate change issue. This is an important ontological step, because climate policy and mitigation actions could then be formulated as a means to achieve this overarching target, whereas before disparate policies had been added up and presented as climate policy.

Environmental policy, including policy aimed at climate change also has a prominent role in the 12<sup>th</sup> Five-Year-Plan (FYP) as published in 2011. The 11<sup>th</sup> FYP had for the first time included overall targets for the energy efficiency of the economy, which were split down and delegated to provinces and then to cities as the main guidance points for local energy policy (China NDRC 2007c). The 12<sup>th</sup> FYP for the first time explicitly adds GHG emission reductions to the list of things to be achieved with a clear macro-level target: From 2011 to 2015, relative energy consumption (per unit of GDP) is to be cut by sixteen per cent, and carbon dioxide emissions are to be cut by seventeen per cent relative to economic growth (CPC Central Committee 2010; China Daily 2011). Similar to the experience of the energy target in the past FYP, the CO<sub>2</sub> intensity target is being broken down to provincial level for local implementation and will hold the status of a career-defining goal for provincial governors (Interviews 1, 3, 14). The top-down formulation of the carbon intensity target marks an important step in the institutionalization of Chinese carbon governance: Starting with the 12<sup>th</sup> FYP, the central government sets a macro-level target, and the responsibility to achieve it – and with it to some degree the pressure to develop the right mechanisms to do so – is devolved to the provinces. It is not likely that many of the central-level initiatives aimed at improving energy savings (and thus indirectly emission reduction) like the 1,000 Enterprise Program (Price et al. 2008)

and the new 10,000 Enterprise Program, which delegates absolute energy savings amounts to large energy consumers by province (China NDRC 2011b), will be supplanted solely by the FYP's energy and carbon dioxide targets. This new approach of a centrally decided macro-level target, delegated to the provinces, however allows or even asks for devolved climate policy making and experimentation at the provincial and even local level. In this way, it opens up the doors for piloting of innovative mechanisms like emission trading systems or low carbon cities to achieve a 'low carbon economy' in line with the changed Chinese climate change discourse (see Chapter 3).

### **7.3. Choosing a policy instrument: The case for ETS in China**

#### 7.3.1. Overview of policy instruments

Environmental goals can be achieved through the use of different policy instruments, and the choice of instrument can make a fundamental difference with regards to the economic efficiency and environmental effectiveness of a certain approach (Sterner 2002; Goulder et al. 2008; Endres 2011). Apart from the theoretical design of a policy instrument or new mechanism, considerations of the political ecology – that is the influence of the location-specific human-nature interaction in the political process – can explain some of the gaps between economic theory and political practice (Keohane et al. 1998; Ellermann 2007; Tilt 2007). The sections below offer some reflections on policy instruments in the realm of carbon governance and their viability in China based on interviews and participant observation in policy advisory projects in the country.

### *7.3.1.1. Command and control*

The People's Republic has for a long time relied on command and control measures for directing its economy. The famous Five Year Plans (FYP) set the development agenda for the coming half decade, and provided the government at various levels with the backing for directing specific administrative measures at subordinate governments and at economic and social actors directly. The environment is no exception to this cornerstone of governance in China (Ma et al. 2000; Shapiro 2001a; Economy et al. 2004; Yuan et al. 2011). “[...] in the previous 10<sup>th</sup> and 11<sup>th</sup> 5-Year Plan and the forthcoming 12<sup>th</sup> 5-Year Plan, most abatement activities and policies have been and are implemented in a top-down or central planning manner,” as “command and control policies are preferred by the planning authorities in China” (Cao 2010). The FYP and its sub-plans have for example contained grand plans for afforestation, mandates for reduction of local water pollutants and build up of renewable energy sources (Yuan et al. 2011). Examples of command and control measures used to achieve the energy targets of the 11<sup>th</sup> FYP incl. mandated closings of inefficient power plants and industrial plants, as well as contractual obligations for the 1,000 most energy-consuming large (often state-owned) enterprises.

Command and control measures can be effective in achieving their predefined targets, provided a working institutional environment for their implementation and enforcement exists. In the absence of full information and absolute foresight, command and control measures will necessarily be less economically efficient at reaching an environmental goal than a functioning market mechanism. The Chinese government has however managed to use command and control measures to significant success, e.g. in the cases of reducing energy intensity (Price et al. 2008)

and SO<sub>2</sub> emissions (Schreifels et al. 2012). Schreifels et al. (2012) regard command and control measures as successful when they were embedded and implemented using “broad set of political and administrative tools specific to the Chinese context”.

#### 7.3.1.2. *Price signals*

Price signals to steer an economy to environmentally cleaner outcomes are routinely implemented around the world in the form of taxes, as pollution levies and subsidies for abatement: No matter the economic system, actors not necessarily take into account the full cost of their behaviour vis-à-vis the benefits they gain. Energy use, for example by burning fossil fuels, results in environmental externalities – in the form of GHG emissions and local pollution – that represent a cost to the society at large, but are not a direct cost to the user of energy and thus not factored into production functions. So-called Pigouvian taxes – such as a tax on carbon emissions – impose an extra cost e.g. on the use of carbon based fuels, and so aim to incorporate the resulting externalities and steer economic actors to choices that reflect the true, total cost of the use of energy. Under full information and foresight of economic activities and their effects, the government would be able to set the price of carbon at a level that steers the economy to an economically efficient economic outcome that reflects the full cost of the use of fossil energy (Endres 2011). Achieving a targeted environmental outcome with some certainty through a Pigouvian tax requires a deep understanding of the economic interrelations, not to mention effects of political economic and cultural nature. Environmental pricing mechanisms furthermore require solid institutions, both for the setting of the price level, as well as for the monitoring, reporting and verification of polluter’s behaviour and related enforcement.

Compared to pollution levies, which have been applied in the case of numerous environmental problems (Finamore et al. 2002; Wang et al. 2005a; Schreifels et al. 2012), China has limited experience with environmental taxes, most of them levied on resource extraction and on energy consumption in the transportation sector (Yang 2009; Xu 2011). Most recently the government has imposed a tax on electricity production to be used for the financing of demand side management measures (China NDRC 2010a). With fixed consumer electricity prices, the ability of the tax to steer economic outcomes – besides generating revenue that is supposed to be used for energy savings measures – is however doubtful (Interviews 14 and 23). Transport fuel is formally taxed in China, but the refining industry also receives various subsidies so that any effects of the tax are blurred (Yan et al. 2009; Xu 2011).

