Disruptive Events of Environmental Pollution as a Transformative Force - The Impact of Extreme Air Pollution on Policy Making in China

Kumulative Dissertation
zur Erlangung des Doktorgrades der Naturwissenschaften (Dr. rer. nat.)

vorgelegt dem Fachbereich Geographie
der Philipps-Universität Marburg (Hochschulkennziffer 1180)

von

Julian Schwabe
aus Göttingen

Marburg 2016

Erstgutachter: Prof. Dr. Markus Hassler

Zweitgutachter: PD Dr. Johannes Maria Becker

Die Zulassung zum Promotionsverfahren erfolgte am 28.09.2016 durch den Promotionsausschuss des Fachbereichs Geographie, Philipps-Universität Marburg. Die Disputation erfolgte am 16.12.2016.

Disruptive Events of Environmental Pollution as a Transformative Force - The Impact of Extreme Air Pollution on Policy Making in China. Marburg

Julian Schwabe

Marburg 2016

Table of Contents

List of Figures and Tables

List of Abbreviations

API	Air Pollution Index
AQI	Air Quality Index
CGSS	Chinese General Social Survey
EPA	United States Environmental Protection Agency
FYP	Five year-Plan
GDP	Gross Domestic Product
IGES	Institute for Global Environmental Strategies
IPE	Institute of Public and Environmental Affairs
MEP	Ministry of Environmental Protection of the People's Republic of China
$\mu g/m^3$	Micrograms per cubic meter
NASA	National Aeronautics and Space Administration
NGO	Non-governmental organization
NIE	New Institutional Economics
PM 2.5	Particulate matter with 2.5 micrometers in diameter
PM 10	Particulate matter with 10 micrometers in diameter
SO2	Sulfur dioxide
U.S.	United States
WHO	World Health Organization

1. Introduction

Since the beginning of its reform and opening up period at end of the 1970s, the Chinese economy has undergone rapid development. China's average economic growth of 10.2% between the years 2004 and 2013 made the county's economy the second largest in the world by nominal GDP (cf. World Bank 2014a; Ran 2013, p. 18), providing the population with a material wealth that was largely inaccessible to previous generations. This investment- and export-based economic growth however, led to critical environmental degradation, including water-, soil-, and air pollution (cf. MEP 2013a; Harris 2006, p. 6).

The economic costs of the environmental damage are enormous: The Ministry of Environmental Protection of the People's Republic of China (MEP) estimated in 2006, that the damages resulting from environmental pollution reached 8% to 15% of the Chinese GDP each year (cf. Ran 2013, p. 18). Quantitatively speaking, this dimension basically neutralizes the achieved economic growth and indicates that environmental pollution urgently needs to be addressed.

Air pollution is the most visible of all environmental hazards and it has accompanied large Chinese cities at least since 2000, when air quality recordings of the MEP were first publicized in form of the "Air pollution index" (API; cf. MEP n.d.). Beijing in particular has gained an infamous reputation for notoriously high levels of air pollution and, as the country's capital, received the most attention in this regard, even though other Chinese cities feature even worse levels of pollution.

The composition and sources of air pollution are complex and depend on the location. Several main pollutants have been identified in various studies including Sun et al. 2004 and Yu et al. 2013. The most significant air pollutants by chemistry include sulfates, nitrates, ammonia, metals, ground level ozone and organic carbon, all of which have detrimental health effects (cf. Guan & Liu 2013, p. 14; Yu et al. 2013, p. 578). The most commonly referenced pollutant however is particulate matter with 2.5 micrometers in diameter (PM 2.5), which is defined not by its chemistry, but by its particular size. PM 2.5 may consist of various chemical elements and can be emitted as primary particulate matter (which is directly discharged at sources like industrial plants, construction sites or vehicles) or it can form in the atmosphere (as secondary PM 2.5) through chemical reactions of suspended primary gases and compile a cluster of diverse elements (cf. Guan & Liu 2013, p. 14).

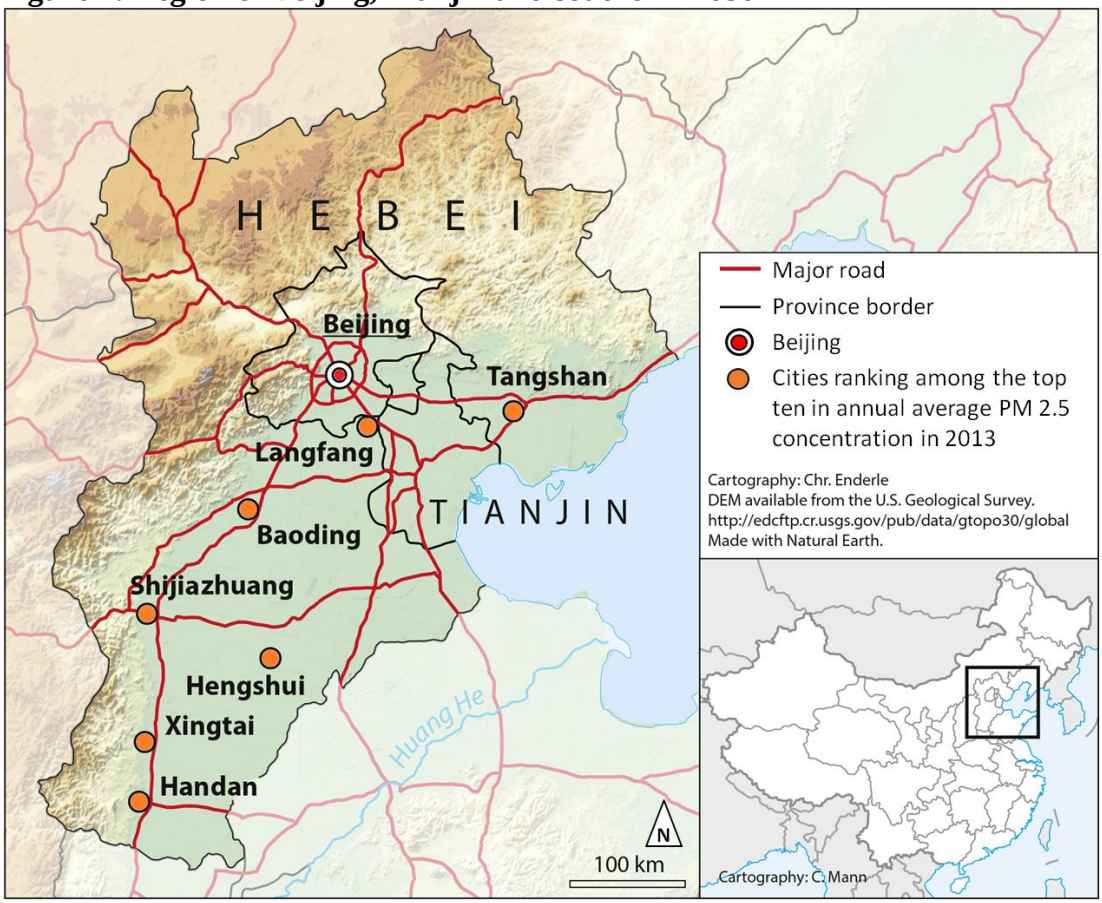
Due to its small size, PM 2.5 is considered particularly detrimental to human health as it enters the bloodstream and causes increased risk of lung cancer, aggravation of existing respiratory problems such as asthma, heart attacks and eventually premature death (cf. EPA 2015). Chen et al. (2013) identified particulate matter as a main cause for shortened life expectancy in China: In a comparison of average life expectation of cities north and south of the Huai river, Chen et al. found that north of the river, life expectancies were shorter by an average of 5.5 years, mainly due to cardio respiratory mortality as a consequence of air pollution. A main root cause of this is coal fired central heating during winter season, the infrastructure of which has only been installed in cities north of the Huai river basin. These cities suffer 55% higher particulate concentrations compared to cities which do not apply central winter heating. Chen et al. estimate that every increase of exposure by an average particulate concentration of 100 $\mu g/m^3$ by time of birth shortens life expectancy by an average of 3 years (cf. Chen et al. p. 2, 15).

Due to its diverse chemical composition, the origins of PM 2.5 vary based on region, season, weather and geographical attributes. Source apportionment studies for PM 2.5 in Beijing and its surrounding region generally identify coal combustion for thermal power generation and winter heating, vehicle exhaust, metal processing, biomass burning during autumn and, during springtime, suspended soil dust as main sources of PM 2.5 (cf. Yu et al. 2013, p 578ff; Guan & Liu 2013, p. 17ff). By and large, such studies indicate that (apart from dust storms which occasionally occur in northern China during springtime) human activity is mainly responsible for the formation of particulates and the associated negative health effects. Weather influences PM 2.5 concentrations through humidity, sunshine and wind, whereas higher humidity and sunshine tend to favor the formation of secondary PM 2.5 that can be transported over large distances and contribute to high particulate concentrations in a region far away from the original source (cf. Ji et al. 2014, p. 548f).

Consequentially, it is estimated that, depending on weather conditions and season, a significant share of particulates concentrated in Beijing originate from outside the city. Regional transportation of particulates is thereby particularly important in causing periods of intense pollution (cf. Ji et al. 2014, p. 551f). Beijing is located within the northern half of the Hebei province and to the north and west surrounded

by the Yan mountains, which are located roughly 30 km from the city centre. The Hebei plain stretches south and east of Beijing. Southern and eastern Hebei is the location of various heavy industry centers such as Tangshan, Langfang, Baoding, Hengshui, Handan, Xingtai and the provincial capital Shijiazhuang. These cities are major steel production bases and heavy emitters of PM 2.5. Countrywide, all of those cities were among the top ten in terms of annual average PM 2.5 concentrations in 2013 (cf. MEP 2014). Under specific weather conditions, with south- or south east wind persisting for several days in Hebei, particulate matter can be transported over the North China Plain over long distances and accumulates at the threshold of the Yan Mountains around Beijing, leading to regular periods of high particulate concentrations in Beijing (cf. Ji et al. 2014, p. 548f; Figure 1).

Figure 1: Region of Beijing, Tianjin and southern Hebei



(Source: Own adaption based on MEP 2014; U.S. Geological Survey n.d.)

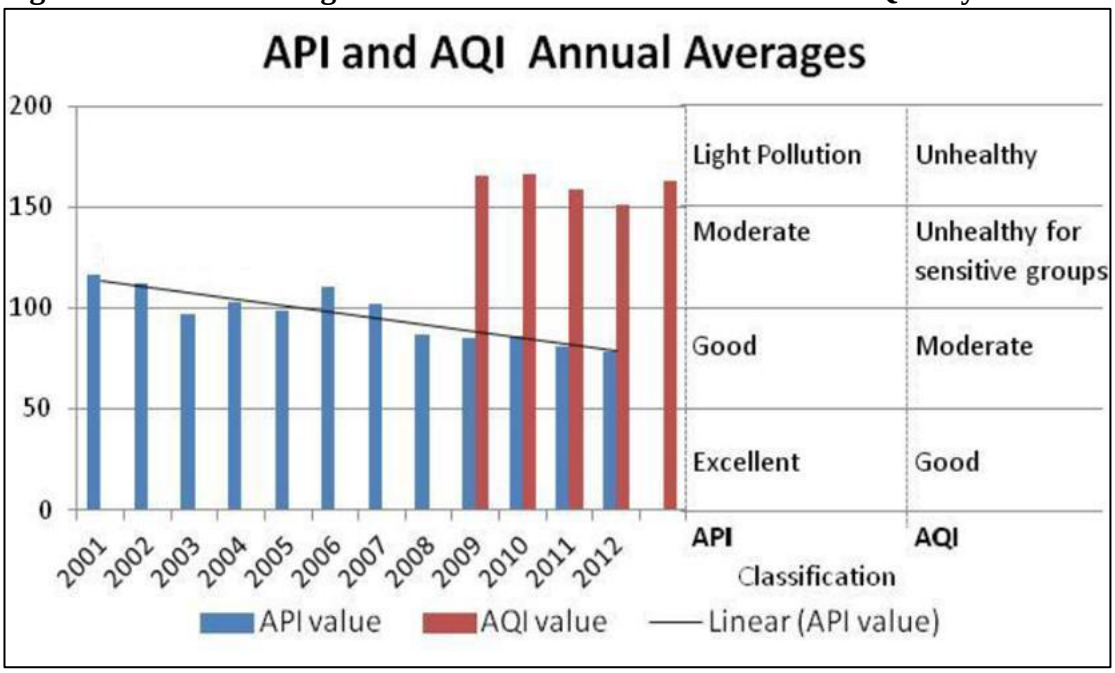
Historically, levels of air pollution in Beijing more or less stagnated since the beginning of the 2000s. The publicly available record of historical data on air quality is incomplete: From 2000 to 2013, the Ministry of Environmental Protection has published an air pollution index (API), which was based on concentrations of

particulate matter with 10 micrometers in diameter (PM 10), Nitrogen Oxide and Sulfur Dioxide (cf. MEP n.d.). Particulate matter of smaller size has not been part of China's API readings, even though PM 2.5 is considered more lethal and thus more important than PM 10 (cf. Williams 2009, p. 39ff; Chen et al. 2013, p. 14). API data has also been suspected of being manipulated as measuring stations from particularly polluted areas in Beijing have been excluded from published index readings in 2006 and further stations from less polluted areas outside of the city have been included in overall index readings which artificially decreased the number of officially polluted days over the year (cf. Andrews 2011). These aspects have made the Chinese API prone to criticism and limited its informative value regarding health effects of air pollution inside the city.

The U.S. Embassy air quality monitor evolved as the most referred to database for air pollution in China and provides the only complete, publicly available dataset for PM 2.5 levels in Beijing over time since 2008. Air quality data from the U.S. Embassy are expressed as Air Quality Index (AQI), which indicates the overall health risk posed by different ranges of PM 2.5 concentrations (cf. Embassy of the United States to China n.d.). Publicly available data coverage on air pollution and in particular PM 2.5 dramatically increased beginning of 2013, when the MEP published hourly PM 2.5 readings for 74 major cities, including 496 stations countrywide, providing a more balanced and more accurate picture on overall air quality sine then (cf. IPE et al. 2014, p. 5; Central People's Government 2012).

Judging from historical data of the Chinese API and the AQI of the U.S. Embassy, overall air quality in Beijing did not change fundamentally over the years, if anything, it slightly improved. Annual average API-values declined from 113.7 in 2001 (a "moderate" level according to the API classification) to 78.5 in 2012 (which is classified as "good" according to API; cf. MEP n.d.). The AQI of the U.S. Embassy naturally draws a more pessimistic picture, with the annual average AQI ranging between 151 and 166 during the years from 2009 to 2013 (values which are classified as "unhealthy"; cf. Embassy of the United States to China n.d.; Figure 2).

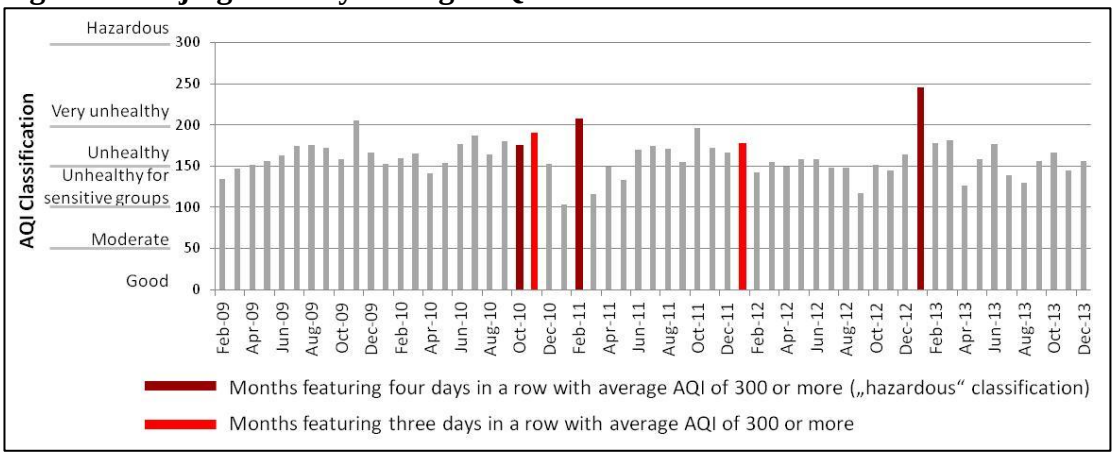
Figure 2: Annual average values of Air Pollution Index and Air Quality Index



(Source: Own adaption based on MEP n.d.; Embassy of the United States to China n.d.)

According to the available data, pollution levels in Beijing can change drastically day by day between excellent air quality and severe pollution which depends largely on wind direction. Seasonal patterns have mostly remained the same over time, with winter season featuring higher levels of pollution due to increased coal burning for winter heating. Most years featured one to two prolonged periods of severe air pollution which would usually last for several days until air quality again improved (cf. MEP n.d.; Embassy of the United States to China n.d.; Yu et al. 2013, p. 576; Figure 3).

Figure 3: Beijing monthly average AQI 2009 to 2013



(Source: Own adaption based on Embassy of the United States to China n.d.)

Despite constantly recurring levels of high air pollution in most larger Chinese cities, the problem has arguably been met with a sense of indifference on part of the general

public (cf. Harris 2006, p. 9). The development of public sentiment on air pollution over time is difficult to estimate due to inconsistently designed annual surveys and low availability of complete datasets. According to the annual Chinese General Social Survey (CGSS), conducted by the Renmin University of China, respondents in 2010 seemed to be aware of the problem and mostly viewed air quality within their area to be low, but the majority did not engage in environmental protective activities, nor did they state to be particularly knowledgeable about the issue (cf. Renmin University of China 2010). Attitudes, behaviors and prioritization towards environmental issues is influenced by a variety of factors including the fundamental values of society, personal exposure to pollution and the odds for success of personal engagement.

The initiation of the reform and opening period end of the 1970s brought about a fundamental shift in paradigm of the Chinese government, which, contrary to previous policies under Mao Zedong, started to encourage the pursuit of material wealth. It has since been the paramount priority of the Chinese to escape poverty and accumulate wealth that would allow them to live in material comfort. This notion led to a thriving culture of consumerism in urban centers where citizens aimed to pursue Western standards of living regardless of environmental costs (cf. Harris 2006, p. 8f). Van Rooij (2010) pointed out that in order for the general public to develop a meaningful awareness on environmental issues and grievances about pollution, it is necessary to acquire detailed knowledge about the specific harm done by different kinds of pollution and how this affects one personally (cf. van Rooij 2010, p. 58, 60). Knowledge about the environmental impact of one's behavior however has generally been low. While most Chinese would agree that the environmental pollution should be lowered, there has been a disconnect between adjusting one's own behavior accordingly, let alone accepting higher personnel expenses that may be associated with a change towards more environmentally friendly behavior (cf. Harris 2006, p. 7ff).

Other explanations for traditionally low awareness on environmental protection lie in the values of Confucianism and the top-down governance that is characteristic of China's authoritarian system. According to Harris (2006), Confucianism, as a foundational philosophy shaping Chinese society, is fundamentally an anthropocentric view in which nature is regarded to be at the disposal for human manipulation and exploitation. Chinese therefore rarely view the environment as a

value in itself that is worthy of protection (Harris 2006, p. 8). The Chinese government system, which mostly relies on top-down governance with few effective possibilities for citizens to provide feedback or effectively channel grievances may reinforce the notion that people are first and foremost concerned with their personnel well being, while any problems affecting society as a whole are expected to be addressed by government measures rather than citizen action (cf. Harris 2006, p. 9, 11).

Chinese are no exception in terms of prioritizing their personnel well-being. This is arguably part of human nature and certainly common in Western countries as well (cf. Harris 2006, p. 12). In consequence, citizen awareness and even action on pollution has usually been triggered by incidents which directly affected the local population and threatened their livelihoods. In this case, the necessary prerequisites of citizen action are detailed knowledge about the harm done, knowledge about the pollution source and personal affection. Citizen action in such cases is usually directed against singular point sources like factories which pollute air, soil or water and can take shape in the form of petitions towards higher government levels, court litigation cases, demonstrations, blockades or physical damage against the polluting facility (cf. van Rooij 2006, p. 60f).

When it comes to addressing air pollution and exposure to PM 2.5 in Chinese cities in general, public engagement has rarely been triggered. Several reasons make the notorious pollution levels in cities a difficult target for citizen action: First, it does not originate from a single known source which could be addressed easily, but is basically due to the rapid growth of energy consumption in industry, transport and winter heating (cf. Hu & Jiang 2013, p. 747f). Second, the effects of PM 2.5 exposure, to the extent that they are known to the general public, are usually not immediate but long-term. While people would notice that the air is polluted, the lack of an obvious entity to blame, low knowledge about the potential harm of particulate matter and the absence of an immediate threat to human health or livelihoods provide low incentive to take action.

On a central level, the Chinese government has recognized the need for reducing pollution since the 1980s but the overall success record for effective pollution control has been ambivalent: Targets specifically directed at reducing air pollution have been issued since the 9th Five-year Plan (FYP; in force from 1996 to 2000) and grew

increasingly ambitious and specific during the subsequent plans. Targets formulated in the Five-year Plans can be attributed by the central government as "optional" or "binding", whereas binding targets are enforced based on performance indicators for subsequent government levels. Officials of provincial and local governments are either promoted or penalized based on their achievement of binding Five-year plan targets, which in turn makes them powerful tools for policy enforcement. During the 11th FYP period, air pollution targets specifically directed at industrial pollutants like sulfur dioxide (SO2) have been defined as binding and the Chinese economy reportedly managed to reduce SO2 emissions between 2005 and 2010 by 14% (cf. Schreifels et al. 2012, p. 781). This success has been achieved mainly through administrative mandates such as closing inefficient power plants, technology performance standards or mandated installments of emission reduction devices in industrial plants (cf. Schreifels et al. 2012, p. 783). Targets specifically directed at PM 2.5 reduction however have only been issued since the 12th FYP, in force from 2011 to 2015 (MEP 2012, p. 23). The enforcement of emission reduction measures through means of administrative mandates revealed several issues which stood in the way of reducing pollution more effectively: First and foremost, investing in pollution reduction technology conflicted with binding targets related to economic growth which incentivized local governments to turn a blind eye on pollution control as long as the targets would be met (cf. Ran 2013, p. 23f). Such misaligned interests led to partly absurd results, for instance that only 40% of devices for flue gas desulfurization which were installed in coal plants (as mandated during the 10th FYP period), were actually being operated, with 60% staying idle due to lack of enforcement, trained staff and costs (cf. Schreifels et al. p. 784). Another issue which was specifically triggered by binding targets has been the provision of falsified statistical data in order to report success to the upper governance levels (cf. Ran 2013, p. 25).

Besides the achievement of FYP targets, measures for environmental protection can be applied through the legal system. Laws relevant to pollution control have been issued in 1989 (Environmental Protection Law) and in 1995 (Air Pollution Prevention and Control Law; cf. IGES 2014, p. 13ff). However, laws and regulations have initially been too weak to incentivize emission control in the industry and enforcement of existing laws has been generally lacking due to aforementioned conflicting incentives between the pursuit of economic growth and environmental

protection on the local level. Until the amendment of the environmental protection law in 2015, it was less expensive for operators of polluting industrial plants to pay fines for unlawful pollution than to invest in pollution control (Tiezzi 2014).

With local governments acting as rational players and prioritizing career advancement, it was logical for them to only invest as much in environmental protection as they absolutely had to in order to avoid penalty while it was easy to pursue GDP-growth at the expense of enforcing environmental regulations (cf. Ran 2013, p. 23f). Summing up, pollution control based on administrative mandates, lacking enforcement of environmental laws and prioritization of GDP-growth over sustainable development on the central government level has prevented effective containment of air pollution and allowed it to emerge as a recurring major environmental hazard in most Chinese cities.

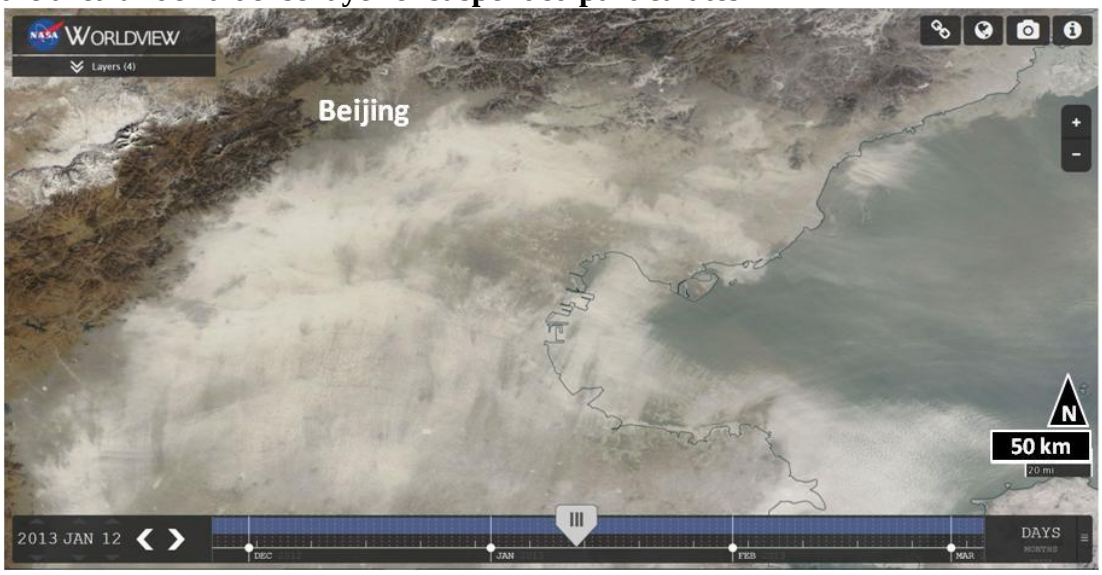
Based on the background of notoriously high air pollution in Beijing, weak public scrutiny over the issue and a governance structure which traditionally did not treat pollution reduction as a priority, this study explores the sociopolitical impact of an event of severe air pollution during January 2013. This event was called "Airpocalypse" by international media and will be referred to with the same denomination in the following sections of this dissertation.

In January 2013, Beijing and the whole North China Plain experienced the highest PM 2.5 pollution in recorded history to date in terms of daily average intensity. Particulate matter started to accumulate on January 10th and pollution levels reached a historical record by January 12th, when PM 2.5 concentrations stayed almost constantly above 300 $\mu g/m^3$ before noon and rose to above 800 $\mu g/m^3$ during most of the afternoon and evening. The maximum concentration was reached at 19:00 with 886 $\mu g/m^3$. Such particulate concentrations were absolutely exceptional even by Beijing standards and far exceed the Air Quality Index classification, which is designed for maximum PM 2.5 concentrations of 500 $\mu g/m^3$, with the range of 251 to 500 $\mu g/m^3$ being classified as "hazardous" for human health. The daily average PM 2.5 concentration on January 12th, 2013 of 569 $\mu g/m^3$ was consequentially the highest in recorded history and more than 20 times above the daily average concentration considered as safe by the World Health Organization, which recommends daily average PM 2.5 concentrations not to exceed 25 $\mu g/m^3$ (cf. WHO 2005, p. 5; Embassy of the United States to China n.d.). Skies were visibly darkened

during the afternoon and visibility was reduced to several hundred meters. Visually, it was obvious that this level of pollution was unprecedented (Figure 4).

Air pollution constantly remained at "hazardous" levels by AQI standard until the evening of January 14th, when air quality again improved. Further periods of "hazardous" pollution occurred on January 18th to 19th, 22nd to 23rd and 27th to 31st. With such concentrations, January 2013 was by far the most polluted month in terms of PM 2.5 intensity in recorded history (cf. Embassy of the United States to China n.d.).

Figure 4: Satellite picture of North China Plain on January 12, 2013, showing the area under a dense layer of suspended particulates



(Source: Own adaption based on NASA n.d.)

The specific causes for the pollution episodes in January 2013 were diverse. Generally, a combination of meteorological conditions were particularly conductive to the formation of particulate matter: Surface temperatures were unusually low in northern China, which led to snow fall in some areas and increased coal burning for winter heating. Thus, emission of primary particulates and precursor gases as well as ground level humidity were higher than usual, leading to intensified formation of particulates. Low wind due to a weakened polar vortex and relatively high stratospheric temperature created an inversion layer that prevented air masses to disperse and led to a prolonged accumulation of particles in low altitudes above the North China Plain (cf. Ji et al. 2014, p. 549). Within these conditions, the period of the "Airpocalypse", which commonly defines the days from January 12th to 14th, is characterized by a sharp increase in particulate concentrations within a few hours on January 12th inside Beijing, while air quality levels outside of the city remained

more constant, indicating that urban emission sources were mainly responsible for the drastic increase of pollution during those days. For the period of intense air pollution towards end of January, urban and rural PM 2.5 concentrations appeared to be more even and increases in pollution were less drastic compared to January 12th, which can be explained by stronger regional transportation and dispersion of pollutants within the North China Plain (cf. Ji et al. 2014, p. 549ff).

The inspiration for this dissertation project came initially from anecdotal evidence that the phase of intense air pollution in January 2013 may have triggered a change in how the general public perceives the problem and how the Chinese central government prioritizes pollution control. The "Airpocalypse" led to an intensified discussion among people who were professionally or privately engaged in the subject of pollution reduction und who witnessed this episode personally. Some commented that this event would mark a turning point in Chinese environmental policy, while others would deny the "Airpocalypse" to have caused any longer term consequences. However, most were in agreement that this event was relevant.

The aim of this dissertation is to explore the relevance of the "Airpocalypse" towards public awareness and government priorities. Due to the explorative character of this study, multiple theoretical perspectives and a variety of methods are applied. These include 1) qualitative, semi guided interviews which the author conducted with experts professionally involved with the subject matter, 2) a standardized survey among Beijing residents who experienced the recurring air pollution in the city and 3) descriptive timeline analysis from publicly available quantitative data on air quality, media reporting and social media discussion.

The empirical data obtained through these methods is analyzed in three research papers which have been written as part of this dissertation. Each of those papers explores a subject matter relevant to the overall aim of this thesis. Specifically, the research papers are broken down as follows:

1) *"The Impact of Periodic Air Pollution Peaks in Beijing on Air Quality Governance in China"*, subject: policy responses triggered by the "Airpocalypse" and their relevance
2) *"The Impact of Severe Air Pollution in January 2013 in Beijing on Sustained Elevation of Public Concern about Air Pollution"*, subject: public concern triggered by the "Airpocalypse"

3) *"Policy Response to Focusing Events and its Enabling Factors - A Case Study of Government Response to Extreme Air Pollution in Beijing in January 2013"*, subject: identification of situational factors which differentiated the "Airpocalypse" from previous events of heavy air pollution in Beijing

Analogue to the topic focus of each research paper, the following theoretical approaches are particularly relevant for this dissertation:

The concept of *focusing events* formulated by Birkland (1997) is a framework for identifying and defining events which caused disruption. Such events can originate from entirely different domains such as oil spills, terrorist attacks or earth quakes, but share a set of characteristics, including suddenness, obvious harm, intense media coverage in the aftermath and a policy response of some kind. The approach of focusing events by Birkland is used to frame the "Airpocalypse" and distinguish it from other comparable occasions of intense air pollution.

To evaluate the existence and relevance of media reporting in the aftermath of the "Airpocalypse", the theory of *media agenda setting* is applied, which was originally formulated by McCombs and Shaw (1972) and empirically validated in numerous studies since. This approach emphasises the outstanding role of the mass media in setting the public "agenda" or, in other words, determining the set of topics and issues which are important to the general public and thus relevant for policy makers to respond to.

Finally, the concept of *new institutional economics*, initially formulated by Williamson (2000) is used as a framework for evaluating the Chinese governance institutions for managing air quality on the formal and informal level and their possible alteration as mid-term consequence of the "Airpocalypse".

From this diverse approach the case of the "Airpocalypse" can be reconstructed and evaluated. In more general terms, this work shall contribute to the understanding of the distinguishing situational factors which need to be in place in order to make an event of intense pollution impactful in terms of public awareness and policy response. This dissertation touches upon various disciplines in the field of geography: The situation under study is defined by the regional climate of the North China Plain, thus, the situational context is defined by attributes typical to physical geography. The

research aim of this study however, lies within the domain of human geography, since, ultimately, human reaction to a natural event is explored.

In the following sections the theoretical framework and the methodological approach of this dissertation is outlined in more detail. This is followed by the research papers which have been published (or respectively are in the process of publication) and a discussion and summary of the overall results.

2. Theoretical Framework

The social and political consequences of environmental pollution in the Chinese context have commonly been researched as case-studies in which the pollution in question came from a single known source (for example a factory that would discharge unfiltered air or water) which directly disrupted the livelihoods of the local population. The causal chain for such case studies usually appears to be quite clear: Local pollution sources which threaten citizen health, harvest or access to clean water cause potentially violent protests which in some cases force the local government to respond. The central points of criticism in such cases are decisions made on the local level, for example the approval of a polluting factory or the purposeful non-enforcement of environmental laws and regulations. Such cases are numerous in China and relatively well researched. An insightful summary and macro-analysis on this topic is provided by van Rooij (2010).

The attributes of the case studied in this dissertation are different. With no single known source of pollution, the direct root cause of the "Airpocalypse" lies not within flawed decisions on the local level, but within the industrial structure of northern China in general. With the absence of a single entity to blame, an event like the "Airpocalypse" would be less likely to trigger street protests and causal relationships of the event and its sociopolitical consequences would be more obscure. The theoretical context and methods applied for this study should provide the means to reconstruct the case of the "Airpocalypse" in its complexity from various perspectives and establish a framework for evaluating its sociopolitical consequences. Three different theoretical concepts are used, all of which have been previously applied mainly in the fields of social sciences and economics. With these concepts, a hypothetical framework of causalities and consequences of the "Airpocalypse" can be drawn. These hypothetical assumptions are then tested during the research, and, as a concluding step, the possibility of integrating the three concepts outlined below for evaluating similar cases is explored.

2.1. Focusing Events

The potential of sudden disasters to trigger intense public attention and government response may seem obvious, but for a long time the phenomenon has not been subject of systematic research, nor has there been a sufficient understanding as to

which factors determine the disruptive potential of an event (cf. Birkland 1997, p. x). This gap was filled in the 1990s by Birkland who developed the theoretical framework of *focusing events.* The concept is based on the assumption that disasters drastically increase attention of society and policy makers towards an issue which has been neglected previously, possibly leading to policy responses to mitigate harm or prevent such an event from happening again. Policy makers in this case respond to the pressure created by public and media attention, however this attention fades as soon as the immediate danger passed (cf. Birkland 1996, p. 221). Hence, such events develop focal power by concentrating attention of diverse actors towards one specific issue, however the sustained impact of a focusing event, or in other words the translation of elevated attention into substantial response, varies each time. One of the merits of the concept of focusing events is that it provides a systematic set of attributes based on which potential focusing events can be identified and the focal power and possible impact of a specific event can be determined. This concept is applicable to events of very diverse domains (e.g. terrorist attacks or earth quakes) which nevertheless share a set of common characteristics, while acknowledging that each focusing event is unique (cf. Birkland 1997, p. 26f).

In this context, Birkland defined a focusing event as an event "that is sudden, relatively rare, can be reasonably defined as harmful or revealing the possibility of potentially greater future harms, inflicts harms or suggests potential harms that are or could be concentrated on a definable geographical area or community of interest, and that is known to policy makers and the public virtually simultaneously" (Birkland 1997, p. 22). Another important attribute to a focusing event is that it affects a large number of people. If this were not the case, the event simply would not be paid attention to no matter how large the destructive potential may be for example, an earth quake in an area without population will not gather public interest, unlike an earthquake that hits a large city (cf. Birkland 1997, p. 25). The general public and policy makers learn about the occurrence of the event almost simultaneously, eliminating the informational edge and reducing initial control over information that governments usually possess, and in turn increases pressure for policy makers to respond quickly and adequately (cf. Birkland 1997, p. 25). Other scholars have proposed similar characterizations for such disruptive events: Wilson et al. (2010) characterized "extreme events" in a study about strategic policy making to be unprecedented or unplanned occurrences which impact business as usual and either

disrupt or destroy resources (cf. Wilson et al. 2010, p. 707). Kapucu (2008) analyzed the catastrophy of Hurricane Katrina as a "trigger event" to be a rare, large-scale disaster of massive size, unusual urgency, unusual range of devastation and high loss of life (cf. Kapucu 2008, p. 10). The commonality of such characterizations is that a disastrous event is generally unexpected, intense, harmful to humans and forces a policy response.

Due to its sudden and harmful nature, a focusing event creates immediate and intense interest and activity that is attributable to the particular event. Interest groups seeking to preserve the status quo will find it difficult to prevent the event and its associated issues to dominate the public agenda while groups proposing policy change are provided with a strategic window of opportunity to lobby for their cause (cf. Birkland 1997, p. 23; Birkmann et al. 2008, p. 4ff).

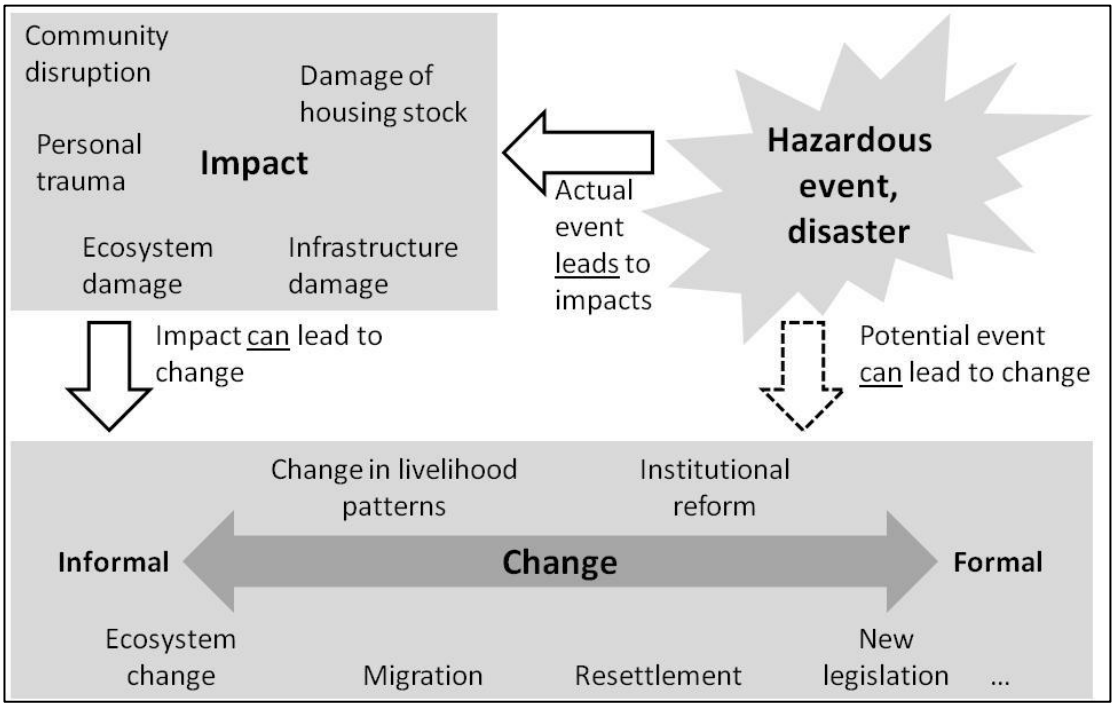
The sustained impact triggered by a focusing event thereby depends on several factors: First, in order for an event to unfold focal power, there must be some kind of tangible harm which can be directly attributed to this event. The more obvious and graphic the harm, the more likely is a sharp increase in attention and, on the other hand, the more ambiguous the harm done, the more difficult it will be to sustain a level of high attention that creates sufficient pressure for policy change (cf. Birkland 1997, p. 43ff). Second, the amount of tangible harm is directly connected to the level of media coverage which is triggered by the event. With graphic pictures of the sudden damage caused by the event, the media will have a compelling "story" to publish and report about the event with high intensity. Media coverage typically peaks within weeks after the event and is influenced by the tangible harm done, the number of people affected and, not least, by the number of available reporters in the geographical area of the event (cf. Birkland 1997, p. 23; 30f). Third, the degree of public interest in the specific issue highlighted by the event is strongly influenced by the degree of media coverage. Public attention may or may not translate into pressure for governments to asjust existing policies: Empirical evidence indicates that public pressure for policy change depends on whether the event was a natural disaster or man-made. While natural disasters such as earth quakes often cannot be prevented, but only mitigated in their consequences, man-made disasters are by definition avoidable and therefore carry a stronger potential for the general public to assume policy failure and apply pressure for strong government response (cf. Birkland 1997, p. 42). Fourth, whether or not public pressure will indeed lead to sustained

government policy change depends on the degree of organization of pro-change forces. This can take shape in the form of interest groups in the economy, political parties, non-governmental organizations and other forms of organized engagement for a cause. For such groups, a focusing event constitutes a strategic opportunity to lobby for policy adjustments. Organized stakeholder groups are assumed to hold much more leverage in altering a policy equilibrium than a disorganized public outcry (cf. Birkland 1997, p. 36f; Giger and Klüver 2012, p. 2, 4).

The focal power of an event, and the factors influencing policy response, are not dichotomous, but continuous variables, which means that an event cannot be "focal" or "unfocal", but rather "more focal" or "less focal" (cf. Birkland 1997, p. 23). Focal power and disruptive potential differs also by the domain in which the event happened: Man-made versus natural disasters are one important distinction that determines whether options for response only include reaction and mitigation (which is common in the former case) or also prevention (in the latter case). Also, the degree of polarization of opposing interest groups plays a role. If polarization between stakeholder groups about an issue is high, even a disaster won't be likely to lead to a change in positions, but nevertheless provide a strategic advantage for groups which oppose the status quo. Examples for this are catastrophic incidents in nuclear power plants (cf. Birkland 1997, p. 40). Also, depending on the domain, the metrics for estimating the damage caused by the event differ: For some domains such as earthquakes, one would estimate casualties and material damage, while for disasters such as oil spills or nuclear power plant incidents the estimate for caused harm is less obvious and, depending on the degree of polarization of stakeholder groups, highly disputed (cf. Birkland 1997, p. 29).

The concept of focusing events has been adapted over time, for example by Birkmann (2008), who differentiated between the impacts of a focusing event and the change that it may or may not trigger. Impact and change stand in a causal relationship, in which it is assumed that a focusing event always triggers *impacts* such as community disruption, ecosystem damage or infrastructural damage and possibly leads to *change* in the form of institutional reform, resettlements, new legislation etc. Compared to Birkland's focus on policy response to a focusing event, Birkmann used a wider definition of "change", which can manifest itself in social, legal, organizational, institutional, economic or environmental dimensions (cf. Birkmann 2008, p. 5ff; Figure 5).