#### *7.3.1.3. Quantity signals*

Emissions trading schemes (ETS) are the classic example of a quantity signal in environmental economics, where the total allowed level of emissions is set, and economic (market) actors need to submit an emission allowance for each unit (e.g. a ton of CO<sub>2</sub>) of the pollutant they emit. In practice, different allocation methods exist for the initial distribution of emission allowances, which can result in starkly different rent distributions to the stakeholders.<sup>57</sup>

Whereas the economic effects of an ETS and a Pigouvian tax will be the same under perfect information and absolute foresight, a quantity signal guarantees reaching of environmental goal, while leaving the price of pollution to be determined by the market. The emphasis and challenge lies therefore in determining the optimal level of pollution on which the total amount of allowances is based – a task that is equally

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<sup>57</sup> See the full issue of *Climate Policy* (Volume 6, Number 4, 2006) for an in-depth analysis of the considerations involved in allocation.

difficult to setting the right level of taxation in a the case of the price signal (Endres 2011). The same is valid for the institutional conditions for a functioning ETS, which requires a solid understanding and implementation of policy-making mechanisms, MRV and enforcement institutions.

Chinese experience in environmental quantity signals is mostly limited to a local market for sulphur dioxide (SO<sub>2</sub>) for energy and industrial installations in Shanxi and later more broadly starting in the period of the 10<sup>th</sup> FYP (Schreifels et al. 2012). More recently, the Ministry of Environment (MEP) is considering cap and trade schemes for water and air pollution of certain local pollutants (Interview 1).

### 7.3.2. Political considerations

The regulation of carbon emissions are an extremely interesting field to be studied through the lens of political ecology, as factors of the human geography, incl. cultural, historical, political and social ones determine how approaches that are straightforward in economic theory work in local practice (Keohane et al. 1998; Tilt 2007). The following are some considerations regarding the design choices of the appropriate policy instrument, which have been at play in the case of ETS pilot implementation in China.

Although economists regard command and control measures as the least efficient means in achieving environmental (or indeed any economic) outcomes, practitioners and China scholars often see them as the most appropriate – even inevitable – form of environmental governance in China (Interview 4 and 15). Several factors can be considered the main reasons for the predominance of command and control measures in Chinese environmental governance, which generally revolve around an *institutional structure* that is not conducive to more indirect environmental

mechanisms: Firstly, state-owned enterprises still dominate the economy, especially in the group of the largest polluters and emitters of GHG. For environmental measures that are of high enough importance, the state can therefore (at least partially) rely on the direct influence it has on enterprises, for example through mandates or contracts given out by the State-owned Assets Supervision and Administration Commission, which manages major state-owned enterprises. For example it has been able to commit them to contractually fixed energy savings targets (which also result in GHG emission reductions), as was done in the “1000 Enterprise Programme” of the 11<sup>th</sup> FYP (Price et al. 2008). Secondly, because of its very fast growing nature, China’s economy could be less susceptible to the steering function of taxes, unless the levies on pollution or energy consumption were to be very high. This is especially true in areas of the economy that encounter very high demands for the goods they produce, e.g. building materials and electricity, and where “investment decisions are made for political and less for economic reasons” by the largest emitters of GHGs (Interview 6). Thirdly, underdeveloped markets for green finance and a limited understanding of the economics of sustainable production practices are further reasons (Liu et al. 2011; Zhang et al. 2011). It is “easier to convince management to undertake energy efficiency measures under the 1,000 Enterprise Program” because they have been “ordered by the state”, compared to energy efficiency measures that are “only economic decisions” (Interview 6). Individual command and control measures are generally the outcome of a complicated negotiation process involving multiple government departments as well as stakeholders (Schreifels et al. 2012). Consequently, they have certainly been the most common form of environmental governance up to date, as they fit the

historically grown Chinese institutional environment of economic and political decision making.

Why then has the Chinese government now chosen to employ a market mechanism – even a quantity mechanism – in the form of an ETS for the regulation of CO<sub>2</sub> emissions? Far from providing a definitive answer, a few China-specific considerations that see the implementation of the ETS pilots in the light of the Chinese climate change discourse and evolution of related institutions can provide a first direction.

In the Chinese climate change discourse, “[d]eveloping a ‘low carbon economy’ is actually framed not primarily as a matter of climate change, but as an important vehicle supporting economic restructuring” based on “industrial and energy policy prerogatives” (Chapter 3). Hajer (2005), Oels (2005) and others have traced how climate change has become “an economic question of neoliberal governmentality through market and technology solutions” (Liverman 2009) in other international spheres. Similarly, through the shift in the Chinese discourse since roughly 2010, climate change has become an issue permitting or even requiring domestic action, and allowing China to take an active stance and also explore new ways of environmental regulation, i.e. through forms of ecological management and carbon markets in particular:

“It is a major strategy in China’s economic and social development to actively face climate change, and this is also a major opportunity to more quickly change the mode of economic development and structurally readjust the economy.” (NDRC 2010)

The framing of climate change as a matter of a ‘low carbon economy’ is therefore one central factor to explain why carbon markets in the form of ETS pilots have been chosen as one of the prime policy instruments for achieving GHG emission

reductions in China. Indeed, it is hard to imagine this form of environmental management in China in the absence of the ‘low carbon economy’ frame.

Besides this rationalization based on the discourse, a look through the institutional lens also reveals supporting explanations. After the 11<sup>th</sup> FYP marked the first time that China had given out fixed energy savings targets, the 12<sup>th</sup> FYP elevated both energy savings and emission reductions to a much higher status, turning them into binding targets, i.e. concrete performance indices for provincial governors and mayors. As the target is now a fixed (albeit indexed to GDP growth) number of emission reductions that need to be achieved, a market mechanism with a cap can contribute to ensuring that the political target is met<sup>58</sup>. In the light of the pronounced government goal of economic modernization it is therefore an attractive way for the NDRC to institutionalize emission reductions.

This is even more true as firstly, the most obvious energy saving opportunities (the ‘low hanging fruit’) have already been exploited for reaching the 11<sup>th</sup> FYP targets, mostly through administrative command and control measures. The complexity of determining the most appropriate places for emission reductions has increased – possibly beyond the capabilities of the provincial and local governments (Interviews 1 and 14).

Secondly the NDRC and local DRCs have very limited resources to institutionalize mechanisms of GHG emission governance. China has gathered some positive experience in letting private actors find, harness and profit from emission reduction opportunities through energy saving and use of renewable energy sources. The country has become by far the largest supplier of international certified emission

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<sup>58</sup> This is true at least for the part of the economy (the sectors), which is covered by the scheme.

reductions (CERs) through the Clean Development Mechanism, the generation of which is by now mostly in the hands of domestic companies (Interview 2). It has also become a growing market for energy service companies (ESCOs) that for example provide solutions to large energy users that need to comply with command and control energy savings targets (Feng et al. 2011). Using carbon emission reductions to further explore and test the use of a quantity-based market mechanism was therefore seen as an attractive option and a goal that the NDRC felt comfortable implementing as of mid 2011 (Interview 14).