Figure 5: Impact and change triggered by a disastrous event based on Birkmann



(Source: Birkmann 2008, p. 7)

Since its formulation, the framework of focusing events has been applied in various empirical studies, for example for oil spills (Birkland 1997, Bishop 2013), earthquakes (Birkland 1997) or Tsunamis (Birkmann 2008). Applying the concept of focusing events is useful when comparing disasters which occurred within one domain and estimate which of these events unfolded focal power (cf. Birkland 1997, p. 29). For this dissertation, the characteristics of the "Airpocalypse" are evaluated based on this framework in order to identify the main factors which distinguished it from earlier periods of extreme air pollution.

2.2. New Institutional Economics

The term *new institutional economics* (NIE) was originally coined by Williamson (1975). The concept was developed based on the recognition that development paths of economies and societies cannot be sufficiently explained purely by quantitative predictive neoclassical approaches and assumptions of purely rational behavior as those approaches are unable to grasp social systems in their whole complexity (Richter 2005, p.7). Instead, NIE focuses on the restrictive potential of human made institutions which are considered to be the main drivers and inhibitors of societal and economic change. In this context institutional structures are examined within NIE in order to understand decision making processes in organizations and among

individuals as well as drivers and constraints of institutional change and to identify trajectories for future development (cf. Andrews-Speed 2010, p. 7). Rather than a fully developed theory, New Institutional Economics is a concept that can integrate quite diverse existing approaches including (but not limited to) transaction cost economics, evolutionary economics or public choice theory (cf. Richter 2005, p. 4). The main underlying integrative assumption of NIE is that "institutions matter" (Williamson 2000, p. 595) and thus need to be taken into account when evaluating the rationales of behaviors and interactions between organizations and individuals. Institutional change is thereby assumed to commonly occur in an incremental, evolutionary manner through constant adaptation rather than in the form of a sudden, erratic event, and it is always constrained by existing structures which in turn outline future development paths (Rafiqui 2009, p. 341; North 1991, p. 97; North 1990, p. 6).

The term "institutions" in this context is not synonymous to "organizations", but defined as the sum of formal and informal rules which shape the behavior of individuals and organizations. Based on North 1990, institutions can be defined as "the rules of the game in a society or, more formally, [...] the humanly devised constraints that shape human interaction" (North 1990, p. 3).

Within this context, Williamson identified four levels of institutions which are relevant in shaping development paths of societies and to each of which different approaches of social and economic research are applicable. These levels form a hierarchical relationship from macro to micro in which the upper level constrains the lower level. At the same time, the lower level does exert a certain amount of influence on the upper level through feedback effects (cf. Williamson 2000, p. 596):

1) Level one defines the overall cultural norms and values which shape a society and determine the basic manners of interactions among individuals and organizations. This level influences the setup of formal and informal institutions and changes slowly, within centuries or millennia (cf. Williamson 2000, p. 596).

2) Level two encompasses the formal institutions and governance structures including its written laws and regulations. This level is referred to by Williamson as the "rules of the game", which in most cases change in an evolutionary manner for example through amendments, reforms, renewed

contracts but occasionally in a disruptive manner like civil wars (cf. Williamson 2000, p. 598).

3) The third level refers to informal structures, behaviors and unwritten rules which Williamson called the "play of the game". This level determines the actual manner of implementation (or lack thereof) of the formal rules outlined in the second level as well as the interaction patterns between stakeholders of all kinds (cf. Williamson 2000, p. 599).

4) Level four addresses the individual behaviors and transactions which are the result of the institutional constraints of the upper three levels. This can refer for instance to the distribution of funding, employment decisions, allocation of individual tasks etc. (cf. Williamson 2000, p. 600).

The different institutional levels are somewhat intertwined, with blurry borders and the concept has been adapted in different empirical studies. Andrews-Speed for instance applied this concept in a study on China's governance institutions in the field of energy and adapted the original linear hierarchy of the governance institutions to a circular scheme in which levels two and three would be positioned next to each other and simultaneously exercise influence on level four, which in turn was assumed to have stronger influence on the upper levels than indicated in the original scheme by Williamson (cf. Andrews-Speed 2010, p. 7ff).

For this dissertation, levels two and three of the aforementioned scheme are used for characterizing China's governance institutions on air pollution control and evaluating the significance of potential political responses which may be attributed directly to the air pollution in January 2013.

2.3. Media Agenda Setting

Like new institutional economics, the media agenda setting theory has its origins back in the 1970s, when McCombs and Shaw (1972) concluded in an empirical study on undecided voters during the U.S. presidential election, that mass media have a profound influence in the choice of topics which are prioritized by the general public. Originally, empirical studies found little correlation between mass media reporting and public opinion, however, if one changes the premise and examines the correlation between mass media reporting and the choice of topics which the general public considers important, the media appears to be extremely influential. A quote

from Cohen 1963 builds the foundation of the hypothesis which McCombs and Shaw (1972) continued to develop: "The press may not be successful much of the time telling people what to think, but it is stunningly successful in telling its readers what to think about" (Cohen, 1963, p. 13). In a later essay, McCombs further elaborated: "What we know about the world is largely based on what the media decide to tell us. More specifically, the result of this mediated view of the world is that the priorities of the media strongly influence the priorities of the public. Elements prominent on the media agenda become prominent in the public mind" (cf. McCombs 2002, p. 2). In short, the media mainly determines the public agenda. The term "agenda" in this context can be understood as the set of topics which are prioritized by the general public at a given point in time (cf. McCombs 2002, p. 2).

McCombs and Shaw are commonly credited with having conducted the first methodologically sound agenda setting theory, however the general idea of media influence on topic priorities of the public dates back further. In a study during elections in Great Britain in 1959, Trenaman and McQuail came to similar conclusions (cf. Rössler 2016, p. 124; Trenaman and McQuail 1961, p. 174). The merit of McCombs and Shaw (1972) however lies in the formulation of a coherent theoretical concept based on assumptions of media agenda setting and systematically testing its validity (cf. Rössler 2016, p. 125f).

The assumption of media agenda setting is usually tested in empirical studies by estimating the correlation between the intensity of media reporting about a specific topic and the increase in public attention to it, with a high degree of correlation indicating evidence for media agenda setting. The basic premise of media agenda setting has since the 1970s been empirically verified in several hundred studies (cf. Neuman et al. 2014 p. 193). Naturally, empirical studies in this area have taken diverse refined approaches, for example by comparing the agenda setting function for different types of issues, different types of media or different types of audiences (cf. Neuman et al. 2014, p 194).

With the dawn of the digital age and the mass adoption of online social media the concept of media agenda setting continues to be relevant, and the question of more complex correlations arises, for example whether or not users of social media possess an agenda setting function towards mass media ("reverse agenda setting") and whether social media lead to the rise of a new form of independent journalism made

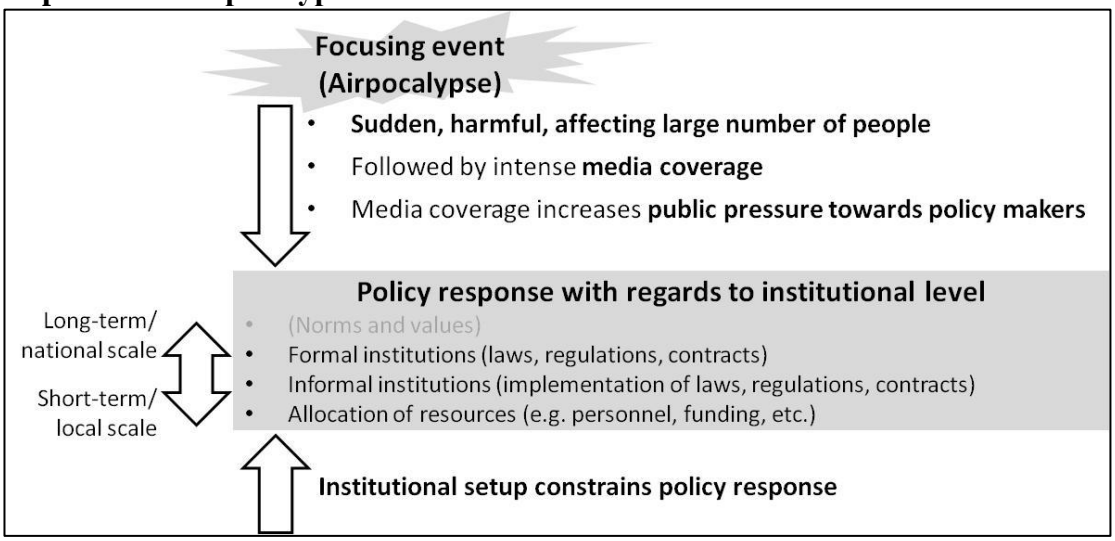
by private bloggers which could compete with traditional media over influence in setting the public agenda. This notion however could not be empirically verified so far. Rather, social media have been found to be reactive to mass media reporting. The influence of private bloggers on the public agenda appeared to be relatively low compared to traditional media (cf. Neuman et al. 2014, p. 194ff; Meraz 2009, p. 701).

Based on the theory of media agenda setting, it can generally be assumed that increased media coverage about a specific issue will expose it to stronger public attention, while the content or topic "spin" does not necessarily influence opinions. The approach of media agenda setting is used in this dissertation to examine the evolution of public awareness on air pollution in Beijing and to the extent to which the "Airpocalypse" may have played a role in shaping the public agenda on the topic of air pollution.

2.4. Research Questions for this Study

Within the framework of the three theoretical approaches of *focusing events*, *new institutional economics* and *media agenda setting*, it is possible to examine the sociopolitical significance of the "Airpocalypse" from diverse perspectives. Combining these concepts, a hypothetical model of causalities can be outlined which guides the structure of this study: As the "Airpocalypse" is examined as a focusing event, it can be assumed that it was followed by intense media coverage and a political response. The manner of political response and its long-term effect thereby depend significantly on the degree of interest which the general public attached to air pollution. Since the "Airpocalypse" supposedly triggered intense media coverage in the aftermath of the event, following the assumption of the media agenda setting theory, public concern about air pollution significantly increased as well, thus putting policy makers under pressure to respond substantially. The manner of policy response and the options available to policy makers however are constrained by the institutional setup of China's air quality management. Additionally, policy responses to the "Airpocalypse" will lead to an alteration of the original institutional setup. Despite the disruptive nature of the "Airpocalypse" as a focusing event, any political response is likely to lead to institutional change in a subsequent and not in an erratic or "revolutionary" manner. Different political responses will alter different institutional levels as defined within NIE, which in turn provides indications about their mid- to long-term significance (Figure 6).

Figure 6: Hypothetical framework of causal relations for shaping policy response to "Airpocalypse"



(Source: Own adaption)

In order to use this theoretical framework in the Chinese context, several factors must be taken into account: First, the Chinese media are subject to a comprehensive system of censorship, in which the government either directly or indirectly determines how and to what intensity the press may cover certain topics. This also applied to a certain degree in the area of air pollution, leading to the question to which extend the traditional media are able cover a focusing event in this domain. Second, the institutional setup of China's governance system allows little room for the general public to influence policy making, putting into question the causality of public pressure and policy response. These aspects are discussed in the context of the respective research papers outlined in the latter sections. From the context outlined above, following main research questions are derived for this study. This question is broken down into three sub questions which guide the research papers:

> What are the sociopolitical implications of the "Airpocalypse" in Beijing in January 2013?
>
> - What is the significance of political responses to the "Airpocalypse"?
> - How (if at all) did the "Airpocalypse" influence public perception on air pollution among Beijing residents?
> - How did the "Airpocalypse" differ from other instances of heavy air pollution in Beijing?

Additionally, as the theoretical approaches outlined above are applied to evaluate these questions, the possibility of combining these approaches in one coherent concept for the research of similar case studies is explored.

3. Methodology and Research Design

The purpose of the empirical material obtained for this study is to enable the reconstruction of the sociopolitical context of the January 2013 air pollution in Beijing and its implications with the aim to paint a picture that is as complete as possible. This aim grants the project an explorative character and therefore a variety of methods in gathering empirical data is applied, including quantitative timeline data, a standardized survey as well as qualitative, semi-standardized interviews. In social research there has been considerable dispute between proponents of qualitative vs. quantitative approaches respectively in terms of feasibility, controllability and suitability to reflect reality. For this study, the view of Gläser and Laudel is adopted, who do not see qualitative and quantitative approaches for gathering empirical data as mutually exclusive, but as meaningful complements to each other (cf. Gläser and Laudel 2009, p. 25).

The combination of empirical data from various sources should be suitable for obtaining a relatively objective view on the causal mechanisms which have been at work during the days of the "Airpocalypse", as well as the main contributing factors. Naturally, in the fields of human geography (or for that matter in social sciences in general), it is virtually impossible to "proof" causal relations or conclusively reflect the "truth", however with the mixture of methods applied for this study, reality can be approached and workable conclusions can be drawn. Information about the interview partners, interview questions, survey questions and results as well as timeline data can be found in Appendix I.

3.1. Quantitative Timeline Data

Timeline data has provided the empirical backing for numerous studies in the fields of media agenda setting, focusing events and also, more specifically, with regards to air pollution trends in China. These include recent papers which are relevant for this dissertation, such as Bishop (2013), Neuman et al. (2014), van de Ven (2014), Kay et al. (2014) and also Ji et al. (2014). These studies used timeline data to display trends and explore correlations between variables over time through visual analysis and cross-referencing.

This simple but useful way of providing an empirical foundation is also applied for this study. Sets of daily average values or respectively daily frequencies are used to

display the development of air quality in Beijing, media reporting on air quality as well as social media discussion over time. The main goals of these timelines is to provide a picture of trends in air quality, media reporting and public discussion, to visualize apparent correlations between those variables and to estimate the extent to which daily frequencies deviated during and after January 2013. Specifically, the following datasets are used:

Air quality: As a proxy for trends of air pollution over time in Beijing, the air quality monitor of the Embassy of the United States to Beijing is used. The U.S. Embassy publishes hourly data as air quality index, which in this case is based on PM 2.5 concentrations. Data from the U.S. Embassy goes back to 2008 and provides the most comprehensive record of historical PM 2.5 readings, making this a useful indicator for trends in air quality in Beijing (cf. Embassy of the United States to China n.d.). The shortcoming of this dataset is that it includes only one station, located at the premise of the embassy in the centre of Beijing, therefore it is not necessarily representative of air quality in Beijing as a whole, let alone the surrounding region.

Media reporting: Intensity of media coverage on the topic of air pollution is measured by the daily frequency of online articles containing the word "air pollution" or respectively the words "air pollution" and "Beijing". These are obtained for the years 2009 to 2013 from the advanced news-search function from Baidu, which is a commonly used online search engine in China.

Public discussion: The intensity of online discussion about air pollution on the Chinese social media platform Weibo is used as an indicator of public concern about air pollution among Beijing residents. For this estimate, daily frequencies of Weibo entries containing the word "air pollution" posted by users from Beijing are used. Data from Weibo offers a relatively high degree of representation since Weibo is one of the largest social media platforms in China with over 60 million daily average user logins as of 2013 (cf. Weibo 2016). Daily average frequencies of Weibo-postings were obtained through the advanced search engine of Weibo. Weibo-data as a proxy of public concern however may provide a picture that is demographically biased towards younger population groups which are more common to use online social media than older generations.

The intensity of media reporting and public discussion measured quantitatively by daily frequencies naturally does not take into account article contents. It is therefore not possible to estimate how the media reports on air pollution or respectively which directions public discussions took on this regard. Based on the premise of media agenda setting however, the media determines for the public not *what* to think, but what to think *about*. From this angle, measuring the intensity of media reporting and Weibo-discussion appears useful for measuring the level of priority that the general public attributes to air pollution.

3.2. Qualitative Interview

For this study, eleven subject experts have been interviewed in open, semi-guided interviews. The purpose of conducting qualitative interviews for this project is threefold: First, expert comments are used to further inform about the existence of causal relationships between air quality, public opinion and media reporting which may be visible in the timeline data. Second, and more importantly, the semi-guided interviews are used to explore the underlying context in which the air pollution in January 2013 occurred and to identify situational factors which differentiated the "Airpocalypse" from other events of severe air pollution. Third, interviewees were directly asked, which, if any, government policy responses could be directly attributed to the "Airpocalypse", as this was a question that could not be answered through quantitative means. Thus, the evidence gathered from qualitative interviews does not only complement existing timeline data, it additionally provides evidence for a subject matter that could not be grasped through quantitative methods and is therefore vital for informing the research and drawing conclusions.

The approach for choice of interview partners, conducting the interviews and evaluating the results is generally based on the approach for the *open interview* as defined by Gläser and Laudel (2009, p. 41ff), who describe expert interviews as a tool for reconstructing specific subject matters in social studies. Methodologically, expert interviews are usually conducted as individual semi-guided or open interviews with little to no standardization, while the set of questions is based on the specific expertise of the interviewee and guided by the desired empirical information (cf. Gläser and Laudel, p. 41ff). The obtained interview data was processed and prepared based on the qualitative content analysis, in which the most relevant interview

passages were extracted from the script and allocated based on the guiding research questions (cf. Gläser and Laudel 2009, p. 44, 46f, 199ff).

The choice of interview partners was diverse: While most came from the sphere of academics and non-governmental organizations (NGO), representatives from foreign government agencies as well as companies active in the branch of environmental technology have been interviewed as well. What all interview partners did have in common, was their professional engagement with the field of environment and Chinese environmental policy, either in medium level or senior positions. Representatives from academic institutions and NGOs in this context have been acting partly as government advisors on environmental policies, while representatives from companies were acting and reacting as organizations within the situational context of a notoriously polluted capital city. With the aim to collect qualified opinions on the significance of the "Airpocalypse", the identification and choice of suitable interview partners was done using the snowball-approach, based on subject expertise, recommendation and accessibility of the interview partner.

The interviews were conducted during the course of 2014 as individual face to face interviews and, for interview partners who stayed outside of Beijing during the time of research, as telephone interviews. The interviews were designed to capture the opinion of the interviewee in its complexity, while comparability between the respective interviews was of low priority. Therefore, interview questions were generally open and the degree of standardization of the interview guideline was low. This approach enabled an adjustment of the interview guideline to the specific and unique expertise of the interviewee. Despite a low degree of standardization, it was nevertheless necessary to provide structure to the interviews and ensure that the it would indeed inform at least part of the research questions for this dissertation. For this purpose, a guideline was designed as a pool of relevant interview questions, which would then be selectively asked to the interviewer to elaborate on. Following the standards for expert interview guidelines outlined in Gläser and Laudel (2009, p. 131ff), the interview questions were formulated to be *open*, *neutral*, *simple* and *clear*, meaning that no predefined answers were given to the interviewees, no indications were made as to which answer would be "right" or for that matter more or less desirable, that each formulated question would contain one single question only and that the formulated questions would be understandable.

Following the research questions of this dissertation, the main set of interview questions is outlined as follows:

- What was the overall significance of the air pollution in January 2013 in Beijing ("Airpocalypse")?
- Which, if any, actions by the central and local governments can be directly attributed as a response to the "Airpocalypse"?
- How will those actions presumably influence pollution control in China?
- What is the difference of the "Airpocalypse" compared to previous events of heavy air pollution in Beijing?
- Why was the situation during the "Airpocalypse" different compared to previous events of heavy air pollution in Beijing?

These main questions do not form a strict interview guideline which was followed through without deviation, but they formulate the desired information that was to be gained from the interviews. The interview situation and expertise of the interviewee in this regard influenced the emphasis of certain questions and their order or asking them.

Based on the approach of qualitative content analysis, the interviews were literally transcribed and, in a second step, the core passages for informing specific guiding questions were identified. These were allocated into a matrix in which the most important interviewee statements were aligned with the guiding questions to which they referred. As the subject of this research possesses a certain political sensitivity in the Chinese context, most interviewed experts asked for anonymity. Thus, interview quotes in the papers are not referenced with the name of the interviewee.

3.3. Standardized Survey

In order to obtain additional insights on how public perception on air pollution has evolved over time and which channels are generally used for information about air pollution, a standardized survey was conducted from July to August 2014 in which six simple questions related to the subject matter were asked to random respondents who resided in Beijing at least since 2013. These included:

1. When did the air pollution problem first come to your attention?
2. Through which channels did you first learn about the air pollution problem?

3. When comparing air pollution to other problems affecting daily life (e.g. food safety, safety on the streets, economic crimes and others...): How do you currently evaluate the importance of air pollution?
4. How did your current opinion on the importance of air pollution change compared to 2012?
5. How do you currently perceive the urgency of addressing air pollution?
6. How did your opinion on the urgency of addressing air pollution change compared to 2012?

A standardized survey providing multiple-choice questions was the method of choice in this case in order to make the obtained data comparable and processible and to derive trends and tendencies among the respondents. Based on Malhotra (2006), the design of multiple choice questions followed the principle of providing answers which were mutually exclusive and completely exhaustive, meaning that the list of multiple-choice answers was to cover the complete range of available options without overlapping each other (cf. Malhotra 2006, p. 86). Furthermore, the survey was deliberately kept brief in order to further increase convenience and likelihood for responding.

The standardized survey was conducted online. Such web-based surveys are a popular tool for relatively simple access to a seemingly unlimited number of respondents. The main strengths of online surveying as a research method includes its reach, high convenience for respondents in terms of inserting and sending data as well as relatively easy data processing and analysis from the perspective of the researcher (cf. Evans and Mathur 2005, p. 198). One main weakness of online surveying includes the risk of the survey and an accompanying message being perceived as junk mail. Also, as Evans and Mathur (2005) rightfully pointed out, the sample of online survey respondents is unlikely to be representative of the population as a whole and skewed towards younger males who are more likely to regularly use the internet compared to other demographic groups (cf. Evans and Mathur 2005, p. 201).

To avoid the risk of being perceived as junk mail, which is also an imperative from the viewpoint of research ethics, the online survey has been distributed via the snow-ball method to persons familiar with the author of this dissertation, who in turn were encouraged to distribute the survey among their associates. Based on this approach, a set of 161 valid responses were collected. The relatively low number of results and

the apparent risk of biased survey demographics towards the younger population limit the representativeness of the survey. Another shortcoming is the fact, that this survey could only be conducted at a given point in time, providing a snapshot of how respondents felt during July and August 2014, with no possibility of comparing with responses from earlier surveys.

Despite these weaknesses, the survey provides a snapshot on the question of how public concern about air pollution may have changed from 2012 to 2014 and how channels such as online news portals and social media played a role in informing the public about the issue.

3.4. Structure of the Research Papers

Based on the context, the theoretical framework and the research methodology outlined above, the core part of this dissertation consists of three research papers which are broken down by topic and specific research questions. While there is a clear separation of the papers based on the research question, the separation by theoretical approach as well as methodology of empirical data collection is less obvious. Since the "Airpocalypse" is the critical event for each of the research papers, Birkland's approach of focusing events is relevant for each paper, while two of the three papers additionally apply the media agenda setting theory and new institutional economics respectively. Two of the research papers apply more than one method for empirical data gathering, while one solely relies on results obtained through qualitative interviews (Table 1).

Table 1: Structure of the research papers with respect to research question, theoretical framework and method for empirical data collection

Name	Research question	Theoretical framework	Method of empirical data collection
The Impact of Periodic Air Pollution Peaks in Beijing on Air Quality Governance in China	Which (if any) political actions can be attributed to the "Airpocalypse"?	- Focusing events (Birkland) - New institutional economics (Williamson)	- Qualitative interview
The Impact of Severe Air Pollution in January 2013 in Beijing on Sustained Elevation of Public Concern about Air Pollution	How (if at all) did the "Airpocalypse" influence public perception on air pollution among Beijing residents?	- Focusing events (Birkland) - Media agenda setting (McCombs and Shaw)	- Timeline analysis - Standardized survey
Policy Response to Focusing Events and its Enabling Factors - A Case Study of Government Response to Extreme Air Pollution in Beijing in January 2013	How did the "Airpocalypse" differ from other instances of heavy air pollution in Beijing?	- Focusing events (Birkland)	- Timeline analysis - Qualitative interview

The research papers for this study are outlined in the following three sections.

4. The Impact of Periodic Air Pollution Peaks in Beijing on Air Quality Governance in China

Schwabe, J.; Hassler, M. (2016): The impact of periodic air pollution peaks in Beijing on air quality governance in China. in: Die Erde Vol. 147 No. 1/2016

4.1. Abstract

During the month of January 2013, Beijing suffered air pollution of unprecedented intensity. This event, which was named "Airpocalypse" in international media, was followed by vibrant media reporting and public discussion on the topic and prompted the central government to issue unusually ambitious measures to contain air pollution more effectively. This paper explores the impact of the "Airpocalypse" on China's air quality governance by conducting a qualitative analysis of pollution control policies that followed the "Airpocalypse" and concludes that this event of heavy air pollution was indeed impactful in causing the issuance of stricter national targets for pollution control as well as increased public awareness. In combination with the newly amended environmental protection law, these aspects put local governments under intense pressure to address air pollution more effectively. However, the changes caused by the "Airpocalypse" were not revolutionary in a sense that it led to major structural reforms of government institutions and their interrelationships. The case of the "Airpocalypse" demonstrates that single disruptive events of heavy pollution can cause a recalibration of policy priorities. In this context, the role of “disruptive events” may be worthwhile of more systematic research in order to understand their potential impact on institutional environments.

4.2. Introduction

China's rapid economic development since the 1980s lifted large parts of the population out of poverty, but it also led to serious environmental degradation. The most visible environmental hazard is severe air pollution, which causes an estimated annual damage of 100 billion to over 300 billion US-Dollars in health care costs and lost labor (cf. World Bank et al. 2014, p. 25). The north China plain, consisting of the provinces Hebei, Henan, Shandong, Shanxi as well as the cities of Beijing and Tianjin is particularly affected by air pollution, which is mainly due to the region’s strong reliance on energy consuming heavy industries and growing vehicle numbers

(cf. IPE et al. 2014, p. 25). Discussion on air pollution in China commonly refers to the concentration of particulate matter with less than 2.5 micrometers in diameter (PM2.5), which is identified as particularly unhealthy for the human body (cf. WHO 2013, p. 6ff). Suspended PM2.5 can be traced back to primary industrial and vehicle exhaust as well as atmospheric photochemical reactions from emitted polluting gases like ozone, sulfites and nitrates (cf. Yu et al. 2013, p. 574, 581). Average PM2.5 concentrations in the Beijing/Tianjin/Hebei-region in 2013 reached 106µg/m³ (cf. MEP 2014), far above the annual average of 10µg/m³ which the World Health Organization recommends as a safe level (cf. WHO 2005, p. 10).

Chinese government authorities have long hesitated to acknowledge openly the seriousness of the problem. Government priority on economic growth, employment and the expansion of affordable infrastructure trumped considerations of environment protection and resource efficiency (cf. Ran 2013, p. 34f). As a result, policies, laws and regulations regarding air pollution control have suffered under notoriously weak enforcement. However, anecdotal evidence suggests that an event of heavy air pollution in Beijing in January 2013 may have changed the way how the central government perceives the challenge of air pollution. Following this event, which international media referred to as "Airpocalypse" (and hereinafter will be referred to with the same denomination), the general public and Chinese media discussed air pollution with unprecedented intensity. The central government reacted by issuing an unusually ambitious action plan for reducing PM2.5 concentration with potentially wide implications for central and local government actions regarding air pollution control.

This paper explores if and how the event of the January 2013 "Airpocalypse" in Beijing caused a recalibration of China's development priorities and an alteration of the institutional setup in China's management of air quality. For this study, Williamson's concept of New Institutional Economics serves as an analytic framework to examine subsequent government actions related to air quality management. In more general terms, the paper examines the effects of specific regional climate parameters on the evolution of local and national policies and institutions. Therefore, from the perspective of a geographer, the paper specifically draws upon the disciplines of climate- and political geography.

To estimate the relevance of policies related to air quality management and their correlation with the event of the "Airpocalypse", empirical evidence was gathered from eleven in-depth interviews with representatives of Chinese and international academia, governmental and non-governmental institutions conducted during the course of 2014. Semi-guided interviews were the method of choice for this explorative study, as the author aimed to gather in-depth opinions from various perspectives. This aim called for a non-standardized interview-design which could be customized to the background and expertise of the respective interviewee. To ensure a certain degree of comparability between interviewee-statements, interviews were led around a set of guiding questions:

- Which, if any, government action related to air quality management were either influenced or triggered by the "Airpocalypse"?
- What is the significance of those government actions on the effectiveness of air quality protection?
- What is the role of public and media discussion in the process?

Supplementing these interviews, quantitative empirical data on public discussion on air pollution was obtained through key word-counts on the Chinese social media platform Weibo and the search engine Baidu.

This paper aims to expand the understanding of the significance and disruptive potential of extreme events for the evolution of governance institutions, using the severe air pollution of January 2013 in Beijing as a case.

4.3. Conceptual Framework

4.3.1. New Institutional Economics

For the analysis of this paper, the concept of New Institutional Economics (NIE), first formulated by Williamson (1975), is used as a framework. NIE puts the institutions that govern and manage a society at the center of analysis. Based on Williamson (2000) and Richter (2005), the main legitimacy of NIE comes from highlighting the importance of values, formal governance structures and actual policy implementation in order to understand 1) decision making of organizations and individuals, 2) drivers and constraints for institutional change and 3) trajectories for future developments (cf. Williamson 2000, p. 595f; Richter 2005, p. 5-8).

"Institutions" are thereby defined according to North (1990) as "the rules of the game in a society or, more formally, [...] the humanly devised constraints that shape human interaction" (cf. North 1990, p. 3). Based on this definition, institutions provide the framework of formal and informal rules according to which individuals and organizations interact with each other. Consequently, "institutions" are to be distinguished from "organizations" which also provide a frame for human interaction, but, unlike institutions, in the form of political, social, economic and educational bodies that allocate individuals around a common purpose (cf. North 1990, p. 4).

By putting institutions at its core, NIE provides a framework that complements and goes beyond the quantitative and predictive approach of neoclassical theories, which do not grasp the complexity of formal and informal institutions as potential drivers or constraints of change (cf. Richter 2005, p.7). The concept of institutional change is commonly applied in anthropogeography to analyze variations of development across regions (cf. North 1991, p. 98ff; Rafiqui 2009, p. 335).

Within NIE, it is argued, that institutions constrain socioeconomic and political development and therefore are key in determining future development paths of societies (cf. Andrews-Speed 2010, p. 7). Institutional change (whether societal, political or economic) is thereby considered to generally happen in an evolutionary, incremental way through constant adaption on different levels - and not as a sudden, erratic event (cf. Rafiqui 2009, p. 341; North 1991, p. 97). North explicates that "changes at the margin can be a consequence of changes in rules, informal constraints and in kinds and effectiveness of enforcement" (cf. North 1990, p. 6). In other words, institutional change is generally constrained by preexisting structures that define a certain development path from which an entity is usually unable to completely deviate in a sudden or "revolutionary" manner.

Relating to this school of thought, Williamson (2000) drew four levels of analysis that form a linear hierarchy within which the level above constraints the level below, indicating that the upper level exerts greater influence in shaping the lower level than vise-versa (cf. Williamson 2000, p. 596, see Figure 7).

Level one stands for the macro-level values, norms and traditions, which broadly define interaction patterns in a society and directly shape its institutional structures (level two). Parameters of level one change slowly, within a matter of millennia or centuries (cf. Williamson 2000, p. 596).

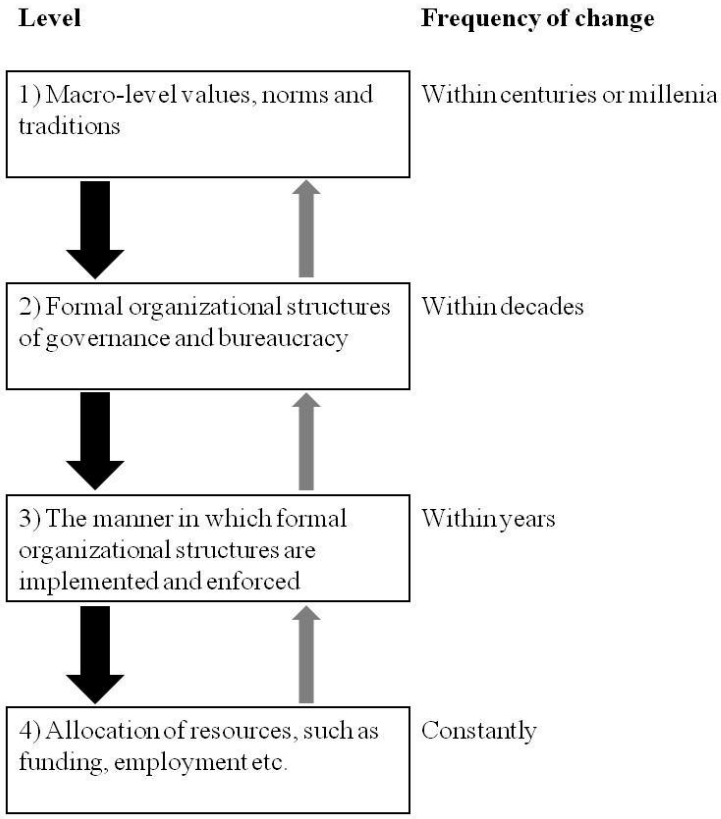
Level two defines the formal organizational structures of governance and bureaucracy such as laws and regulations, to which Williamson (2000) refers to as "the rules of the game". Changes in these structures can be forced, e.g. through revolution or civil war, or in an evolving manner such as through reforms or renewed contractual relationships (cf. Williamson 2000, p. 598).

Level three addresses the manner in which formal organizational structures are implemented and enforced, and is referred to by Williamson (2000) as the "play of the game". Interactions on this level take formal as well as informal structures and unwritten rules into account which shape the actual patterns of how organizations and individuals interact with each other (cf. Williamson 2000, p. 599).

Finally, the fourth level addresses individual behavior and continuously changing resource allocations based on surrounding conditions shaped by the upper levels. These include employment, pricing decisions, allocation of individual tasks etc. and can be subject to neoclassical analysis (cf. Williamson 2000, p. 600).

While Williamson acknowledges that in reality all levels are at least somewhat intertwined with blurry borders, this framework provides a useful context for analyzing the effects of the "Airpocalypse" on different categories of Chinese air quality governance.

Figure 7: Four institutional levels (thick arrow indcates greater influence)



(Source: Williamson 2000, p. 597)

4.3.2. China's Governance Institutions

Based on the concept of NIE, the institutional levels of China's governance can be characterized as follows:

Regarding overarching norms (level one), the Chinese society is traditionally hierarchical, prioritizing conformity over individual development. Interactions between individuals and organizations tend to be shaped by personal relationships ("Guanxi") rather than formalized regulations (cf. Andrews-Speed 2010, p. 17). Guanxi is the predominant pattern that shapes interaction and tends to be more complex than what would be commonly understood under the term "friendship" or "relationship". The underlying motivation of individuals of maintaining Guanxi to peers, subordinates and superiors include self interest, ceremonial and moral obligations, as well as emotional bonding. These dimensions of Guanxi tend to be strongly intertwined and serve the purposes of gaining advantage through the exchange of favors and of establishing harmonious relationships (cf. Guo 2001, p. 71).

Besides the emphasis on "Guanxi", another important notion is the prevailing tension of central authority vs. local autonomy. Traditionally China has shown little tolerance for diverse centers of power beside the central government (or respectively the imperial court). On the other hand, due to the size of the country, the central level has always been forced to leave local affairs to be dealt with by local representatives, creating a potential field of tension between central- and local level governance (cf. Andrews-Speed 2010, p. 17).

On level two, formal institutions of the Chinese state appear fragmented, with diffused structures of decision making and authority (cf. Howell 2006, p. 291). The county level of governance has obtained a high degree of influence in policy implementation. Vertical and horizontal relationships between state bodies tend to be a result of negotiations and have rarely been defined by law (cf. Andrews-Speed 2010, p. 17). Besides government bodies on different levels, state owned enterprises (SOEs) have emerged as powerful actors which can shape policy making. SOEs exercise a high degree of control in strategic sectors of the Chinese economy and, on the top management level, are strongly intertwined with government bodies (cf. Andrews-Speed 2010, p. 26; Downs 2008, p. 1). According to Andrews-Speed, the Chinese Communist Party appears as the unifying force within this fragmented environment of powerful stakeholders, as structures of government bodies and SOEs are echoed by parallel structures of the party, ensuring the influence of the communist party towards any stakeholder involved in shaping governance in China (cf. Andrews-Speed 2010, p. 26f).

As a result of the paramount importance of informal relationships and organizational interactions, policy implementation (level three) is highly dependent on personalities of leading officials. Policies, implementation and cross-organizational relationships are defined based on negotiations in which all parties aim to reach a consensus. In the case of unresolved conflict, the decision will be left for the respectively higher level to make. This practice leads to a piling up of unresolved decisions to be managed by upper level government bodies and, eventually by the State Council, China's highest ranking governance body. Another result of this practice is a high degree of competition and low cooperation between organizations, as well as intransparency about how competencies are divided. These patterns are referred to by Howell as "hyper-rivalistic" which leave different state bodies to be competing with each other on a sectoral and regional basis (cf. Howell 2006, p. 291).

In this environment, the central level leadership's role is to provide broad development guidelines, while details of implementation are left to local authorities. Specific policy initiatives are formulated by the central level only in rare events. Division among stakeholders, unclear guidelines and the perception that a central level policy initiative may not be of high priority leads to widespread non-compliance of central government guidelines on the local level (cf. Andrews-Speed 2010, p. 29f).

The individual behaviors, allocations of budget and other resources as well as determination of prices (level four) are a result of the environment constituted by the upper levels and subject to constant adjustment. Regarding governance in China, this means that local governments have a high degree of autonomy in terms of how they allocate and determine budget, personnel and local level incentive policies. These allocations by local governments are determined by upper-level incentives and personal interrelationships on the local level (cf. Howell 2006, p. 283f).

Analysis of institutional change are mainly concerned with levels two and three (the formal institutional setup and the manner of implementation; Williamson 2000, p. 596), which are also relevant for this paper. Levels one and four will therefore be neglected in the following.

4.3.3. "Extreme Events" and other Drivers and Inhibitors of Policy Change

New Institutional Economics provides a framework that can help identifying determinants which either inhibit or accelerate policy change. These factors can be embedded in the institutional environment itself, such as strong vested interests among key decision makers (which could inhibit change) or an obvious failure of previous policies, conflicting interests as well as incompatibility and friction between institutions (which could favor change). An exogenous force for policy change can be constituted by a disruptive event (cf. Andrews-Speed 2010, p. 10). As Andrews-Speed explicates: "Events, trends or other changes may provide the necessary rational or impetus to persuade a government to enforce a long-contemplated change. [...] These events, trends or changes may be political, economic, social or even physical in nature, and may be domestic or foreign." (cf. Andrews-Speed 2010, p. 10).

To further frame the event of the “Airpocalypse”, this paper borrows from two definitions provided by Wilson et al. (2010) and Birkland (1997) respectively: In a study about organizational strategic decision making amidst "extreme events", Wilson defined such events as “determined within organizational context; characteristically unprecedented or unplanned occurrences that impact upon business as usual through the disruption or destruction of key resources.” (cf. Wilson et al. 2010, p. 15). Birkland provides a useful supplement to this notion when describing what he called a “focusing event” as a sudden, rare and harmful occasion, that is known to policy makers and the general public simultaneously and affects a large number of people (cf. Birkland 1997, p. 2). The consequences of such events include immediate and intense media coverage that peaks within weeks after the event as well as long-term reactions by policy makers (cf. Birkland 1997, p. 29ff).

The potential of such an event to instill a change in policy agenda is due to the sudden and intense generation of media and public interest in a certain issue, that in turn pressures policy makers to reexamine their priorities. This logic contrasts the concept of institutional change within which sudden disruptions are uncommon.

This study explores the possibility of the "Airpocalypse" being a disruptive event that may have triggered institutional change with respect to the formal setup as well as implementation of China's policies related to air pollution control. The institutional setup of China's air quality governance is briefly outlined in the following.

4.4. Institutional Setup of China’s Air Quality Management

4.4.1. Level Two: Formal Institutions

Like most other domestic policy areas, the legal framework and the Five Year-Plan cycle respectively define the boundaries as well as the overall development direction of China's air quality management. As air pollution is an issue for a variety of industries and concerns economic development, environmental protection and climate change, the number of stakeholders involved in managing air pollution is high and the system of governing air quality generally fragmented.

Laws relevant to air quality emerged since the end of the 1980s, with the Environmental Protection Law (环境保护法) and the Air Pollution Prevention and Control Law (大气污染防治法), which are in force since 1989 and 1995 respectively. These laws call for the establishment of pollution discharge standards

and fees, environmental impact assessments for large projects as well as pollution monitoring based on standardized procedures. Also, fines for unlawful pollution are introduced and polluting actors are declared legally liable for submitting emission data reports. Competencies and obligations have been somewhat defined in the Air Pollution Prevention and Control Law, which tasks the State Council to incorporate atmospheric protection into the national Five Year-Plans and puts the Ministry of Environmental Protection in charge of specifying environmental regulations, while local governments are responsible for enforcement (cf. The Central People's Government of the People's Republic of China 2012; IGES 2014, p. 13ff).

Five Year-Plans (FYP) set the overall agenda for China's development over their respective period. These plans specify targets for economic and social development that are broken down by region and sector in complementary plans. Air quality related targets have been published since the 9th FYP (1996 to 2000). The successive FYPs mainly targeted emissions of specific industrial pollutants by formulating emission reduction goals (cf. Xue et al. 2013, p. 273f). Targets directly related to urban air quality were initially set in the 10th and 11th Five Year-Plans (cf. SEPA n.d.; MEP 2008a, p.6). The 12th Five Year-Plan (2011 to 2015) for the first time introduced quantitative targets for the reduction of PM10 and PM2.5 concentration, which was to be reduced by 10% and, depending on the region, by 5% to 15% respectively. Another novelty of the 12th FYP is the prioritization of major regions for air pollution control, namely Beijing/Tianjin/Hebei, the Yangtze River Delta and the Pearl River Delta (cf. MEP 2012, p. 23).

The key tool of the central government to align local government policies with FYP priorities is a list of **key performance indicators** (KPI), which link the achievement of targets to the promotion (or penalty) of local government officials. Targets featured in these KPIs are distinguished as "hard" high priority targets, or "ordinary" targets which are desirable but of lower priority. The specified binding targets are the essential orientation based on which local governments lay out their policies (cf. van Acken and Lewis 2014, p. 22f). Over the periods of the 10th and 11th FYP, this system has been strongly biased towards GDP growth, for which a set of binding targets were specified, while goals for environmental protection were defined as non-binding, causing local governments to prioritize the latter and go so far as to cover unlawful pollution within their premise in order to fulfill economic development goals (cf. Ran 2013, p. 7ff).