A last, but not least important factor is the institutional setup of different possible policy instruments in terms of organisational authority in China. The governmental administration of energy issues in China – while split over multiple government agencies depending on the exact topic – is centered at the NDRC (Andrews-Speed 2003; Andrews-Speed 2012), its National Energy Administration (NEA) and the local energy bureaus under vertical line authority of the NDRC/NEA (Saich 2004). The energy savings targets under the FYPs are implemented through the local subsidiaries of the NEA. Climate change is also managed centrally in the NDRC's Climate Change Department, which coordinates China's foreign policy on this topic (e.g. the UNFCCC delegation) and domestic elements like the CDM. By making GHG emission reductions a matter of carbon markets, the administrative authority and therefore the prerogative to build related institutions stays clearly within the realm of the NDRC. If GHG emission reductions had become a matter of administrative command and control regulation, it is possible that the MEP would have been more strongly involved given its vast regulatory experience and related institutional structures at local level. The Finance Ministry on the other hand would

have had the natural lead role if a price signal for example in the form carbon tax had been chosen as the main mechanism to control GHG emissions.<sup>59</sup> A quantity-based mechanism for GHG emission reductions finds its place however quite naturally under the authority of the NDRC. It allows the government to build on the NDRC-based administration of energy efficiency, as well as the institutions developed for project-based GHG emission reductions under the CDM.

In summary, the combination of discursive factors of climate change being a matter of the development of a ‘low carbon economy’, and the evolution of GHG emission governance building on existing institutions can be seen as the main points explaining the choice for a quantity signal in the form of a ETS.

#### **7.4. Status of ETS in official policy and local implementation**

As outlined above, the Chinese government has long avoided the public discussion of domestic carbon trading, until 2010 when a discursive shift opened up the opportunity to explore options for taking a pro-active approach to engage in domestic carbon emissions.<sup>60</sup>

This change became manifest in the form of the “Decision of the State Council on Accelerating the Fostering and Development of Strategic Emerging Industries”, published on 18 October 2010, which asks for the “establishment and improvement of trading mechanisms for major pollutants and carbon” (China State Council 2010). The current 12<sup>th</sup> FYP, published in March 2011 speaks generally of “improving the incentive mechanisms of energy conservation and emission reduction” and directly of “establishing a carbon emission trading market” and “advancing low carbon pilot

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<sup>59</sup> As some experts point out, the political “fight” between supporters of a carbon tax and those of carbon markets is however still not ultimately decided (Interviews 1 and 14).

<sup>60</sup> For a detailed analysis of this shift see Chapter 3.

projects” (China State Council 2011). To date these are the only high-level political *decisions* of the central government concerning GHG emission trading. A national climate change law, which is alluded to in the FYP, and is expected to contain details on an emission trading system, is still in the policy-making process and not expected to be passed before 2013 or even later.

The “NDRC circular regarding the establishment of carbon emission rights trading pilots” of 29 October 2011 is the first document officially mentioning the establishment of the pilots in the cities of Beijing, Tianjin, Shanghai, and Chongqing, as well as the provinces Guangdong and Hubei and the city Shenzhen (China NDRC 2011a). In it, the NDRC “agrees” to the seven regions developing pilots “according to the comprehensive arrangements for climate change related work of the Central Committee of the Communist Party and the State Council”.

In China, new policies or policy instruments – often controversial at the time – are regularly tried out at in designated areas at the local level, with the explicit or only implicit approval of higher levels of authority, as studied in depth by Heilmann (2008b; 2008a; 2009) and acknowledged by many China policy practitioners. This otherwise under-researched form of *governance through pilots* has led to sweeping changes in policy – like nation-wide economic and legal reforms following from the testing in the special economic zones in southern China in the early 1980s (e.g. Crane 1990; Yeung et al. 2009); and it has led to the complete or at least temporary burial of other ideas, for example in one case relevant to the present discussion in which the “Taiyuan SO<sub>2</sub> emissions trading program does not seem to be functioning anything like a theoretically ideal model and this brings into question proposals to introduce emissions trading in China” (Lu 2010).

In a classical manifestation of the principles of *governance through pilots*, with a “pattern of central-local interaction in generating policy – ‘experimentation under hierarchy’” (Heilmann 2008b), the NDRC thus allows for ETS experimentation through pilots at the provincial/city level to possibly reach the overarching policy goal set by the Communist Party and the State Council. The NDRC however does not take any final decision on the application of the mechanism itself, i.e. not overcommitting the central government to the success and failure of the idea of an ETS before its successful application has been proven.

The NDRC circular requires the pilots to submit their plans for approval by the NDRC – which in effect keeps full control over a final implementation decision – and stipulates the following minimum requirements for work to be undertaken by the pilots:

- administrative measures for an ETS
- basic rules of the pilots
- overall GHG cap
- allocation methodology
- “regulatory system” and registry
- trading platform
- ETS support system in order to “smoothly carry out the pilots”.

The above is the short, but complete legal basis for the establishment of an ETS in China, and there is currently no expectation of any further national level policy promulgations until first results of the ETS testing have been evaluated in 2013 or 2014.

Apart from the official basis of the ETS, what happened in practice at the same time also gives some interesting insides on the functioning of *governance through pilots*. Although the pilots were only officially announced in the fall of 2011, the regions had actually been preparing since late 2010. According to news reports and my own interviews, an internal domestic roadmap exists for the implementation of the pilots in 2013 to 2014 and a national rollout by 2015, but recent statements of Xie Zhenhua, Director of the NDRC Climate Change Department have somewhat qualified this ambitious timeline (Durkin 2012). Initially the central government had only planned for the four municipalities under direct central control (Beijing, Tianjin, Shanghai and Chongqing) and the provinces Guangdong and Hubei to be ETS pilots. The ambitious and well-connected mayor of Shenzhen managed to get the city accepted as an additional testing ground. The case of Shenzhen is different from the other cities, in that it is not a directly governed municipality, but rather a part of Guangdong Province – itself an ETS pilot region – albeit with historically developed special rights (Crane 1990). In the second half of 2011, and before the release of the NDRC’s circular, rumours abounded that the central government had already dropped Hubei and Chongqing from their internal list of pilots-to-be, due to insufficient capacity and preparation. This manoeuvring, the rumours and high activity in academic and think tank circles, both local and central, is a good example of the early stages of a piloting process in China. Throughout 2011, representatives of the pilots’ local Development and Reform Commissions (DRCs) held very regular meetings with the NDRC Climate Change Department, reporting on and planning for their regions’ pilot rollout. The local governments were expected to submit near final drafts of their plans (covering at least the topics listed above) to the NDRC by June

2012, to be put in place by the end of the year. The pilots are expected to be launched in the beginning of 2013, but various news reports and interview partners indicate, that only some (namely Beijing and Shanghai) will be able to meet that target, and the launch of the other pilots may be delayed to the middle of 2013 or later. Officials of the NDRC Climate Change Department have mentioned in several speeches that the lessons of the development and implementation of the pilots from 2013 shall build the basis for a larger, potentially countrywide scheme from 2015 onwards. The timeline for the development and implementation of the regional schemes, and even more so a national scheme, is widely seen as extremely ambitious.