Central government bodies dealing with air quality issues mainly include the State Council, the National Development and Reform Commission (NDRC) and the Ministry of Environmental Protection (MEP): The State Council, headed by the prime minister, is the highest ranking body for policy implementation in China and determines high level development priorities. It approves the national Five Year-Plans and occasionally issues high level plans and targets (cf. Williams 2009, p. 20f). The NDRC is responsible for developing the Five Year-Plans and as such formulates targets and policy measures related to environmental protection and air quality improvement. The MEP issues environmental regulations and standards for industry, transport and other sectors and is in charge of overseeing their implementation (cf. MEP 2008; Williams 2009, p. 21f). Besides these major stakeholders, several ministries are at least indirectly involved in China's air quality governance by influencing energy and resource management, including the Ministry of Industry and Information Technology the Ministry of Housing and Urban-Rural Development and others (cf. IGES 2014, p. 25ff).

Local governments are generally tasked with implementing FYP targets within their area of jurisdiction and local Environmental Protection Bureaus (EPB) are responsible for overseeing and ensuring compliance with environmental regulations and penalize offenders if necessary. Local EPBs are branches of the Ministry of Environmental Protection and report to their upper level peers, however, they depend on the respective local government in terms of funding, promotions, staffing and resource allocations, creating a conflict of interest between the cause of environmental protection and local government priority to maximize economic development (cf. IGES 2014, p. 23ff).

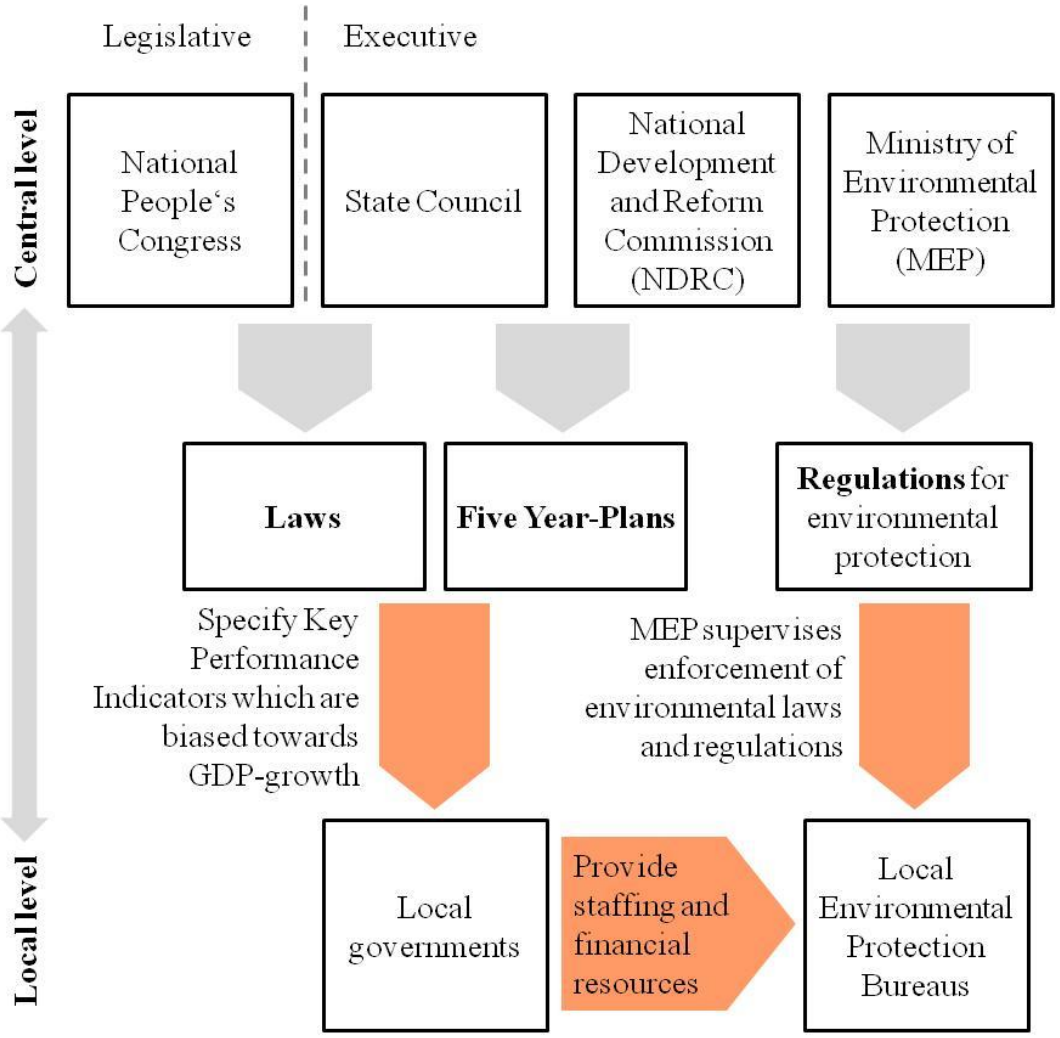
4.4.2. Level Three: Policy Implementation

While the legal framework on environmental protection in terms of regulations and standards has been relatively developed, Beyer (2006) points out that "China's law regime has not been able to control the further deterioration of the environment" (cf. Beyer 2006, p. 209). Law enforcement has traditionally been weak and the central government has not been able to fully enforce environmental regulations on a local level (cf. Beyer 2006, p. 207). Due to their dependency on local governments, in terms of budget and personnel, EPBs oftentimes find themselves incapable of enforcing environmental regulations, without counteracting the local government priority of pursuing GDP growth (cf. Williams 2009, p. 22). In addition, as of the

time of writing this paper, fines for environmental pollution were limited to a one-time payment of RMB 10,000 (equivalent to about EUR 1,200) - far too low for incentivizing industries to comply, since expenses for installing and operating pollution control systems are much higher (cf. Tiezzi 2014). Consequently, industrial enterprises would rather pay the fine instead of investing in pollution control. The provision of false emission data to indicate compliance is another symptom of weak legal implementation and enforcement mechanisms (cf. Ran 2013, p. 25).

The system of key performance indicators itself is implemented inconsistently, depending on geography and personal relationship of an evaluated cadre with his or her supervisor. As van Acken (2014) points out, performance evaluation only distinguishes between passing or failing, regardless of how a specific goal has been achieved. The KPIs are usually easy to pass for an official and afterwards promotion mainly depends on personal relationships (cf. van Acken 2013, p. 127f). Easy achievement of binding targets is due to a reporting system that lacks independent control: Local and provincial officials are usually involved in the process of specifying their own targets and the actual achievement of quantitative targets are evaluated based on statistics which are produced under the supervision of the very officials that are being examined. False reporting and modification of statistics emerged as a resulting practice to ensure that binding targets would be achieved with a passing score (cf. Ran 2013, p. 25; see Figure 8).

Figure 8: Institutions of China's Air Quality Management at the Time of the "Airpocalypse" (red arrows indicate conflict of interest)



(Source: own adaption based on IGES 2014, p. 21ff)

The core reason of the shortcomings in environmental policy implementation lies in the low priority that environmental protection has been given compared to economic growth. Below I will explore the impact of the "Airpocalypse" on the institutional environment outlined. The government responses to this event and their potential impact are described in the following section.

4.5. Evolvement of Government Targets and the Legal Framework following the "Airpocalypse" in 2013 and 2014

4.5.1. The "Airpocalypse"

The problem of air pollution in Beijing has been known internationally at least since the 2008 Olympic games, but reporting on air pollution in China has been suppressed, with little discussion about the subject taking place in the media (cf. Mol 2010, p.

521f). This apparently changed after the happening of the “Airpocalypse” in January 2013, which featured historically severe air pollution in Beijing and its surrounding region. PM2.5 concentrations on January 12 averaged 569µg/m³, which lies even beyond the Air Quality Index classification of "Hazardous" and is almost 24 times higher than the daily average concentration of 25µg/m³, as recommended by the World Health Organization (cf. WHO 2005, p. 5; Embassy of the United States to China n.d.). This heavy air pollution persisted during most of January, making this the most polluted month in recorded history to date, based on daily average PM2.5 concentration (ibid). This event evidently triggered widespread media reporting and public discussion: Compared with the months preceding the “Airpocalypse”, messages on the Chinese social media platform Weibo which contained the word "Air Pollution" ("空气污染") rose by a factor of more than 240 by January 13 (own analysis based on Weibo advanced search function). The event made it into headline articles of international media and the daily output of online articles of the Chinese news agency Xinhua featuring the words "air pollution" in their headline peaked at over 60 on January 14, more than six times higher than the daily average during 2012 (own analysis based on Baidu News advanced search function). The social media discussions caused by the "Airpocalypse" was not only higher than during previous events of severe air pollution, but for the first time, this event was extensively covered in national media (cf. Kay et al. 2014, p. 5). Evidently, the government needed to react. An interview partner who formerly worked as a policy consultant on transport sector emissions summarized the disruptive nature of the "Airpocalypse" as follows: "The January 2013 'Airpocalypse' was huge. It was transformative. You can really not overstate how it changed China’s priorities. If there is one tipping point that changed the government’s attitude, it would be the 'Airpocalypse'. This could be a shift towards longer term more sustainbale solutions." Another conversation partner from the domain of city planning confirmed this view: "Of course, it was the government coming to a point where it just couldn’t not do anything anymore. It [the 'Airpocaypse'] was a public pressure situation. It was a transition.”

4.5.2. Government Response to the "Airpocalypse"

Government reactions caused by this event can be distinguished between short term actionism and adjustments of mid-term air quality targets: Shortly after the days of the "Airpocalypse", the central government and the city of Beijing reacted by issuing numerous announcements, most of which were related to standards for vehicle

emissions and other technical regulations for pollution prevention. Also, statements about the reasons of the current severe air pollution and calls for action by high ranking politicians were published, including a Statement of Li Keqiang (vice premier at the time), saying that solving the air pollution problem is a long term process, but action must be taken (cf. Wagner 2013; MEP 2013). A policy consultant commented on these responses that "the immediate regulatory reaction [to the "Airpocalypse"] are things that the government just had not quite pushed enough on the top level that it now could push over the finish line". A call of the state council for the implementation of cleaner fuel and diesel emission standards is an example of this (cf. ICCT 2014).

In September 2013, eight months after the "Airpocalypse", the State Council issued the "Action Plan on Air Pollution Prevention and Control" (in the following referred to as the "Action Plan") and published significantly stronger targets compared to those outlined within the 12th Five Year-Plan framework: For the three prioritized major regions, Beijing/Tianjin/Hebei, the Yangtze river delta and the pearl river delta, annual average PM2.5 concentrations are to be reduced by 25%, 20% and 15% respectively until 2017 based on 2012 levels. This plan reemphasized some of the strategies which the government already followed before, such as industrial restructuring and transformation of the energy mix. Other guidelines included the installation of pollution monitoring systems, development of regional cooperation mechanisms and an improvement of the legal framework (cf. State Council 2013).

This nationwide adjustment of air quality targets was preceded by an air pollution reduction plan for Beijing which was issued in September 2, 2013. It is the most detailed plan to date to outline the city's air pollution reduction efforts from 2013 to 2017: The city specified a binding target for average PM2.5 concentration to reach 60µg/m³ by 2017 (cf. Beijing Municipal Government 2013). This amounts to almost 33% reduction compared to the officially reported PM2.5 concentration from 2013 of 89µg/m³ (cf. Beijing EPB 2014). Considering the stagnant PM2.5 concentration levels during the five years preceding 2014 (which ranged between 91µg/m³ and 105µg/m³ according to U.S.-Embassy data), this target seems extremely ambitious. The plan announced 85 specific measures to reduce pollution, addressing the transport sector, the public heating system, replacement of coal fired power plants as well as supposedly minor items like street barbecues. For each of these measures the plan specified the department and even person responsible for implementation (cf.

Beijing Municipal Government 2013). Following up on this plan, in January 2014, the Beijing Municipal People's congress approved a law that makes measures for reducing environmental pollution for the first time legally binding and increases fines for non-compliance with environmental standards (cf. NPC 2014).

Beijing's plan is unmatched regarding the ambition of the air quality target and the level of detail it provides. The true significance, however, lies within the verifiability: In earlier years, the government of Beijing has been suspected of artificially lowering its average air pollution index[i] data in order to meet air quality targets of the 11th FYP by selectively excluding values from stations in heavily polluted central areas (cf. Andrews 2011). The combination of publicly accessible data of the U.S.-Embassy as an independent source and the binding PM2.5 concentration target for 2017 will make it impossible to manipulate data to artificially meet targets. This in turn creates significant pressure on the Beijing municipal government to take effective action.

The timing of issuing these plans suggest that they have in fact been a response specifically to the "Airpocalypse" and may not have been published the same way had there not been this degree of pollution and discussion in January 2013. The Chinese governments on all levels usually center their actions around Five Year-Plan cycles and the 12th Five Year-Plan on Pollution Prevention and Control in Major Regions has only been released to the public in December 2012, one month before the "Airpocalypse" ran its course. It is unusual for the government to publish yet another plan that refers to the very same kind of targets within a timeline that to a large part overlaps with the period of the valid Five Year-Plan. Interview partners confirmed this view and highlighted that the Beijing municipal government has been put under particular pressure by the central government: "A lot of the environmental drivers had been in the Five Year-Plans. But what happened in September is like a mutified five year plan which goes until 2017 and is all about PM2.5. [...] Beijing only wanted a relative target, which is more 'gameable', but the State Council made Beijing commit to PM2.5 of 60µg/m³. Now it is very difficult for the government to hide if they miss the target" (interview with government consultant). A conversation partner from the Chinese academic sector stated that the central government

[i] The Air Pollution Index published PM10, Nitrogen Oxide and Sulfur Dioxide readings and was the official Chinese indicator for the health risk of air pollution between 2000 and 2013 (MEP n.d.). It did not incorporate PM2.5, making the index prone to criticism.

particularly pressures governments of the Beijing/Tianjin/Hebei-region to control air pollution, while the other key regions (Pearl River Delta and Yangtze River Delta) are under less scrutiny. Jeremy Schreifels, independent consultant on air pollution reduction policies associated with the Tsinghua University confirmed the causality of the "Airpocalypse" and the adjustment of government targets when asked the question: "Short answer: Yes. However, it is more complicated. I think the political pressure was brewing for several years and the 'Airpocalypse' was the event that caused everything to boil over. Much of the analysis for the plan had been done in 2012, but the 'Airpocalypse' opened the door for getting the necessary political approvals to implement the plan". This view is in line with other interview comments which suggested, that the “Airpocalypse” enabled certain policies to be “pushed through” against vested interests.

The Action Plan on Air Pollution Prevention and Control was complemented by an update of official key performance indicators towards a stronger emphasis of environmental protection. In June 2014, the State Council for the first time published a list of criteria, which is to be included into provincial and city-level official KPIs of the Beijing/Tianjin/Hebei-region, the Yangtze river delta, the Pearl river delta and several other provinces. This KPI update heavily emphasizes PM2.5 reduction and features a list of measures like eliminating industrial overcapacity, removing high polluting vehicles, promoting industrial energy efficiency and eliminating redundant production as measures by which officials will be evaluated (cf. State Council 2014a).

4.5.3. Amendment of the Environmental Protection Law

In March 2014, the Chinese environmental law was revised for the first time in its existence since 1989. This amendment was not a direct response to the "Airpocalypse", as it had been under discussion for several years. However, according to an interview comment from a representative of a non-government organization consulting the Chinese government on legal matters, several aspects of the amended law, e.g. on information disclosure and regional coordination may have been included as a consequence of the event. In order to understand the significance of aforementioned Action Plan, the most relevant amendments shall be briefly introduced. Generally, the updates attempt to correct some of the major weaknesses regarding official accountability, data disclosure and pollution fines as described above. Some of the most significant changes include:

1) The amended law requires environment protection to be incorporated in the local cadre evaluation system as "key criteria" and the public disclosure of evaluation results.

2) Officials are personally accountable and may be removed from their post for acts such as covering up illegal activities, approving construction projects without proper environmental impact assessment, failing to act upon unlawful pollution, or falsifying data.

3) Registered non-governmental organizations are explicitly entitled to file lawsuits against unlawful polluters for public interest.

4) Entities which violate environmental regulations can be fined on an ongoing daily basis as long as the violation persists (cf. State Council 2014).

Several scholars on environmental law see these amendments as a potential milestone for the stricter enforcement of environmental protection. Finamore (2014) calls these updates a "game changer", that would provide the Ministry of Environmental Protection with greater authority to exercise punitive measures for non-compliance with environmental standards (cf. Finamore 2014). The amended law on environmental protection has been approved by the National People's congress in May 2014 and is in force as of January 1st, 2015 (cf. State Council 2014). The impact of this law will however depend on its implementation, which for the time being remains an open question.

4.6. Impacts of the "Airpocalypse" on China's Institutional Framework in Air Quality Management

Relating back to the analytical framework outlined above, the question remains how the “Airpocalypse” may have directly or indirectly led to an alteration of China’s institutional setup regarding air quality management. Was the "Airpocalypse" after all a disruptive event that triggered institutional transformation within a governance system that otherwise is reluctant to change? And what are possible mid-term implications of this?

First of all, it can be concluded that the "Airpocalypse" did qualify as an "extreme event" or “focusing event” by the criteria defined respectively by Wilson et al. (2010) and Birkland (1997):

1) It was inarguably a sudden and harmful occasion, which affected a large number of people;
2) it was followed by intense media reporting and increased public scrutiny on the issue;
3) the central government evidently determined that this event needed to be directly and strongly responded to;
4) the event was unplanned and unprecedented regarding the duration of heavy air pollution and intensity of public discussion;
5) it did interrupt business as usual, as it forced the government to respond to an increasingly concerned public (besides numerous hospitalizations, the "Airpocalypse" did not lead to a physical disruption or destruction of resources in its traditional sense, however).

Discussing the changes through the lense of New Institutional Economics, the evidence outlined in this analysis indicates that the "Airpocalypse" either directly or indirectly caused transformations in the formal institutional setup (level two - the "rules of the game" (cf. Williamson 2000, p. 597) as well as the way how stakeholders implement policies (level three, the "play of the game"; ibid). From this perspective, the role of the Action Plan for Air Pollution Prevention and Control, which is arguably the most impactful reaction caused by the "Airpocalypse", is evaluated for both institutional levels.

4.6.1. Impact on Level Two: Formal Institutions

The main implication of the "Action Plan" on China's formal institutional structure governing air quality is that it mandates governments on all levels to readjust their development priority in a way they might not have foreseen prior to the "Airpocalypse": The increased PM2.5 reduction targets were accompanied by a more comprehensive set of goals such as control of coal use, reduction of steel production capacity and the accelerated adoption of renewable power generation etc. (cf. State Council 2013). These central government targets issued by the State Council trickle down to province and local level governments as well as central government ministries which are prompted to comply with the new set of goals. China's regions are affected by this to varying degrees, with the region of Beijing, Tianjin and Hebei being under highest pressure of adjustment. This overall notion is likely to be

reinforced by the updated key performance indicators and the amended environmental protection law. Depending on its enforcement, the amended law can increase accountability and elevate the observing role of the civil society and thus significantly add pressure to local governments towards stronger compliance. In addition, with the authority to impose fines on a daily basis, local EPBs will be equipped with stronger leverage to discourage industries from breaching pollution discharge standards.

These alterations in the institutional framework are impactful insofar as they can build the necessary pressure and incentive to accelerate environmental protection across all relevant stakeholders. However, some core issues of the institutional setup are likely to remain challenges in the future: These include fragmented responsibilities and conflicting interests between pollution reduction on one side and avoiding impacts on local industries, employment and tax revenue on the other side. Local environmental protection bureaus remain dependent on governments of their respective municipality and the weighting of the published set of environmental KPIs against KPIs related to economic development remains unclear for the time being. A representative of an environmental technology company summed up: "Some targets were accelerated. Now they do retrofits a bit earlier and they shut down [steel and cement] overcapacity a bit earlier and try to control corruption more tightly. But there has not been a tectonic shift in policy."

4.6.2. Impact on Level Three: Policy Implementation

The potential influence of the "Airpocalypse" on the way how policies are implemented (level three of NIE) is linked to aforementioned institutional changes. Generally speaking, all actors will likely be prompted to stronger prioritize air pollution control within their daily operations. Non-compliance with environmental regulations and achievement of FYP targets based on falsified data could be increasingly difficult for local governments and industries.

The direct impact of the "Airpocalpyse" in this regard is that it elevated attention of the State Council as well as the general public to the problem, pressuring local governments from both sides to more effectively address pollution. Kay et al. (2014, p.3) point out, that there is a strategic aspect to the central government delegating responsibility to lower government levels, which allow the central level to reduce attacking points for public discontent. The improvement of air quality in the three

key regions outlined in the Action Plan, and in the Beijing/Tianjin/Hebei-region in particular, has arguably become a priority for the central level leadership. In other words, on the top, there now seems to be a stronger will to address pollution more effectively and it seems that the tolerance for neglecting environmental regulations in favor of economic growth is diminishing. The same may be true for the general public: Social media discussion patterns indicate that during the period between 2012 and 2014 the public concern about air pollution in Beijing was elevated to a point that the government had to respond to in order to ensure social stability. Facing increased pressure to address the inter-regional problem of air pollution, a conversation partner from an international non-governmental organization stated that regional coordination efforts have been intensified as a result of the "Airpocalypse", with governments from the Beijing/Tianjin/Hebei-region having formed a joint committee to coordinate strategies for pollution reduction.

The addition in KPIs could be a significant correction towards implementing pollution reduction at the local level, but the unclear weighting towards economic targets makes it hard to evaluate their potential impact. The new KPIs put a heavy emphasis on PM2.5 reduction and could therefore incentivize local officials to stronger prioritize this area. As an interviewee from international academia pointed out: "[This KPIs update is] significant insofar as it makes implementation more likely by providing specific steps. This scorecard is important insofar as it solidifies and gives a roadmap for the implementation of wider pollution reduction goals – but it depends on the strictness with which it is implemented." However, the risk of minimum KPI-requirement being overly easy to achieve remains, possibly weakening the impact of this update.

The combination of the Action Plan, amended environmental protection law and updated KPIs could be a powerful mixture of incentive and pressure towards local governments for stronger compliance in environmental protection. But the changes were not revolutionary insofar, as it did not visibly lead to major alterations in the governance structure, but rather to a shift in priorities within the existing institutional structures. Judging by interviewee comments, the timing of the "Airpocalypse" played a crucial role in its impact, since those measures that the "Airpocalypse" caused to be approved during the cause of 2013, were already under discussion before the event. It appears likely, that the degree of public discussion and media

reporting on the issue as well as the progress of discussion among the political leadership at that time were factors that enabled the "Airpocalypse" to be impactful.

4.7. Conclusion

This paper explored the disruptive potential of the "Airpocalypse" on China's institutional environment in air pollution control, using the Williamson's New Institutional Economics as framework. It can be concluded, that the "Airpocalypse" was indeed impactful in terms of triggering the issuance of significantly more ambitious targets related to air pollution control as well as increasing pressure on local level governments in effectively addressing the issue on the ground. However, the event did not visibly lead to more fundamental changes with regards to the allocation of responsibilities in air quality management or the mechanisms of policy implementation.

The case of the "Airpocalypse" underscores the disruptive nature which events can play in terms of shaping the governance of a sector. This paper concludes with the hypothesis that events play a significant role in the evolvement of China's governance institutions, which, given certain preconditions, can trigger recalibrations in central government priorities, the interrelationship of different government levels and the relationship of different government levels with the general public. Given the significance of events in this regard, this subject seems worthwhile for further systematic research. The theoretical framework of New Institutional Economics can thereby be meaningfully extended by adding vertical categories to the horizontal set of institutional levels, which define drivers of institutional change (one of which being disruptive events), providing a framework for systematically analyzing the significance of different disruptive forces on each institutional level.

4.8. References

Andrews, S. Q. (2011): Beijing’s hazardous blue sky. in: China Dialogue, 05.12.2011 - https://www.chinadialogue.net/article/show/single/en/4661-Beijing-s-hazardous-blue-sky (access: August 07, 2014)

Andrews-Speed, P. (2010): The Institutions of Energy Governance in China. - www.ifri.org/downloads/noteandrewsspeedenergychina_1.pdf (access: Nov. 22, 2013)

Beijing Environmental Protection Bureau (Beijing EPB) (2014): 2013年北京市PM2.5年均浓度89.5微克/立方米 [The average PM2.5 concentration in Beijing in 2013 was 89μg/m³]. - http://www.bjepb.gov.cn/bjepb/323474/331443/331937/333896/383912/index.html (accessed: January 18, 2015)

Beijing Municipal Government (2013): 北京市人民政府办公厅关于印发北京市2013-2017年清洁空气行动计划重点任务分解的通知[The office of the People's government of Beijing publishes 2013-2017 Action Plan on Air Pollution Prevention and Control]. - http://www.bjyj.gov.cn/flfg/bs/zr/t1139285.html (access: August 09, 2014)

Beyer, S. (2006): Environmental Law and Policy in the People's Republic of China. in: Chinese Journal of International Law 2006, Vol. 5, No. 1, 185–211

Birkland, T. A. (1997): After Disaster: Agenda Setting, Public Policy, and Focusing Events. Washington D.C.

Downs, E. S. (2008): China's "New" Energy Administration. - http://frankhaugwitz.eu/doks/policy/2008_11_China_NEA_Brookings.pdf (access: Nov. 22, 2013)

Embassy of the United States to China (n.d.): Beijing - Historical Data. - http://www.stateair.net/web/historical/1/1.html (access: June 15, 2014)

Finamore, B. (2014): New Weapons in the War on Pollution: China's Environmental Protection Law Amendments. - http://switchboard.nrdc.org/blogs/bfinamore/new_weapons_in_the_war_on_poll.html (access: June 15, 2014)

Guo, X. (2001): Dimensions of guanxi in Chinese elite politics. in: The China Journal 46, p. 69-90

Howell, J. (2006): Reflections on the Chinese state. in: Development and Change 37 (2), p. 273-297

Institute for Global Environmental Strategies (IGES) (2014): Major Developments in China's National Air Pollution Policies in the Early 12th Five-Year Plan. - http://pub.iges.or.jp/modules/envirolib/upload/4954/attach/Major_Developments_in_China's_Air_Pollution_Policies_March2014.pdf (access: October 14, 2014)

Institute of Public and Environmental Affairs (IPE); Society of Entrepreneurs & Ecology; Renmin University of China; Friends of Nature; Envirofriends; Nature University (2014): Real-Time Disclosure Begins. - http://www.ipe.org.cn/Upload/IPE-Reports/Report-Blue-Sky-Roadmap-II-EN.pdf (access: August 09, 2014)

Kay, S.; Zhao, B.; Sui, D. (2014): Can Social Media Clear the Air? A Case Study of the Air Pollution Problem in Chinese Cities. in: The Professional Geographer, DOI: 10.1080/00330124.2014.970838

Ministry of Environmental Protection of the People's Republic of China (MEP) (n.d.): 北京市空气质量日报分析 [Daily analysis of air quality in Beijing]. - http://datacenter.mep.gov.cn (access: April 13, 2014)

Ministry of Environmental Protection of the People's Republic of China (MEP) (2008): Mission. - http://english.mep.gov.cn/About_SEPA/Mission/200803/t20080318_119444.htm (access: July 27, 2014)

Ministry of Environmental Protection of the People's Republic of China (MEP) (2008a): China National Environmental Protection Plan in the Eleventh Five-Years (2006-2010). - http://english.mep.gov.cn/down_load/Documents/200803/P020080306440313293094.pdf (access: August 15, 2014)

Ministry of Environmental Protection of the People's Republic of China (MEP) (2012): 重点区域大气污染防治“十二五”规划[12th Five Year-Plan on air pollution control in key regions]. - http://www.zhb.gov.cn/gkml/hbb/gwy/201212/W020121205566730379412.pdf (access: August 15, 2014)

Ministry of Environmental Protection of the People's Republic of China (MEP) (2013): 李克强谈空气污染治理问题：我们必须有所作为[Li Keqiang on air pollution: We must act]. - http://www.mep.gov.cn/zhxx/hjyw/201301/t20130115_245169.htm (access: August 09, 2014)

Ministry of Environmental Protection of the People's Republic of China (MEP) (2014): 环境保护部发布 2013 年重点区域和 74 个城市空气质量状况[MEP

publishes 2013 report on air quality situation of 74 cities in key regions]. - http://www.zhb.gov.cn/gkml/hbb/qt/201403/t20140325_269648.htm (access: January 01, 2015)

Mol, A. P. J. (2010): Sustainability as global attractor: The greening of the (2008) Beijing Olympics. In: Global Networks, February 2010. - https://www.researchgate.net/profile/Arthur_Mol/publication/229480151_Sustainability_as_global_attractor_the_greening_of_the_2008_Beijing_Olympics/links/02e7e515d20960ad09000000.pdf (access: December 17, 2015)

National People's Congress of the People's Republic of China (2014): 北京市大气污染防治条例[Key measures to control air pollution in Beijing]. - http://www.npc.gov.cn/npc/xinwen/dfrd/bj/2014-01/22/content_1824468.htm (access: August 09, 2014)

North, D. C. (1990): Institutions, Institutional Change and Economic Performance. Cambridge.

North, D. C. (1991): Institutions. in: Journal of Economic Perspectives, 5(1): 97-113.

North, D. C. (1994): Economic Performance Through Time. in: American Economic Review, 84(3): 359-368.

Rafiqui, P. S. (2009): Evolving economic landscapes: Why new institutional economics matters for economic geography. in: Journal of Economic Geography, 9(3): 329-353.

Ran, R. (2013): Perverse Incentive Structure and Policy Implementation Gap. in: China's Local Environmental Politics, Journal of Environmental Policy & Planning, 15:1, 17-39, DOI: 10.1080/1523908X.2012.752186

Richter, R. (2005): The New Institutional Economics - Its Start, Its Meaning , Its Prospects. - http://www.uni-saarland.de/fak1/fr12/richter/institut/the_new_institutional_economics.pdf (access: August 10, 2014)

State Council of the People's Republic of China (2013): 国务院关于印发大气污染防治行动计划的通知[State council announces Action Plan on Air Pollution Prevention and Control]. - http://www.gov.cn/zwgk/2013-09/12/content_2486773.htm (access: August 16, 2014)

State Council of the People's Republic of China (2014): 中华人民共和国环境保护法（主席令第九号）[Environmental Protection Law of the Pople's Republic of China (9th Issue, signed by Chairman)]. - http://www.gov.cn/zhengce/2014-04/25/content_2666434.htm (access: June 15th, 2014)

State Council of the People's Republic of China (2014a): 国务院办公厅关于印发大气污染防治行动计划实施情况考核办法（试行）的通知 [Office of the State Council on the implementation of the Air Pollution Control and Prevention Action Plan]. - http://www.gov.cn/zhengce/content/2014-05/27/content_8830.htm, (access: June 15th, 2014)

State Environmental Protection Agency (SEPA) (n.d.): The National Tenth Five-Year Plan for Environmental Protection (Abstract). - http://english.sepa.gov.cn/plan/Tenth.htm (access: August 15, 2014)

The Central People's Government of the People's Republic of China (2012): 中华人民共和国环境保护法[Environmental Protection Law of the People’s Republic of China]. - http://www.gov.cn/fwxx/bw/hbzj/content_810469.htm (access: August 15, 2014)

The International Council on Clean Transportation (ICCT) (2014): China V Gasoline and Diesel Fuel Quality Standards. - http://www.theicct.org/sites/default/files/publications/ICCTupdate_ChinaVfuelquality_jan2014.pdf (access: August 09, 2014)

Tiezzi, S. (2014): China Revises Environmental Law for the First Time Since 1989. in: The Diplomat. - http://thediplomat.com/2014/04/china-revises-environmental-law-for-the-first-time-since-1989/ (access: January 18, 2015)

van Acken, T. (2013): Making the Grade. in: China Environment Series (Special Water and Energy Issue), p. 121-128. - http://issuu.com/wilsoncef/docs/cef_ces_vol12/7?e=8516579/5495194 (access: January 18, 2015)

van Acken, T. and Lewis, O. (2014): The Political Economy of Noncompliance in China: The Case of Industrial Energy Policy. in: Journal of Contemporary China 09/2015. - http://www.researchgate.net/publication/264195357_The_Political_Economy_of_No

ncompliance_in_China_The_Case_of_Industrial_Energy_Policy (access: January 18, 2015)

Wagner, D. V. (2013): timeline of china's official responses to recent severe pollution. - http://www.livefrombeijing.com/2013/01/timeline-of-chinas-official-resonses-to-recent-severe-pollution/ (access: August 09, 2014)

Williams, L. (2009): Managing the Air - Environmental Governance of China's Air Quality. - http://www.american.edu/sis/gep/upload/Larke-Williams-s-SRP-Managing-the-Air.pdf (access: August 10, 2014)

Williamson, O. E. (1975): Markets and Hierarchies: Analysis and Antitrust Implications. New York.

Williamson, O. E. (2000): The new institutional economics: taking stock and looking ahead. - Journal of Economic Literature vol.37, p. 595-613

Wilson, D. C.; Branicki, L.; Sullivan-Taylor, B; Wilson, A. D. (2010): Extreme events,

organizations and the politics of strategic decision making. in: Accounting, Auditing & Accountability Journal, Vol. 23 Iss 5 pp. 699 - 721

World Bank; Development Research Center of the State Council (2014): "中国：推进高效、包容、可持续的城镇化" [China: Promoting Highly Efficient, Inclusive and Sustainable Cities and Municipalities]. - http://www.cssn.cn/dybg/gqdy_ttxw/201403/W020140328524920426573.pdf (access: January 18, 2015)

World Health Organization (WHO) (2005): WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. - http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf (access: January 18, 2015)

World Health Organization (WHO) (2013): Health Effects of Particulate Matter. http://www.euro.who.int/__data/assets/pdf_file/0006/189051/Health-effects-of-particulate-matter-final-Eng.pdf (access: January 18, 2015)

Xue, B; Mitchell, B.; Geng, Y.; Ren, W.; Müller, K.; Ma, Z.; Puppim de Oliveira, J. A.; Fujita, T.; Tobias, M. (2013): A review on China's pollutant emissions reduction assessment. in: Ecological Indicators 38 (2014) 272– 278

Yu, L.; Wang, G.; Zhang, R.; Zhang, L.; Song, Y.; Yu, B.; Li, X.; An, K.; Chu, J. (2013): Characterization and Source Apportionment of PM2.5 in an Urban Environment in Beijing. in: Aerosol and Air Quality Research, vol. 13, 2013, p. 574–583

5. The Impact of Severe Air Pollution in January 2013 in Beijing on Sustained Elevation of Public Concern about Air Pollution

Submitted at: Journal of Environmental Policy and Planning (August 27th, 2016)

5.1. Abstract

Harmful and sudden events trigger intense media coverage which in turn can elevate public interest in a previously neglected problem within an instant. A period of heavy air pollution in Beijing in January 2013 may have been such a case. This sudden and intense period of air pollution featured historically high levels of fine particulate concentrations and was assumed by observers to be a trigger for shifting public perception and increased pressure for policy adjustment. In this paper, we examine whether or not this period of severe air pollution indeed triggered increased public scrutiny and outline the influential factors behind this development. A focus on the interplay of air quality, media reporting and public discussion in shaping sustained public interest in air pollution is laid. Based on a timeline analysis and survey data, we argue that the combination of historically high air pollution with intense media reporting did lead to sustained higher public attention to the topic.

5.2. Introduction

The city of Beijing has experienced high levels of air pollution almost on a daily basis over the past years. Publicized hourly measurements by the U.S.-Embassy and (more recently) the Chinese Ministry of Environmental Protection show concentrations of particulate matter regularly exceed safe levels by a high margin, posing a constant threat to human health (cf. Embassy of the United States to China n.d.; MEP, 2016). Yet, the general public, while knowing about the problem, did not attach primary importance to pollution control and environmental protection, as Chinese urban residents tended to be preoccupied with pursuing their individual material well-being (cf. Harris 2006, p. 7ff).

However, this notion may have changed with a period of intense air pollution in Beijing in January 2013. While Beijing had experienced episodes of heavy haze and smog even before January 2013, the intensity of the pollution was unprecedented when daily average fine particulate matter (PM 2.5) concentrations reached 569 $\mu g/m^3$ on January 12th, far above safe levels determined by the World Health

Organization, which recommends daily average concentrations not to exceed 25 µg/m³ (cf. WHO 2005, p. 5). This is the highest daily average PM 2.5 level in the recorded history of the air quality monitor of the U.S.-Embassy in Beijing, which is the only publicly available historical record for daily PM 2.5 concentrations at the time (cf. Embassy of the United States to China n.d.). The estimated economic harm caused by the air pollution in January 2013 amounted to a total of 1.84 billion RMB for Beijing (cf. Zhang 2013, p. 60ff).

The purpose of this paper is to explore the degree of discussion and sustained public attention caused by the air pollution on January 2013 in Beijing. This is done through a survey and an empirical timeline analysis of the evolvement of air quality, media reporting and public discussion of the issue. Specifically, this study examines, to what extent the event of extreme air pollution on January 2013 in Beijing may have impacted media reporting and public scrutiny, and how the interrelationship of air quality levels, media reporting and online discussion shape public sentiment on the issue. The following research questions guide this study:

1) Did the period of heavy air pollution in January 2013 in Beijing trigger higher awareness on the issue among the general public?
2) Which role did media reporting play in the process?
3) Which role did social media discussion play in the process?

To frame the topic and examine the impact of the January 2013 air pollution in Beijing, we refer to the theoretical framework of focusing events by Birkland (1997) and the media agenda setting theory formulated by McCombs and Shaw (1975). The combination of these approaches provides a useful framework that allows us to derive hypothesis on the aforementioned interrelationships and test those hypothesis in the course of the research.

For examining this subject, we apply two methods: First, quantitative timeline data of air quality, media reporting and social media discussion from 2012 and 2013 were compiled for a timeline analysis. This approach allows us to visualize the possible impact of heavy air pollution in January 2013 and draw initial conclusions on possible correlations of air quality, media reporting and social media discussion. To complement the observations of the timeline analysis, a survey has been conducted among Beijing residents to verify if and how sentiment on the subject of air pollution

has changed over time. This approach allows us to reconstruct the situation before and after January 2013 from multiple perspectives and draw initial conclusions.

The geographical focus for this study is Beijing and the sample for the empirical analysis is not intended to be representative. With this limitation in mind, the paper aims to contribute to the understanding of the consequences of the heavy air pollution in January 2013 and, in a general sense, the interplay of disruptive events, media reporting and the public agenda in the context of air pollution.

5.3. Context and Theoretical Background

Historically high air pollution in Beijing in January 2013, especially from January 11th to 14th, constitutes the key event for this study. To provide a contextual framework, we view this natural hazard as a *focusing event*, which is defined by Birkland as a sudden, rare and harmful occasion, that is known to policy makers and the general public simultaneously and affects a large number of people (cf. Birkland 1997, p. 2). The consequences of such events include immediate and intense media coverage that peak within weeks after the event, as well as long-term reactions by policy makers (cf. Birkland 1997, p. 29ff). Focusing events have the potential to trigger an alteration in public awareness and policy towards a certain issue. This is due to the sudden and intense generation of media and public interest which pressures policy makers to reexamine their priorities (cf. Birkland 1997, p. 23f; 28). In this context, the actual impact of a focusing event on elevating public attention to a specific matter depends heavily on the degree of sustained media coverage: A short but intense peak in mass media reporting may be less influential on public and government attention than sustained elevation of media coverage on a specific issue in the long-term (cf. Wolfe et al. 2013, p. 181). By viewing the air pollution in January 2013 and in particular the days from January 11th to January 14th as a focusing event, we can derive the assumption that this episode of severe pollution did trigger intense media coverage and potentially elevated public attention to air pollution in the mid- and long term.

To explore this question, we refer to the concept of *media agenda setting*, which was originally formulated by McCombs and Shaw (1975) in the context of the 1968 U.S. presidential election campaign. The basic hypothesis of this theory is that the topic selection and emphasis of news-media heavily influences the readership's perception and prioritization of current issues (cf. McCombs 2002, p. 1ff). As McCombs (2002,

p. 2) pointed out: "What we know about the world is largely based on what the media decide to tell us. More specifically, the result of this mediated view of the world is that the priorities of the media strongly influence the priorities of the public. Elements prominent on the media agenda become prominent in the public mind." The term "agenda" in this context is understood as the public perception about the importance of different issues at a given time (cf. McCombs 2002, p. 2).

McCombs and Shaw were not the first ones to recognize the agenda-setting function of mass media, but are generally credited with being the first to systematically research the question (cf. Rössler 2016, p. 125f). Since the formulation of the concept in the 1970s, the notion has been empirically verified in numerous studies examining diverse social environments. The correlation between topic selection of the mass media and public perception is typically measured using public opinion surveys. However, a variety of methods including laboratory experiments, time series analysis, and panel studies have also been applied (cf. McCombs 2002, p. 3; Neuman et al. 2014, p. 193).

The media agenda setting theory by McCombs and Shaw has been generally accepted as valid and several authors expanded the concept since then; especially *how* the "agenda" for the media is determined. Kim and Lee (2006) introduced the term "reverse agenda setting" whereby the general public influences the media on their choice of topics; and Shoemaker and Reese (2014) proposed a model of five main aspects that influenced agendas for the media, which are individual journalists, media routines, organizational factors, social institutions and culture (cf. Neuman et al. 2014, p. 195).

With the evolution of the Internet and the advent of online social media, dynamics have changed significantly. Essentially, traditional media have lost their monopoly to determine news agendas, with online social media and blogs emerging as another influential force (cf. Meraz 2009, p. 700). The trend of increasing online activity allows for a closer interaction between the media and its audience, and provides users with an effective tool to influence public discussion and the media agenda, thus increasing attention to the principle of reverse agenda setting. However, empirical studies examining the influence of social media platforms on the agenda of traditional media and the general public usually concluded that such platforms have little agenda-setting influence. This is because users of social platforms tend to

simply react to online media reports, with little independent journalism or systematic provision of information being channeled through social media (cf. Neuman et al. 2014, p. 194ff; Meraz 2009, p. 701).