#### 7.4.1. The pilot regions

The pilot regions, depicted in Figure 7-1 and detailed in Table 7-1, cover a significant part of the Chinese economy and population, as well as energy consumption and resulting carbon dioxide emissions.

<b>Region</b>	<b>Population (millions)</b>	<b>GDP (billion RMB)</b>	<b>Energy consumption (million t sce)</b>
Beijing	19.6	1,411.4	30.7
Tianjin	13.0	922.4	38.0
Shanghai	23.0	1,716.6	53.3
Chongqing	28.9	792.6	33.4
Guangdong <sup>61</sup>	104.4	4,601.3	99.4
Hubei	57.3	1,596.8	86.5
Sum	246.2	11,041.0	341.3
Share of national	18%	28%	16%

**Table 7-1. Indicators of ETS pilot regions (China Statistics Press 2010; China Statistics Press 2011).**

<sup>61</sup> Guangdong province includes data for Shenzhen.



**Figure 7-1. Geographical location of ETS pilot regions.**

Beijing, Tianjin, Shanghai and Shenzhen are by most indicators the most developed Chinese cities. In the past decade, Beijing and Shenzhen, and to a slightly lower degree Tianjin and Shanghai have undergone large transformations in their economic structure. They have moved much of their original industrial production and electricity generation capacity outside of city boundaries. As it is impossible to speak of any typical Chinese province, the emissions profiles of these four cities are hardly representative of China at large, being increasingly dominated by the transportation and building sectors. As comparatively developed cities, the expectation is however that they are good candidates for ETS implementation on the basis of a better-developed data foundation, institutional basis and stakeholder capacity.

Regarding most characteristics, the very large municipal region Chongqing can be grouped with the two provinces Guangdong and Hubei. In this group, Guangdong is by far the most developed large region to be nominated as an ETS pilot, also being relatively well experienced in energy-saving efforts in industry and power generation and the development of a market economy in general. With the exception of Chongqing, the less developed western regions of China are notably absent from the list of ETS pilots, as are the highly coal dependent, heavy industry regions of the North. As the pilots are running on a very ambitious timeline, meaning that this is a case of policy experimentation with little room for failure, it is not surprising that these more challenging provinces have not been considered for piloting in the first stage.

#### 7.4.2. Setup of the pilots and design choices

The development and implementation of an emission trading scheme entails a large number of choices that can roughly be divided into two categories: Choices regarding the institutional setup of the ETS in each region, including its development and implementation; and choices concerning the functional setup and detailed technical design elements of each ETS. While the NDRC Climate Change Department has officially taken a step back by allowing experimentation in the form of *governance through pilots*, it has been very active to direct the pilots in at least part of the necessary decisions in both categories.

#### 7.4.3. Institutional setup

In each region, the local Development and Reform Commission (DRC) is the political lead agency for the development and implementation of the ETS. The local

DRCs coordinate the work vertically with the NRDC, and horizontally within the province, municipality, or city in the case of Shenzhen. In practice, and due to the fact that the establishment of the ETS still lacks a strong legal basis, no new departments in the local DRCs have been setup for this work, but the topic is rather covered by the DRC’s Energy or Energy Savings Bureaus. In each pilot, the DRCs have nominated various local organizations to undertake the preparational work for the schemes, including local environmental exchanges, associations or companies affiliated with the government, “think tanks” and academic institutions, with one organization being responsible for the overall coordination of the work. Table 7-2 and Table 7-3 give an exemplary overview of the organisations entrusted by the government with developing Shanghai’s and Tianjin’s ETS.

<b>Political oversight:</b> Shanghai Development and Reform Commission	
<b>Coordination:</b> Shanghai Environment and Energy Exchange (SEEX)	
<ul style="list-style-type: none"> <li>- cap setting</li> <li>- allocation rules</li> <li>- trading rules and modalities</li> <li>- trading platform</li> <li>- registry</li> </ul>	Shanghai Environment and Energy Exchange
<ul style="list-style-type: none"> <li>- scope (sectors, boundaries)</li> </ul>	Shanghai Energy Saving and Emission Reduction Centre
<ul style="list-style-type: none"> <li>- GHG inventory</li> <li>- MRV</li> </ul>	Shanghai Information Centre
<ul style="list-style-type: none"> <li>- administrative measures, regulations</li> </ul>	Law Research Institute of Shanghai People’s Congress
<ul style="list-style-type: none"> <li>- others (support, etc.)</li> </ul>	Shanghai Jiaotong University, Fudan University and others

**Table 7-2. Organizational setup of ETS development in Shanghai (Interviews 15 and 17).**

<b>Political oversight:</b> Tianjin Development and Reform Commission	
<b>Coordination:</b> Tianjin Climate Exchange (TCX)	
- scope - cap setting - allocation rules	Carbon Market Development Working Group & Tianjin Climate Exchange
- trading platform - registry - trading rules and modalities	Tianjin Climate Exchange
- GHG inventory - MRV	Tianjin Low Carbon Development Research Centre
- others (support, etc.)	Nankai University, Tianjin University etc

**Table 7-3. Organizational setup of ETS development in Tianjin (Interviews 10 and 11).**

In both municipalities, Shanghai and Tianjin, the local exchange concerned with trading environmental rights is tasked with coordinating the development and the practical implementation of the local ETS on behalf of the local DRC. These exchanges were both established in the late summer of 2008 with the backing of the local governments and are both owned by a mix of central and local level state-owned enterprises. While engaging in various trading activities before and having some experience with the CDM, the ETS pilots are their first high profile activities, and they have each established a small group of young experts working on related content questions. In the other pilots (with the exception of Guangdong and Chongqing) local exchanges play a similar role. In all pilots the exchanges take responsibility for additional topics besides the general ETS coordination, mostly in areas close to their own expertise, i.e. trading rules, the trading platform, and registry systems.

The grouping of ETS design topics (MRV, GHG inventory, cap setting, trading modalities, etc.) and their allocation to research institutes and government agencies

differs across the pilot regions. The general notion that the local DRC distributes these tasks to local organisations that possess related capacities, as exemplary shown for Shanghai and Tianjin, is true for all regions. In picking these organisations, the local governments on the one hand aim to benefit from any existing knowledge, and on the other hand also build up stronger capacity in their local organisations. In all pilots, the local exchange with environment or energy focus plays a central role in developing and implementing the ETS. Recalling the discussion of different carbon control mechanisms above, this suggests that the provincial/municipal/city level governments in the pilot regions indeed see *trading* and thus *market* elements as central to the development of the local carbon control mechanism. In fact, local governments are eager to have ‘their’ exchange develop into one of the “two or three nationally successful climate exchanges that will come out of the ETS piloting phase” (Interview 21). They are also seen as the main organisations able to build up the expertise quickly enough to cope with the ambitious timeline. Since the CDM has been administered at central level, there is however little in the form of regulations and organisational structures to allow for some sort of institutional evolution at the pilot level.