Media reporting can increase public knowledge about an issue, which according to van Rooij (2010) is an important prerequisite for the general public to pay attention and take action on a problem. Van Rooij explicates that in order to increase public interest, it is important for the people not only to know that pollution is bad in general, but also have the exact details about the potential harms that exist and how they personally affect one. Detailed knowledge on the potential harms combined with personal exposure in this context increase the likelihood of generating public interest and action on the issue (cf. van Rooij 2010, p. 58ff). In this regard, Harris (2006) described overall environmental knowledge in China to be generally low, though increasing. As long as personal exposure to environmental pollution does not lead to immediate and visible harm, Chinese urban residents tend to prioritize the pursuit of individual material well being (cf. Harris 2006, p. 7ff).

Within this context we explore the question whether media coverage generated by the episode of air pollution in Beijing in January 2013 had a lasting impact on how the general public in Beijing perceives the problem of air pollution. From the conceptual framework described above we can derive several hypothetical assumptions: First, the air pollution in Beijing in January 2013 did trigger intense media coverage; second, traditional media reporting was the main factor driving the public agenda; and third, social media discussion has limited influence on setting the agenda for the media or the public but may be used as an indicator for public sentiment on the issue. In the following section we test these assumptions and explore the evolution of media reporting and the perception of the general public in Beijing on air pollution.

5.4. Evolution of Media Reporting and Social Media Discussion on Air Pollution - Timeline Analysis

For an initial impression on how patterns of air quality, media reporting and social media discussion on air pollution in Beijing evolved over 2012 and 2013, we compiled daily values showing three basic data series which we use in Figure 9, Figure 10 and Figure 11:

1) The daily average air quality index published by the U.S. Embassy is used as a proxy for overall air quality in Beijing: This data is the only source that has consistently tracked hourly and daily average PM 2.5 levels for Beijing since 2008 and has evolved as the most referenced database for air pollution. Pollution levels are expressed as air quality index (AQI) which is based on PM 2.5 levels and displays the health implications of different ranges in PM 2.5 concentration. The AQI-scale ranges from "good" (50 and below) to "hazardous" (above 300). This dataset is however not necessarily representative for the whole of Beijing as the U.S. Embassy air quality monitor provides measurements only from one station (located in the U.S. Embassy). Furthermore, the U.S. Embassy measures only one pollutant, PM 2.5, which is significant but not the only air pollutant impacting human health. Other significant pollutants, such as Nitrogen Oxide, Sulfur Dioxide and ground level Ozone are neglected in this dataset. Amidst these limitations, the U.S. Embassy air quality monitor is nevertheless a useful indicator for overall air quality trends in Beijing from 2010 to 2015.

2) Daily counts of online news reports containing the word "air pollution" ("空气污染") and "Beijing" ("北京"): We collected article frequencies on air pollution in Beijing using the advanced search function from the Chinese search engine Baidu. In principal, this dataset involves the complete Chinese online news landscape including articles that are replicated without changes. However it is possible a number of search results are not shown in the Baidu search engine due to technical reasons. Furthermore, the dataset does not include articles that have been deleted from news websites before its compilation and it may on the other hand contain redundant or invalid results. Media related data of this study is limited to quantitative article frequencies without conducting an analysis on article contents, which would exceed the scope of this paper.

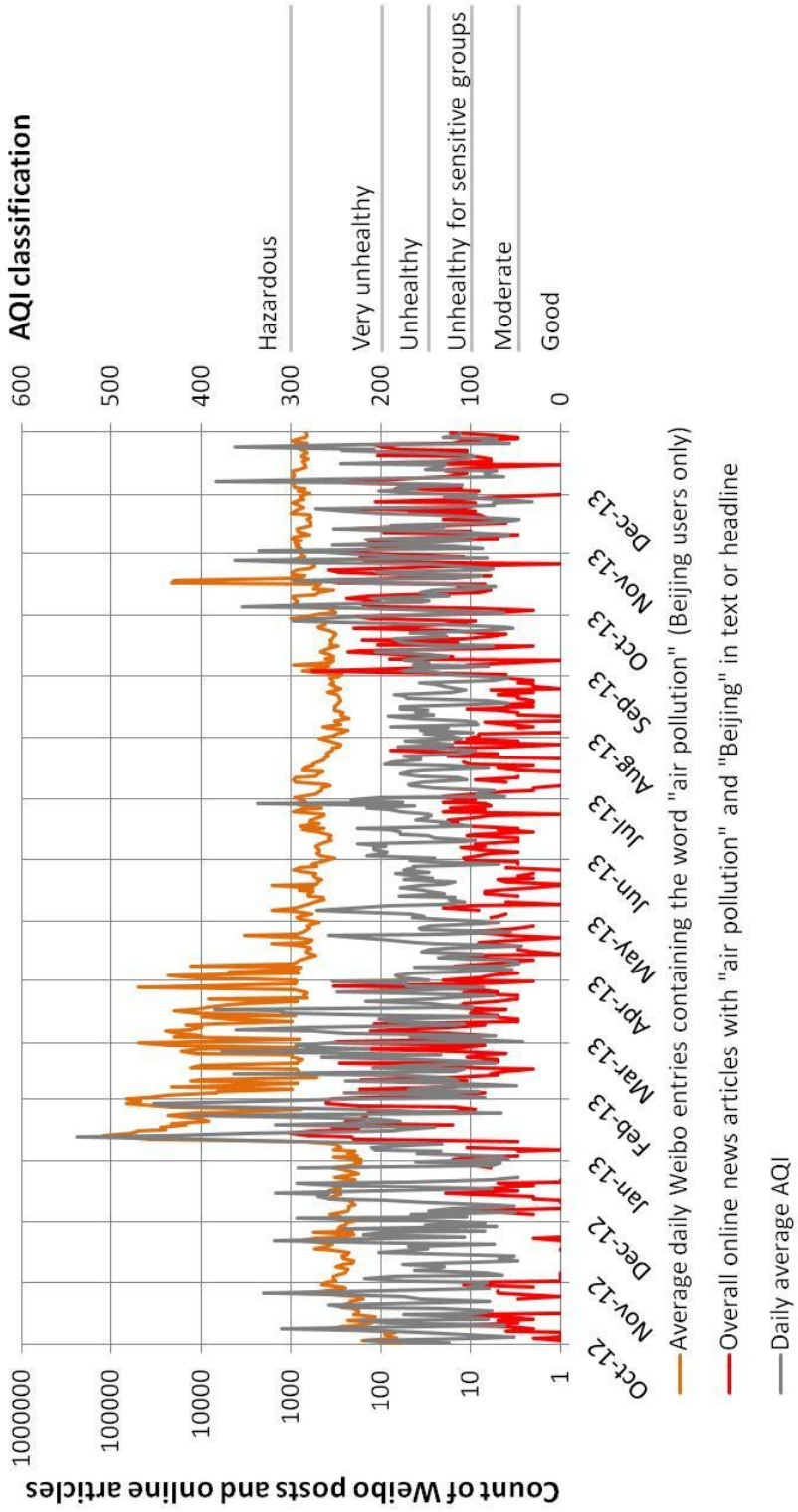


Figure 9: Evolution of daily AQI-level, media reporting and social media discussion from Oct. 2012 to Dec. 2013

3) Daily counts of Weibo-posts: In order to obtain an impression about the sentiments on air pollution among the general public in Beijing, we analyze the evolution of discussion on air pollution on the Chinese social media platform Weibo. Similar to the data collection of online news reporting, the daily frequency of the word "air pollution" ("空气污染") has been compiled for users from Beijing in 2012 and 2013. Weibo is used as an indicator for measuring public sentiment, as it has

been one of the most commonly used social media in China since its foundation in 2009, with about 61,4 million average user logins as of 2013 (cf. Weibo 2016).

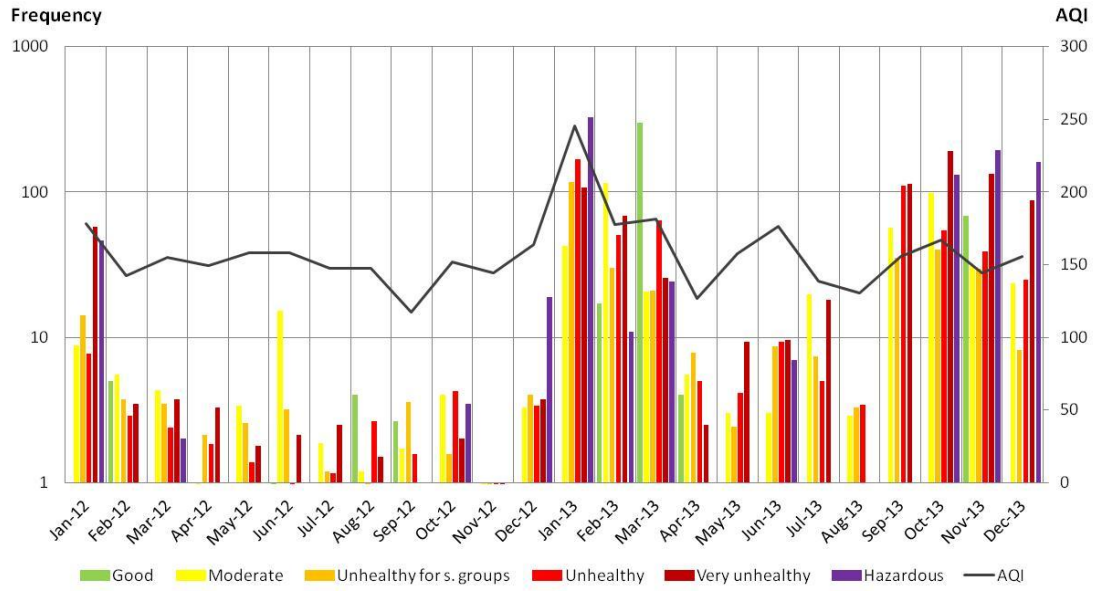
A timeline of daily average AQI as well as frequencies of media reporting and Weibo discussion on air pollution in Beijing is shown in Figure 9. In order to even out extreme peaks, frequencies are shown in a logarithmic scale. From this data, several observations can be made: First, media reporting on air pollution was very low before January 2013. It then showed a striking peak during January 2013 and was more or less elevated to a constantly higher level afterwards. Until the end of 2012, daily reports about air pollution in Beijing usually stayed below 5 in average, with occasional daily peaks above 100. January 2013 brought about a sudden intense increase in media coverage on the topic with the daily average numbers rising from 3.6 in December 2012 to 182 in January 2013. February 2013 showed unusually high numbers as well, with an average of 55 news issues on air pollution in Beijing per day. After this peak, numbers of news reports declined again but generally stayed at a higher level than before 2013, featuring between 3 and 9 daily reports mentioning air pollution in Beijing from April to August 2013. Towards the end of 2013, media reporting again increased significantly to over 40 reports per day, with a maximum of 100 reports on air pollution in Beijing in October. Timeline data from Weibo offers a similar picture to patterns of online news reporting: Until the end of 2012, daily Weibo frequencies were generally low, and despite a prominent peak in January and February 2013, the discussion on Weibo on air pollution did not sustain such a high level afterwards. Like news reporting, monthly Weibo entries on air pollution generally reached a higher level than in 2012. Between December 2012 and January 2013, the daily average frequency on Weibo posts about air pollution increased by 89 times from 268 to 23.887, only to sharply decline again until May 2013, when daily posts mostly settled between 300 and 700 in average.

The average monthly AQI shows a more or less cyclical pattern with peaks in pollution occurring during the cold season while the summer months tend to show lower PM 2.5 levels. Media reporting seems to somewhat correlate with levels of air pollution, but apart from January 2013, Weibo discussion and air pollution shows no obvious correlations. Beginning of 2013, historically high levels of air pollution coincided with drastically increased online discussion on the issue, but in general, the level of Weibo discussion does not seem to significantly match with peaks in air pollution.

The data shown above was processed further in Figure 10 and Figure 11. In these graphics, we display daily counts of media reports and Weibo discussion posts on air pollution in Beijing by daily average AQI level for each month in 2012 and 2013. Figures are shown in a logarithmic scale to even out extreme peaks. These figures allow us to see patterns of media reporting and online discussion by air quality level over time and to observe possible correlations of air quality with media reporting and Weibo discussion. Data shown in Figure 11 confirms the impression that the overall frequency of media reports sharply increased over time, while staying inconsistent during 2013. A general pattern of increasing media reporting during days of high pollution is unclear. On one hand, periods of particularly intense media coverage at the beginning of 2012 and 2013, and at the end of 2013, display a higher frequency of media coverage during days, in which average AQIs were high. On the other hand, months of lower media coverage (such as March to October 2012 and April to August 2013) do not seem to show a significant pattern of higher media coverage when air quality is bad. The notion of intense media coverage at the beginning and end of 2013 dominates any existing daily correlations and stands out as an exception. January to March 2013 showed consistently high media coverage even during days of low pollution, while at other times, high levels of pollution did not seem to trigger significant media reporting (Figure 10).

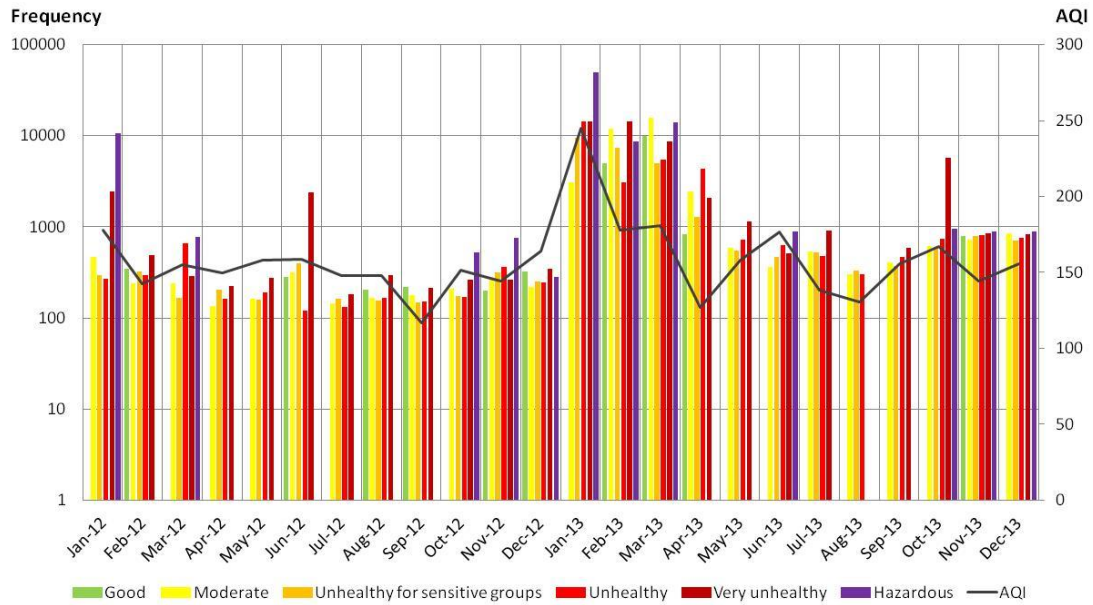
Weibo frequencies on air pollution show a more consistent picture: Compared to correlations between media reporting and level of air pollution, a pattern of increasing Weibo discussion with rising air pollution levels is more apparent. However, this correlation is also dominated by a manifold increase in overall discussion from January to March 2013, when Weibo discussion on air pollution was much more vibrant than in 2012, even during days of low pollution (Figure 11).

Figure 10: Average number of daily media reports on Beijing air pollution by AQI classification in 2012 and 2013



(Source: Own adaption based on Embassy of the United States to China n.d. and Baidu News search)

Figure 11: Average monthly number of Weibo posts on air pollution from Beijing users by AQI classification in 2012 and 2013



(Source: Own adaption based on Embassy of the United States to China n.d. and Weibo advanced search)

These Figures indicate that media reporting and Weibo discussion on air pollution in Beijing increased in absolute terms from 2012 to 2013. Correlations of actual air quality with media reporting and Weibo discussion appear to be weak on a day to day basis, but historically high pollution in January 2013 coincided with a striking peak in media coverage and Weibo discussion on the topic, which was sustained over several months even when air quality improved again. In the following section, survey results will complement this visual analysis.

5.5. Public Awareness on Air Pollution and Main Channels of Information - Survey Analysis

In complementation to the timeline data, a standardized survey was conducted in July 2014 to explore through which channels the respondents inform themselves about air pollution, how they perceived the urgency of addressing the problem, and how their perception has changed over time. The survey was answered by 161 Beijing residents and conducted via single and multiple choice questions to ensure comparability of all answers. This survey allows for a snapshot that indicates whether public interest on the topic has changed between 2012 and 2014, however due to the limited number of respondents, the survey is not representative. Results may also be skewed due to demographic factors such as age group (survey respondents were mostly between 20 and 40 years old). With the results below we aim to provide a workable indication that does not claim to be representative of Beijing as a whole.

Survey data generally suggest that the issue of air pollution was indeed gaining attention among Beijing residents between 2012 and 2014 and also that air pollution as a problem for society was at least as important as other major concerns like food safety, street safety etc. Out of 161 Beijing residents that took part in the survey, 42% stated that they became aware of air pollution in 2012 or 2013. Unsurprisingly, the visibly polluted air outside was the most common trigger for initial awareness about air pollution among respondents. Besides obviously bad air, online news portals, social media as well as personal conversations with colleagues and friends were the most commonly stated channels through which awareness about air pollution was initially raised. Interestingly, only relatively few people mentioned the real time air quality monitors provided by the U.S. Embassy and the Chinese Ministry of Environmental Protection as channels which triggered their awareness of air pollution (Figure 12 and Figure 13).

Figure 12: When did the air pollution problem first come to your attention?

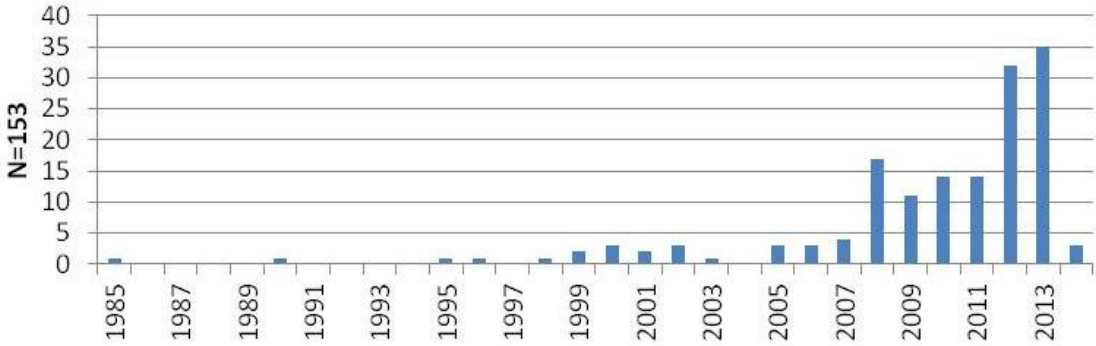
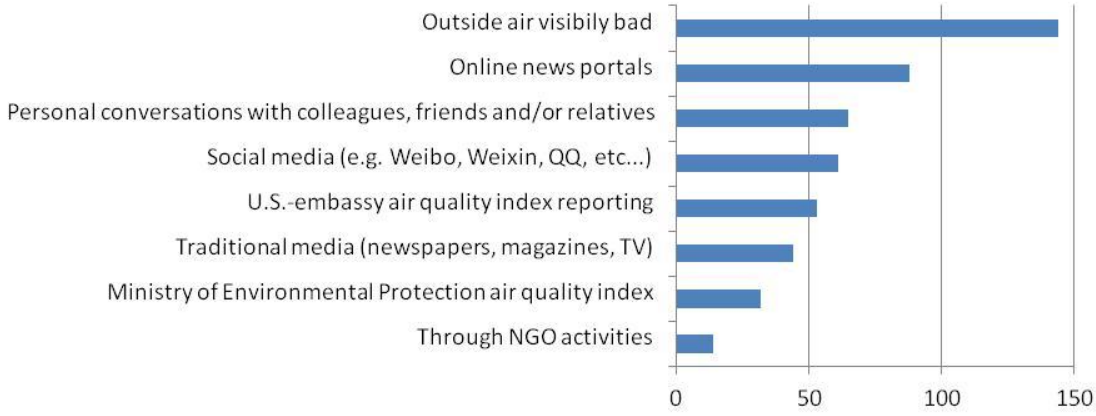


Figure 13: Through which channels did you first learn about the air pollution problem? (Multiple choice)



When comparing air pollution with other problems such as street safety, the majority of respondents (63%) stated air pollution to be either "more important" or even the "most important" issue. Additionally, most people stated that the problem is "now more important" or "much more important", compared to 2012 (as of July 2014), indicating that since 2013, respondents started to feel more strongly about air pollution being one of the most prominent issues among other social problems. This observation confirms the notion from the Weibo timeline analysis that air pollution as a topic increased in importance after 2012 but it contrasts the above observation that according to Weibo patterns, the overall prominence of the topic was, apart from January and February 2013, not very high (Figure 14 and Figure 15). Responses were similar when evaluating the urgency of addressing air pollution as opposed to other problems. 75% of respondents stated that air pollution was either comparatively "more urgent" or "most urgent" to address; and most stated that (as of July 2014) the urgency of addressing the issue has increased since 2012, showing an increasing

expectation that the government takes more effective steps for pollution control (Figure 16 and Figure 17).

Figure 14: When comparing air pollution to other problems affecting daily life (e.g. food safety, safety on the streets, economic crimes and others...): How do you currently evaluate the importance of air pollution?