Overall, at the present stage, the institutional setup of ETS pilot development as described above has become somewhat clear, and it is similar among the seven pilot regions. There is however still no clarity on the institutions needed for the implementation of a regional ETS, for example the responsibilities of certain government agencies, regulations, laws, rules, standards, the roles of certain actors (e.g. verifiers) and their modes of interaction. This more interesting side of institutional development – the local outcome of the *governance through pilots*

approach – is still largely opaque at the present time of research. The local implementation plans, which are expected to be internally submitted and subsequently publicized during the course of 2012 or early 2013 will most likely provide some insights. If the experience of the development of institutions for the CDM in China is any reference (Ellermann 2007), institutional evolution will however continue long after the local ETS have been officially started in the pilot regions.

#### 7.4.4. (Technical) system design choices

Information on the design choices needed for the implementation of the ETS pilots is just as scarce as on their individual institutional setup. Factors like sectoral scope, coverage (e.g. minimum size of mandatory participation), boundaries, allocation mechanism, the cap itself, MRV methods, etc. are topics that are studied and discussed intensely in the groups responsible for develop the implementation plans of the pilots. As of mid 2012, several pilot regions have settled on the most important parameters at working level. The nature of this information is extremely sensitive as it influences participant companies and indeed the ETS pilots' economies directly. It is therefore appropriate to wait for the conclusion of the political decision processes on these parameters and not engage in interpretation of inside information and rumours at this time. Some points that are corroborated by several key informants are that the sectoral scope will differ substantially between pilots and from the sectors covered under the EU ETS; allocation will most likely be to companies and not to installations (as in the EU ETS); the minimum size for inclusion of companies in the pilots will differ widely; the central government has a clear preference for centrally promulgated MRV rules and methods across all pilots and is working towards this

goal; and the possible caps currently discussed are of absolute nature, compared to the intensity-based carbon dioxide reduction targets of the 12<sup>th</sup> FYP.

## **7.5. Conclusions**

The fact that China is developing local emission trading pilots is a remarkable development, given that constraining carbon emissions was considered politically impossible as recently as 2010. The shift in the Chinese climate change discourse towards a strong dominance of a ‘low carbon economy’ frame has opened up the topic for new, pro-active and entrepreneurial approaches to dealing with climate change mitigation. As I show in this paper, the choice of regulating GHG emissions by using a quantity-based market mechanism follows the logic of institutionally implementing carbon regulation in the sphere of authority of the NDRC, and by promulgating a macro-level domestic carbon dioxide target, which is devolved as stringent, binding targets to local authorities at provincial and city level. It is noteworthy that local organisations under the Ministry of Environment (MEP), which do possess relatively developed institutional structures and access to data at the sub-national levels, are not key parts of designing and implementing the ETS in any of the pilots. This mirrors the clear attribution of the topic area climate change to the NDRC – and thus away from the MEP – at central government level.

The preparation of ETS system design choices and institutional foundations by means of a *governance through pilots* approach is an extremely interesting area of study for China scholars as “China’s experimentation-based policy process has been essential to redefining basic policy parameters” (Heilmann 2008b). I have shown how different actors at the local level are currently involved in building the institutional and technical elements of a future ETS – developments which are of

great interest to scholars and practitioners of carbon mitigation and environmental policy making in general. It goes beyond the scope of this paper to assess the possible scheme design implications that the current choice of organisations involved in developing and implementing the pilots has. The central role of the exchanges – which are in the end commercial actors – in the development of the ETS pilots could be seen critical in the light of potential conflicts of interest, and this is obvious in the strong focus of the pilot regions on the trading and market elements of the ETS, compared to regulation and technical details. They are apparently able to deliver solutions in a short timeframe and bring together academic, public and private sector stakeholders and their input; and at this moment this still trumps such worries about conflicts of interest (Interviews 9 and 12). Without a solid political mandate or government budget,<sup>62</sup> the local DRCs as of 2012 are in any case left to motivate these stakeholders that have a (future) interest in the ETSs.

In the Chinese central government emission trading by now is seen as a very important, and still politically and economically sensitive policy instrument. In parallel to the establishment of the ETS pilot regions, the NDRC Climate Change Department is pushing national level research of its own on the topic, and has founded the National Center for Climate Strategy and International Cooperation of China (NCSC) in 2012 to (among other things) coordinate these efforts. It will be very interesting to see if and how the institutions and design choices employed by the pilot regions really differ, and whether as a consequence the approach of *governance through pilots* will turn out to stimulate policy learning and transformation to the degree that is expected. Heilmann's (2008b) analysis of past experience that "[I]arge-

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<sup>62</sup> In fact, based on the current legislation and their institutional setup, the ETS pilots are in theory a voluntary scheme (see Section 7.4)

scale experimentation stimulated policy learning and economic expansion effectively in those sectors in which political elites could benefit from supporting new types of private and transnational entrepreneurial activity” certainly supports the view that developments in the ETS pilot regions will shape the future of China’s ‘low carbon economy’.

## 7.6. List of interviews

	Type / affiliation of interviewee		Date
1	Research institute (central)	Beijing	2011-03-11
2	Research institute (pilot region)	Guangdong	2011-07-27
3	Academic (pilot region)	Guangdong	2011-07-27
4	Academic (pilot region)	Guangdong	2011-07-27
5	Government (pilot region)	Guangdong	2011-07-27
6	Exchange (pilot region)	Beijing	2011-08-23
7	Exchange (pilot region) *	Beijing	2011-09-02
8	Government (international)	Beijing	2011-09-09
9	Government (central)	Beijing	2011-09-21
10	Research institute (central) *	Beijing	2011-09-22
11	Exchange (pilot region)	Tianjin	2011-12-16
12	Exchange (pilot region) *	Tianjin	2012-01-06
13	Company (pilot region)	Tianjin	2012-01-06
14	Research institute (central)	Beijing	2012-01-09
15	Exchange (pilot region)	Shanghai	2012-02-09
16	Company (pilot region)	Shanghai	2012-02-09
17	Government (pilot region)	Shanghai	2012-02-09
18	Exchange (pilot region)	Wuhan	2012-03-16
19	Academic (pilot region)	Wuhan	2012-03-16
20	Academic (pilot region)	Wuhan	2012-03-16
21	Exchange (pilot region) *	Shanghai	2012-04-23
22	Research institute (pilot region)	Shanghai	2012-04-23
23	Academic (central)	Beijing	2012-08-10

- |    |   |         |            |
|----|---|---------|------------|
| 24 | Research institute (central) *          | Beijing | 2012-08-10 |
| 25 | Government/research institute (central) | Beijing | 2012-09-13 |
- \* Repeat interview with previous interview partner

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## Chapter 8: Conclusions

### 8.1. Overview

With China's large and growing share of global emissions, Chinese action on climate change is one of the key factors that will determine whether the target to limit global warming to two degrees above pre-industrial times and avoiding dangerous climate change is still achievable. The Chinese government has pursued an environmental and energy security agenda focussed on increasing the energy efficiency of its economy and the supply of energy from renewable sources. Alongside, a domestic climate change discourse has developed, and changed over time.

This thesis examines what the possibilities for new mitigation action in China is, by asking: *What are the main discursive and institutional elements of climate change in China, how, why and with which interactions have they developed in their present form, and what are the consequences for the viability of certain approaches to address climate change in China?* A political ecology approach helps to answer this complex question through two lines of enquiry:

1. What is the Chinese climate change discourse – how has it evolved, what are the formative forces in its development and at what times do discursive elements lead to opportunities for increasing greenhouse gas mitigation in China?
2. Beyond the climate change discourse, what are other formative factors impacting the likely success of mitigation approaches in China?

In the research for this thesis I eclectically borrowed from the wide theoretical foundation that political ecology provides, in order to arrive at answers to these

questions that reflect the complex realities on the ground in China. It is based on in-depth fieldwork in location in China, with data being collected mostly in the form of interviews during several research trips and extended times spent in participant observation while being part of relevant research and advisory projects.

Five chapters comprise the core of this thesis, each of which have been written as publishable papers and submitted to academic journals. *Paper 1: Chinese framings of climate change. From moral responsibility to low carbon economy* (Chapter 3) and *Paper 2: Climate change with Chinese characteristics. Knowledge production, discourse coalitions, and national identity* (Chapter 4) frame the content of this thesis by examining climate change as a matter of discourse and thus seeing it deeply enshrined in the country-specific interactions of nature, politics, society, the economy and culture. *Paper 3: Differentiating historic responsibilities for climate change* (Chapter 5) explores one important frame in the discourse by quantitative analysis of different methods of attributing responsibility share to China. *Paper 4: Bringing international climate finance to the city. The case of transportation mitigation in Beijing, China* (Chapter 6) finds that a possible international mitigation mechanism supported by the frame of climate change as ‘low carbon economy’ must be adept to the particular ‘political ecology’ of carbon finance in the locality where it is applied by allowing for the integration of the existing multi-level governance and historically grown institutions to regulate mitigation. *Paper 5: Emission trading systems in China: Shaping the future of a low carbon economy, pilot by pilot* (Chapter 7) is an account of the latest development of ETS pilots in China in the way of a *governance through pilots* approach. This concluding chapter brings together the findings of the research presented in this thesis, also leading me to some finishing

remarks on the application of certain research theories and methods, potential future directions of enquiry and implications for policy.

## **8.2. Findings**

The main findings of each paper that is part of this thesis are summarised below.

### 8.2.1. Paper 1: Chinese framings of climate change. From moral responsibility to low carbon economy

This paper constitutes the starting point of this thesis in that it asks, what does climate change mean in China and to the Chinese? Through a discourse analysis based on media analysis and interviews with journalists as well as academic and government stakeholders it illuminates how climate change is rendered comprehensible as a topic.

- The Chinese climate change discourse and with it climate change as a topic has strongly grown in importance from 2005 to 2010. In particular mega-events like the UNFCCC COPs in Bali and Copenhagen have led to spikes in media attention to climate change.
- The Chinese climate change discourse is structured around 5 recurring frames: Mitigation hurts economic growth; Moral (historical) responsibility of the developed countries; ‘Ecological imperialism’; Technological fixes; and ‘Low carbon economy’.
- The dominance of certain frames has changed significantly, resulting in different subject positions for China. *Moral* understandings of climate change have been paramount for a long time, which put China in a position of being reactive to international climate action, being a victim

or in a dilemma. The more recently dominant framing of climate change is ‘low carbon economy’, which opens the topic up for China to be a proactive, entrepreneurial force, with climate change being in line with the domestic (sustainable) economic development agenda.

- Seeing nature as a social construct, a discourse analysis contributes to a deeper understanding of the evolution of China’s domestic and international climate policies, going beyond the usual realist focus on strategic national calculus. It can be useful in suggesting *access points*, where the international community can engage China within its own understanding of the problem, and on the country-specific intersection of constructed nature and the Chinese political economy, which may lead to new successes in the institutionalisation of GHG emission mitigation activities.

#### 8.2.2. Paper 2: Climate change with Chinese characteristics. Knowledge production, discourse coalitions, and national identity

This paper also focuses on the Chinese climate change discourse. It examines the country-specific interactions of nature, politics, science and media, and maps out its genesis and evolution (Jasanoff 1995; Oels 2005; Pielke 2007; Robbins 2012). It does so by using three distinct theoretical angles – the co-production of climate change knowledge by politics and science (Jasanoff 2004); the influence of coalitions between government, science and the media (Hajer 1995b); and the formative power of national identity and history (Shi-xu 2005; Verweij et al. 2006).

- Under the auspices of the government, Chinese research institutions have played an increasingly important role in providing the kind of

background knowledge that the government needs to effectively participate in the international negotiations on climate change, and thereby they have played a key formative role in *co-producing* climate change in the discursive sense. Chinese scientific work has generally followed the agendas set by the government, be it in framing climate change as a moral problem, an economic dilemma or more recently as an development opportunity.

- *Discourse coalitions* between the media, politicians, and activists have been less pronounced than in many western countries, and the media have followed the lead of the government in defining climate change. This follows from the strict control of the state over media in China, but also from journalists' lack of understanding of this complex topic. Compared for example to the problem of localized environmental pollution, they furthermore find it hard to connect climate change to the real life problems of the population. Global warming has therefore not been discussed in a *disaster* frame in China, and discourse coalitions between the media and science have hardly influenced the direction of the discourse or even climate policy action.
- In the Chinese discourse the relation of climate change and national identity and history has long held the country in subject positions of *victimhood* and belonging to the group of the suffering developing countries, consequently supporting a re-active and defensive stance in international climate change negotiations.

- A global perspective on climate change of *environmental management* is not firmly rooted in the complex Chinese realities on the ground. This communication barrier is one major cause that has inevitably produced failures and blockades of internationally coordinated climate change mitigation. International agreements and actions on climate change mitigation or adaptation need to take into account *what climate change means in different places*, and how the country-specific discourses are formed and by whom.

Government plays an immensely important role in the discursive construction of climate change in China. It is argued that the reasons for the promotion of different, partially competing framings of climate change lay in the foreign policy needs vis-à-vis the international climate change negotiations, and the necessity to provide a backdrop to economic changes in the direction of a more sustainable development model respectively. Although this does not constitute an in-depth deterministic explanation of the origins of the forces at play, within the limitations of the applied theoretical framework, the analysed ways of discourse construction provide a very useful template for comparison with e.g. the western climate change discourse, which has developed in a different manner, with much stronger prominence of other actors.

### 8.2.3. Paper 3: Differentiating historic responsibilities for climate change

This paper takes an analytical view on one of the important frames in the Chinese climate change discourse, that of moral/historical responsibility. I put forward and discuss different methodologies for the numerical differentiation of China's responsibility in the light of the international debate on this topic.

- The Chinese government had long shared a position with other developing countries that does not allow for global reduction commitments, but instead differentiates reduction targets for Annex I countries by historical responsibility. The government and the Chinese research community have then started to formulate their own position, a ‘cumulative per capita emissions convergence’ approach, or more recently they have worked with ‘per capita emissions entitlements’.
- A simplified method of looking at historical responsibility finds a 10.8 per cent *causal contribution* share for China based on emissions of all GHGs between 1890 and 2005, compared to 19.7 per cent for the United States (19.7%), and 17.8 per cent for the EU25.
- When emission allowances in the amount of the natural annual carbon dioxide uptake of the earth are distributed proportionally to countries’ populations, China’s responsibility falls to 6.4 per cent, while developed countries’ responsibilities rise. Conversely, if one looks only at emissions after 1990 (using this as a threshold date for scientific closure on the topic and its international recognition as a problem), China’s share roughly doubles to 12 per cent. This is due to the much later onset of large GHG emission quantities following the rapid economic development in the past two to three decades.
- A popular Chinese claim is that the country has reduced GHG emissions by means of its strict population control since the late 1970s. My calculation reveals that China hypothetically reduced its responsibility

for climate change by 10 per cent and 13.5 per cent (not percentage points) respectively for the different cases.

- Looking at GHG emission modelling results that include emissions up to 2030 in addition to the calculated 1890-2005 historical emissions, reveals that more than 40 per cent of total Chinese emissions of 1890 to 2030 lie in the future, i.e. after 2006. Chinese responsibility shares will have surpassed those of the US and the EU in 2030. This paper does not attempt the difficult task of an ethical analysis of future historic responsibility, but points to the use of future emissions scenarios as an important research topic when looking at projected responsibility and potentially re-evaluating the UNFCCC principle of ‘common but differentiated responsibilities’ based on the findings. Similarly, an integration or coordination of the separate, but related historical emissions and ‘embedded carbon’ discussions warrants closer attention by future research on China and in general.

In the course of this thesis, I find that the framing of climate change in terms of historical responsibility – albeit an important and interesting topic of study – has not been conducive to the institutionalization of GHG emission mitigation in China. In future international climate change negotiations, arguments over historical responsibility may however again see the light of day and become important, e.g. in the form of per capita emission convergence methodologies, then potentially mandating strong mitigation in China as well.

#### 8.2.4. Paper 4: Bringing international climate finance to the city. The case of transportation mitigation in Beijing, China

This paper turns to a possible element of another frame of the Chinese discourse, that of climate change as ‘low carbon economy’. I start by detailing the multi-level governance nature of transport energy savings policy in China using the municipality of Beijing as a study case. I then examine how three different mechanisms that are available or under discussion in the international climate negotiations could be employed to bring climate finance to the city to achieve local mitigation.

- Environment-related transportation policy in Beijing encompasses elements of national as well as municipal origin (as a centrally governed city, Beijing combines the provincial and city levels). It further targets trends in emissions by influencing transportation activity, modal structure or modal shares, energy intensity and fuel mix.
- The three mechanisms, namely the Clean Development Mechanism, Nationally Appropriate Mitigation Actions and New Market Mechanisms entail stark differences with regard to the *geographies of carbon finance*, i.e. matters of scale, interaction with the multi-level governance nature of transportation policy, and their institutional requirements for implementation at the local level.
- I find that within the limits of potential international financing mechanisms examined for this paper, only a New Market Mechanism, probably in the form of a sectoral target approach, is suitable for application in the Beijing study case. This is because only this mechanism would make use of the multi-level governance nature of

transportation policy in Beijing and allow its present institutional structures to evolve in a path-dependent manner.

- The complex case of environment-related transportation policy in Beijing shows that an analytical focus on questions of scale, multi-level governance and institutional implications – combined with a clear understanding of the localities in which GHG emission reductions are to be achieved – is necessary when examining possible new approaches to mitigation at the international level.

#### 8.2.5. Paper 5: Emission trading systems in China: Shaping the future of a low carbon economy, pilot by pilot

This paper looks at a new domestic response – emission trading system pilots – to the climate and energy challenge in the light of a changing Chinese climate change discourse, which calls for the development of a ‘low carbon economy’. Due to the very recent nature of these developments, this paper provides an overview of developments as of mid 2012. It applies concepts of *governance through pilots* and a loose understanding of institutional developments – concepts that I suggest as useful for the further study of developments in this area.

- In 2010 and 2011 China has set ambitious central level targets for GHG emission reductions. Their macro-level nature, and the fact that they were devolved to lower levels of government as binding targets, but without a mandatory set of central level command and control measures, has opened the door to policy experimentation at provincial and local level. ETS pilot development in seven Chinese regions can therefore be seen as

a classic case of *governance through pilots* as has been applied in many other areas of Chinese policy making before.

- The choice of using an ETS to regulate carbon emissions in China was far from obvious. Command and control measures have been the policy instrument of choice for environmental regulation in the past, and at first sight they are the best fit for the institutional structure of energy and thus emission regulation in China, especially with large emitters.
- By framing climate change as a matter of developing a ‘low carbon economy’, the Chinese climate change discourse, has contributed to turning climate change into “an economic question of neoliberal governmentality through market and technology solutions” (Liverman 2009).
- Factors of institutional evolution have supported the choice of ETS as the policy instrument: Carbon emission regulation remains in the sphere of authority of the NDRC which also administers the energy savings targets; ETS supports achieving a macro-level quantitative target that is devolved to lower levels of government in spite of very limited resources at the central NDRC; the government has – to a certain degree – already institutionalized project-based emission reductions and energy saving, and aims to benefit from this experience.
- China has so far institutionalized structures for developing ETS by means of *governance through pilots*, and the pilot regions have distributed responsibilities to local exchanges, research institutes and government agencies. As of mid 2012 the institutional setup of the ETS itself and its

(technical) system design choices are still under development and in internal political negotiations.

- Although the government also maintains a policy development agenda for ETS at the central level, past experience with *governance through pilots* suggests that this form of policy experimentation may make a great contribution to policy learning and transformation, as the pilot regions in particular will profit from their first-mover advantage in developing new carbon market and technology solutions.

### **8.3. Wider implications of the research**

#### 8.3.1. Theory, and possibly directions of further research

In this thesis I have used a political ecology framework to examine how political, economic, and social factors affect environmental issues and vice versa, as it “combines the concerns of ecology and a broadly defined political economy” (Blaikie et al. 1987). This framework is particularly useful for location-specific research – the location in this case being China – as it asks for the reasons for environmental change and the way in which the terms of change are defined by different actors (Robbins 2004). It has allowed me to engage with the constructed nature of environment (Watts et al. 2004), seeing climate change in the first instance as a socially constructed matter of discourse, the frame in which solutions to climate change mitigation can be found in China. Political ecology also specifically includes “the study of interdependence among political units and of interrelationship between political units and their environment ... concerned with the political consequences of environmental change” (Hempel 1996) – i.e. institutional arrangements between

different layers of government as well as the formative effect of the political, economic, social and potentially cultural factors on institutions in the area of environmental governance. The application of a political ecology framework in this thesis has proven very enlightening in the study of climate change and China. Like Magee (2006), I feel it deserves a stronger prominence in the field of Modern China studies as a whole, a subject that is known to derive ideas from a broad and diverse range of theories and methods, which can for the most part be subsumed under a heading of human geography.

Trying to describe and analyse the Chinese discourse on climate change presents multiple methodological challenges. The understanding of China as a ‘knowledge community’, in which beliefs about the verity, legitimacy, and applicability of particular forms of knowledge are transmitted, maintained and re-enforced (Büger et al. 2007), and the resulting condensation into five predominant particular frames of climate change will invariably give rise to criticisms as this kind of endeavour can never be complete and completely accurate. In spite of this, I am convinced it was the right way of approaching research for this thesis for a number of reasons: The five frames give a good reflection of what climate change means in China at a certain moment in time. They provided the basis for analysing a number of elements in further detail in this thesis, which are formative in the international debate as well as in domestic policy developments. My application of discourse study methods can also be a starting point for further research that aims to find changes in the discourse, and illuminate the formative forces at play when such change happens in the future. My third paper is the first application of a number of concepts of the idea of historical responsibility to a particular country case. The resulting quantification of

notions of environmental equity over time and space place the paper firmly in a political ecology setting. There is clearly a need to further explore the ethical aspects of climate change and their translation from theory to individual country cases, for example as methods for distributing burdens for mitigation and adaption finance, etc. In the case of China, in the light of strong government planning and therefore responsibility for business as usual GHG emission development, the idea of *future responsibility for climate change* deserves particular attention, as it currently lacks a good theoretical foundation.

Theories of multi-level governance and institutionalism aided my exploration of the Beijing transportation mitigation case as well as the development of Chinese emission trading system pilots. Variants of these theories, like bureaucracy studies (Lieberthal et al. 1992), institutional authority (Oksenberg 1986; Unger 2002), fragmented authoritarianism (Heilmann 2008a; Mertha 2009) and many others are widely applied and useful for understanding modern China. With the same ambition, my research uses institutions and multi-level governance to elaborate in what way and to what degree culturally normative, historical or rational influences shape the origin and evolution of institutions in environmental governance in China. While not necessarily pure in the application of theory, I arrive at a vivid characterization of the interplay of nature, politics and society that shapes the current and potential future forms of GHG emission mitigation in China.

### 8.3.2. Doing research in China

This research was deeply formed and aided by the fact that I have been able to spend significant stretches of time in China, being embedded in research and consultancy work in related areas. Not only is it impossible to embark on research in China

without a proper set of connections, cooperation partners and affiliation to trusted and valued organisations. A deep embeddedness that brings with it an understanding of the culture, modern history, politics and economic system of the country that is impossible to gain from remote study is a prerequisite to undertaking research that reflects the realities on the ground. Only after having this understanding, one can apply methods, and use or even develop theories and to arrive at new insights into Chinese reality. Although participant observation as a method is prone to challenges of being too subjective or limited in scope and the sampling size of available information, because of the above-mentioned reasoning it is far superior to short term study trips, or the sole reliance on structured questionnaires and interviews. For similar reasons, the choice of qualitative over quantitative methods was appropriate for the study of what climate change means, and what the consequences are for the viability of certain approaches to address climate change in China.

### 8.3.3. Policy and practice

During this research, the field of climate change developed rapidly in China, whether understood as a matter of discourse or policy. Studying a quickly evolving subject matter poses some challenges, but also allows the author to make contributions to and potentially support on-going debates with own ideas.

The study of the Chinese climate change discourse illuminates not only the evolution of the discourse itself, but also the formative forces and factors at play in its 'production'. Naturally, *insiders* or *gate-keepers* of the Chinese scientific community are seminal in the construction of the Chinese climate change discourse as well as mitigation policy itself. Through pointing out certain frames that support the *sedimentation* of discourse into mitigation activity better than others, my thesis also

highlights potential access points for engaging China in mitigation activities in the future international climate change negotiations.

While in China climate change is as of 2012 more firmly understood as a matter of environmental management than ever before, moral and ethical aspects of climate change are still present in the domestic discourse, and are certainly behind any position the Chinese delegation to the UNFCCC will take in the international negotiations.

My research also shows that the newly dominant framing of climate change as ‘low carbon economy’ puts China in a pro-active and entrepreneurial subject position. I point out some of the paths of institutional evolution that have become apparent in the development of mitigation mechanisms, both in the case of transportation policy and in the implementation of emission trading systems.

Most importantly, this research shows that in the international climate negotiations China is not only a giant in terms of economic might and emissions, but also a place with a distinct domestic understanding of what climate change is, and existing institutional structures in relevant fields. It is the sincere belief and hope of this author that a better understanding of these facets among international policy-makers and practitioners will lead to a deeper engagement of China in the fight to avoid dangerous global warming.

#### **8.4. Concluding thoughts**

Looking forward, developments in the Chinese climate change discourse, and how new mitigation action is institutionalized in its setting will be an important question in the study and practice of human-environment interactions. A continued observation and examination of changes in the discourse can give early indications of

broader changes in acceptable and promising ways of engaging in mitigation action in China, beyond considerations of purely strategic political and economic nature. The central tension observed, between re-active and pro-active subject positions of China with regards to climate change is far from resolved, although there is currently a trend towards a view of climate change embedded in a sustainable development trajectory of the country. As a matter of ‘low carbon economy’, climate change in China is thus trending towards becoming “an economic question of neoliberal governmentality through market and technology solutions” (Liverman 2009). Institutionalized mitigation – whether in the form of an international carbon finance mechanism supporting GHG emissions in certain sectors, or as local emission trading systems that might eventually be merged and scaled up to national level – is now likely to evolve rapidly. Chinese experiences in ‘ecological modernization’ with regards to climate change will be numerous. They will continue to be an important area of study, not only because of the relevance of the Chinese emissions trajectory for global warming itself, but also because of the lessons that can be learned for similar transformations taking place in other (developing) countries. Results of policy experimentation or *governance through pilots* in the case of Chinese local emission trading systems will have especially broad consequences for the success or failure of institutionalized mitigation in the country. If the piloting approach, and the tried mechanism in particular turn out to result in an efficient and effective way to reduce GHG emissions in the country, this will likely reinforce the framing of climate change in terms of ‘low carbon economy’. It is therefore the hope of the author that this thesis can contribute to an increased attention in academia and policy-making circles to the importance of engaging China on the terms of its

specific climate change discourse, with a particular focus on supporting the development of a low carbon economy and further exploring the question of moral responsibility.

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