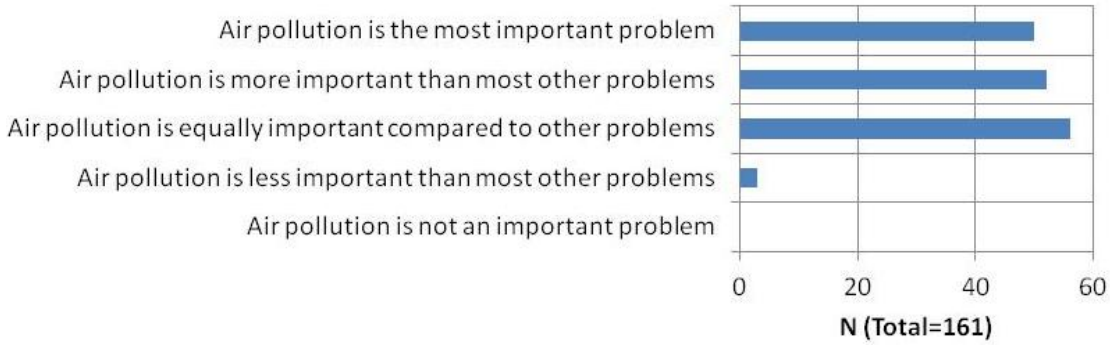


Figure 15: How did your current opinion on the importance of air pollution change compared to 2012?

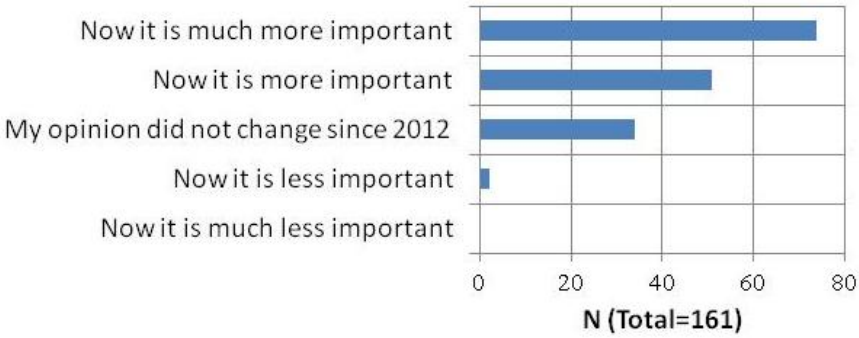


Figure 16: How do you currently perceive the urgency of addressing air pollution?

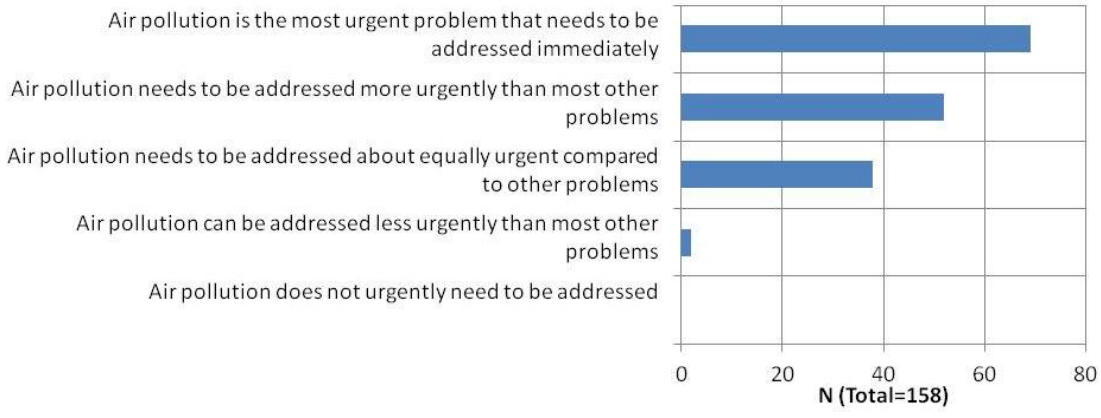
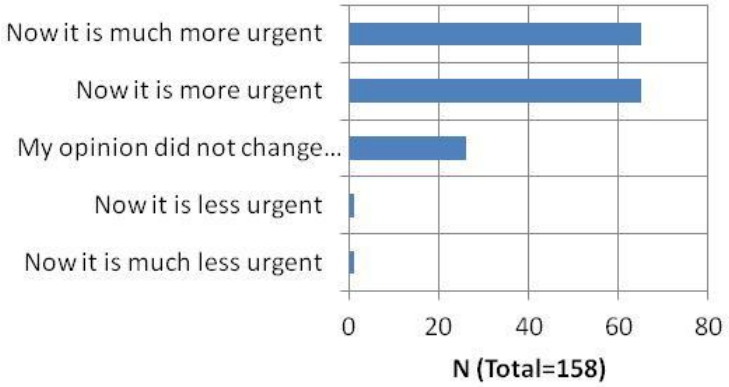


Figure 17: How did your opinion on the urgency of addressing air pollution change compared to 2012?



Increasing relevance of air pollution as a social concern in China has been indentified in other studies as well. One example is the PEW global survey, which is done annually in various countries to explore how respondents feel about contemporary issues. According to PEW, an increasing share of Chinese viewed air pollution as a "very big problem", with the percentage rising from 36% to 47% of respondents between 2012 and 2013. Among eighteen suggested contemporary problems, air pollution was mentioned most frequently as a "very big problem" after rising prices, corruption of officials and the rich-poor gap. Among those topics, air pollution featured the sharpest increase from 2012 to 2013 (cf. PEW Research Center 2013, p. 2). A more mixed picture is offered by the Chinese General Social Survey (CGSS), which is conducted annually by the Renmin University of China and covers a wide variety of topics, including environmental pollution: Comparing CGSS survey results from 2010 and 2013, a trend is hard to identify: When asked about the severity of the environmental situation in 2010, 85% of valid responses from Beijing stated the situation to be either "relatively severe" or "very severe", with 42% of valid responses from Beijing identifying air pollution to be the most severe environmental problem (cf. Renmin University of China 2010). In 2013, 85.6% of valid responses from Beijing identified air pollution to be either "relatively severe" or "very severe", which is only a negligible increase compared to 2010. In 2013, respondents were also asked about their satisfaction about local government performance on environmental issues, in which 39,1% of valid responses stated a critical opinion while about 54% answered with a favorable opinion (cf. Renmin University of China 2013). The

degree of satisfaction about government performance however cannot be compared over time, as previous surveys did not include this question, therefore limiting its informative value.

A perceived higher importance of air pollution and increasing urgency to address it took place despite air pollution patterns remaining roughly the same during the time frame referenced in this study. While levels and patterns of pollution remained similar over time, media reporting, Weibo timeline analysis and survey data all indicate that the problem is increasingly prominent in the media and the public mind. In the following section we will sketch out the interrelations of air pollution, media reporting and social media discussion in terms of agenda setting for media and the general public with reference to the theoretical framework of this paper.

5.6. Air Pollution, Media Reporting, Online Discussion and the Public Agenda

The data analysis outlined above indicates that the general public in Beijing felt more strongly about air pollution in 2013 compared to 2012, thus, speaking in terms of the media agenda setting theory, air pollution was placed more prominently in the public agenda. This increase in awareness was likely triggered by high pollution levels in January 2013, which initiated intense media coverage and online discussion. Media reporting and online discussion reached a large number of people which were in turn informed about the potential harm and personal health risks associated with air pollution. Another important factor is that during the entire period, air pollution remained high almost on a daily basis. With the general public being more informed about the perils of pollution after January 2013, while constantly experiencing it personally, the precondition for sustained higher awareness and sense of urgency was created.

In this case, constantly high air pollution is an atypical case for a *focusing event* because unlike an earth quake or oil spill, it is a disaster that is ongoing over prolonged time periods, potentially even years or decades. This factor likely prevented public interest on air pollution to decrease; even after media reporting and Weibo discussion went back to lower levels in the middle of 2013. Survey respondents also indicate this notion, most of which stated "visibly bad air" as the most frequent factor that brought their attention to the problem in the first place.

Relating back to the hypothetical assumptions outlined above, we come to the following conclusions:

"Air pollution in Beijing in January 2013 did trigger intense media coverage": Based on the empirical evidence in this paper, the period of severe air pollution in January 2013 triggered intense media reporting and provoked unprecedented social media discussion. The noticeable increase in online media coverage on air pollution in the long term after January 2013 and the apparently low correlation with actual air pollution levels can be partly explained by a change in government attitude in letting the media more openly report on the topic: While until 2012 the Chinese media tended to downplay the topic, for the first time in January 2013, at a time when the problem became too eminent to be ignored any further, Chinese media were allowed to address the topic more critically (cf. Schiavenza 2013). It should be noted that other factors than peaks in air pollution are influencing media coverage on the topic as well. For example the high media reporting on the topic during and after September 2013 can likely be explained by a set of new pollution control policies that were issued by the central government in Beijing as a response to the air pollution beginning of 2013 (cf. Schwabe & Hassler 2016, p. 60).

"Traditional media reporting is the main factor driving the public agenda": In terms of setting the public agenda, traditional online media appears to be influential. It is the most important information channel through which survey respondents came to pay attention to air pollution. However, the picture is likely more complex, since Weibo discussion and personal conversations play an important role as well. In this case, it is plausible to assume that the combination of historically high air pollution with intense media coverage was indeed the most important (but not the only) factor in shaping the public agenda in terms of air pollution. The intensity of media coverage likely reached a large number of people who have not paid attention to the topic before. If the severe air pollution in January 2013 is indeed remembered as a focusing event by a larger and more informed audience and given the fact that pollution levels usually remained high after January 2013, it may not be necessary to permanently sustain a high level of media coverage or online discussion in order to keep an increased level of public interest in the topic.

"Social media discussion has limited influence on setting the agenda for the media or the public but may be used as an indicator for public sentiment": The intensity of

Weibo discussion on air pollution does not seem to properly reflect mid-term public sentiment on the topic, confirming the view of Neuman et al. (2014) that social media discussion cannot be equated to public opinion because user demographics are not reflective of society (cf. Neuman et al 2014, p. 196; Kay et al. 2014, p. 6). While this shortcoming is also true in terms of Weibo users, another reason for social media discussion not being entirely sufficient as a proxy of public opinion are its dynamics. Social media appears to react to spectacular events with intense discussion, but it is likely to decline if conditions normalize, while public sentiment may stay strong on an issue (an analogous example from a different domain may be nuclear energy, which, after several catastrophic incidents like Chernobyl and Fukushima led to a sustained alteration of public sentiment in Germany, without the issue being constantly discussed in public).

The assumption by Neuman et al. (2014) on social media discussion tending to be reflective of media reporting but having limited influence on the media agenda seems to be valid. The most striking peak by far in terms of Weibo discussion on air pollution happened in beginning of 2013 and was reflective of severe pollution levels and likely reinforced by the intense media coverage during the time. When air quality went back to usual levels, Weibo discussion on the topic decreased initially, but remained at a more constant level than media reporting and increased again towards end of 2013, indicating that Weibo discussion tends to react more strongly to media reporting than the other way round. In terms of social media setting the public agenda, survey results indicate that they do play a role in shaping public opinion, but with less relevance than traditional media and personal conversations. This observation somewhat contrasts the view proposed by Neuman et al. (2014) which assumes very limited public agenda stetting influence of social media.

While we argue, that pollution levels in Beijing beginning of 2013 did lead to higher levels of public awareness, it should be noted that air pollution was not an unknown problem before this period. Beijing has experienced phases of intense pollution before 2013 (for example in February and October 2012) and it was generally known among the public that air quality was low. Survey data confirms that initial awareness of air pollution among respondents grew succinctly, with 2013 being the year in which the relative majority of respondents stated to have first paid attention to the problem. Our conclusion should therefore not be misinterpreted in a way that the focusing event of January 2013 led to awareness of air pollution in the first place,

but to a sustained increase in existing awareness among Beijing residents, which is due to the combination of historically high pollution, intense media coverage (enabled by lower government restrictions to report on the topic) and reinforced by social media discussion.

5.7. Conclusion

With this study we explored the impact of the air pollution in January 2013 in Beijing on public sentiment about the topic among residents. We did this using diverse empirical materials and relying to some extent on visual analysis of timeline data. By combining the theoretical approaches of focusing events and media agenda setting theory, we tested the assumption of a causal chain between high pollution levels, media reporting and public sentiment. We conclude that the air pollution in January 2013 did lead to a sustained increase in public sentiment on the topic. However, a clear cause- and effect chain of factors appears to be too simplistic for reflecting complex interrelations in media and public agenda setting. We can assume that feedback effects were at place, which were not entirely uncovered with the given empirical data. The role of social media in the process of informing the public on the one hand and reflecting public opinion on the other hand is, for instance, not yet entirely clear in this process. Empirical validation is further needed on the relevance of factors influencing media reporting on air pollution other than air pollution itself, as well as the interrelationship of traditional and social media in terms of shaping public opinion.

Given these limitations, we conclude in more general terms, periods of exceptionally strong air pollution combined with intense media reporting do have the potential to bring this issue more prominently to public attention, which in turn may trigger policy response. Sustained levels of high pollution in this context present a special case as a focusing event, because the fundamental problem persists in the same way over prolonged time periods (in the case of Beijing at least several years). However, a combination of "spectacularly" high pollution combined with intense media reporting appeared to have unfolded the impact of a typical focusing event in terms of elevating and sustaining public attention in an instant.

5.8. References

Birkland, T. A. (1997): After Disaster: Agenda Setting, Public Policy, and Focusing Events. Washington D.C.

Embassy of the United States to China (n.d.): Beijing - Historical Data. - http://www.stateair.net/web/historical/1/1.html (access: June 15, 2014)

Harris, P.G. (2006): Environmental Perspectives and Behavior in China - Synopsis and Bibliography. - http://envpsych.voices.wooster.edu/files/2011/08/Harris.pdf (access: April 3, 2015)

Kay, S.; Zhao, B.; Sui, D. (2014): Can Social Media Clear the Air? A Case Study of the Air Pollution Problem in Chinese Cities. in: The Professional Geographer, DOI: 10.1080/00330124.2014.970838

Kim, S. T.; Lee, Y. H. (2006): New functions of Internet mediated agenda-setting: Agenda-rippling and reversed agenda-setting. in: Korean Journal of Journalism and Communication Studies, 50(3), 175–205.

McCombs, M.; Shaw, D. (1972). The agenda-setting function of mass media. in: Public Opinion Quarterly, 36, 176-185.

McCombs, M., 6; Shaw, D. (2002). The Agenda-Setting Role of the Mass Media in the Shaping of Public Opinion. http://www.infoamerica.org/documentos_pdf/mccombs01.pdf (access: July 5, 2015)

Meraz, S. (2009): Is There an Elite Hold? Traditional Media to Social Media Agenda Setting Influence in Blog Networks. in: Journal of Computer-Mediated Communication, doi:10.1111/j.1083-6101.2009.01458.x

Ministry of Environmental Protection of the People's Republic of China (MEP) (n.d.): 北京市空气质量日报分析 [Daily analysis of air quality in Beijing]. - http://datacenter.mep.gov.cn (access: April 13, 2014)

Neuman, W. R.; Guggenheim, L.; Jang, S. M.; Bae, S. Y. (2014): The Dynamics of Public Attention: Agenda-Setting Theory Meets Big Data. in: Journal of Communication 64 (2014) 193–214

PEW Research Center (2013): Environmental Concerns on the Rise in China. - http://www.pewglobal.org/files/2013/09/Pew-Global-Attitudes-Project-China-Report-FINAL-9-19-132.pdf (access: April 4, 2015)

Renmin University of China (2010): 中国综合社会调查 [Chinese General Social Survey]. - http://www.cnsda.org/index.php?r=projects/view&id=15553986 (access: July 27, 2016)

Renmin University of China (2013): 中国综合社会调查 [Chinese General Social Survey]. - http://www.cnsda.org/index.php?r=projects/view&id=93281139 (access: July 27, 2016)

Rössler, P. (2016): The Agenda-Setting Function of Mass Media von Maxwell E. McCombs und Donald L. Shaw (1972). in: Potthoff M. (ed.): Schlüsselwerke der Medienwirkungsforschung. Wiesbaden.

Schiavenza, M. (2013): Beijing's Air Quality Crisis May Have Had a Silver Lining. in: Citylab - http://www.citylab.com/politics/2013/01/beijings-air-quality-crisis-may-have-had-silver-lining/4428/ (Accessed: June 16, 2016)

Schwabe, J.; Hassler, M. (2016): The impact of periodic air pollution peaks in Beijing on air quality governance in China. in: Die Erde Vol. 147 No. 1/2016

Shoemaker, P. J.; Reese, S. D. (2014): Mediating the message in the 21st century: A media sociology perspective. New York, NY: Allyn and Bacon.

van Rooij, B. (2010): The People vs. Pollution: understanding citizen action against pollution in China. in: Journal of Contemporary China, 19:63, 55-77, DOI: 10.1080/10670560903335777

Weibo (2016): Business Overview. - http://ir.weibo.com/phoenix.zhtml?c=253076&p=irol-homeprofile (access: July 7, 2016)

Wolfe, M.; Jones, B. D.; Baumgartner, F. R. (2013): A Failure to Communicate: Agenda Setting in Media and Policy Studies. in: Political Communication, 30:2, 175-192, DOI: 10.1080/10584609.2012.737419

World Health Organization (WHO) (2005): WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. - http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf (accessed: January 18, 2015)

Zhang, M. Q. (2013): 2013 年 1 月中国大面积雾霾事件直接社会经济损失评估 [An evaluation of the economic loss due to the heavy haze during January 2013 in China]. in: 中国环境科学[China Environmental Science] 2013,33 (11): 2087-2094.

6. Policy Response to Focusing Events and its Enabling Factors - A Case Study of Government Response to Extreme Air Pollution in Beijing in January 2013

Submitted at: Asia Pacific Viewpoint (August 26th, 2016)

6.1. Abstract

Sudden events of crisis ("focusing events") trigger intense media reporting, which in turn can prompt political decision makers to respond with an adjustment of existing policies. As such, focusing events can potentially lead to long term policy change on a certain issue. This paper explores the sudden and intense period of air pollution in Beijing in January 2013 as a focusing event. The episode, which international media referred to as "Airpocalypse", triggered widespread discussion and policy adjustments that can be assumed to accelerate air pollution control in China. The "Airpocalypse" was not the first event of intense air pollution in Beijing, but the only one which seemingly caused lasting sociopolitical changes. The aim of this paper is to explore the underlying situational factors that enabled the "Airpocalypse" to be more relevant than other events of severe air pollution. We argue that a combination of historically high pollution, improved access to information, increasing government willingness to address the issue, and the ability of media to more openly discuss air pollution created a public pressure situation to which the government was prompted to respond in a stronger way than during previous events of heavy air pollution.

6.2. Introduction

China's economic progress over the last decades has brought millions out of poverty but also caused heavy environmental damage, including scarcity of clean water, soil degradation and air pollution (cf. Beyer 2006, p. 187; Harris 2006, p. 6). This development has traditionally been accompanied by minimal public and government attention and priority towards environmental protection, which in turn has been reflected in weak implementation of environmental standards and regulations (cf. Ran 2013, p. 34f). This situation may have changed however, due to an event of extreme air pollution in Beijing in January 2013. While periods of heavy air pollution in Beijing occurred several times between 2008 and 2012, January 2013 featured the highest recorded daily particulate matter (PM 2.5) concentrations in history, with January 11 to 14 featuring the most intense pollution. International

media referred to this event as "Airpocalypse" (and we use the same denomination for this study hereinafter). Anecdotal evidence and expert comments suggest that this case may have changed the way how the Chinese central government perceives the problem of air pollution, and in consequence could lead to an adjustment of China's priorities in terms of air quality control.

The purpose of this paper is to identify and evaluate the underlying factors that prompted the Chinese central government and the government of Beijing to respond differently to the January 2013 "Airpocalypse" compared to earlier periods of severe air pollution.

The air pollution of January 2013 is thereby evaluated within Birkland's theoretical concept of *focusing events*, which provides a useful context for defining the event itself and allocating the policy and public response into a contextual frame. In order to do justice to the explorative nature of this research question, a diverse approach is taken for this study and empirical data is drawn from two main sources:

1) Qualitative interviews: Six semi-standardized interviews were conducted to cover the topic in depth. Interview partners included representatives from government, academia and non-governmental organizations who were professionally involved with the topic of air pollution in China.

2) Quantitative data: For identifying and comparing past periods of severe air pollution, daily average values of the air quality index published by the U.S.-Embassy in Beijing are used. Further quantitative datasets are used for tracking media reporting and public discussion on air pollution over time, using counts of daily Xinhua online articles containing the word "air pollution" in their headline as well as daily entries of the word "air pollution" by Beijing users in the Chinese social media platform Weibo.

Empirical data from the aforementioned sources allows us to identify the main factors which influenced government response to the "Airpocalypse" and to reconstruct the interrelationships and causalities of these factors. This approach is conducted in two steps: First, we evaluate the "Airpocalypse" based on the criteria of a focusing event and second, we explore the relevance and interrelation of enabling factors which shaped public reaction and policy response to the event. In the following section, the theoretical context for this study is outlined.

6.3. Context and Theoretical Background

This study draws on the theory of *focusing events*, a concept introduced by Birkland (1997) in order to provide a systematic framework for analyzing the characteristics of- and responses to man-made and natural disasters. Such disasters typically lead to a drastic increase of public and government attention towards a specific issue, thus making the event "focal". A focusing event triggers government response that aims to mitigate its effects or prevent it from happening again in the future, making focusing events an important aspect in the policy making process (cf. Birkland 1997, p. ix).

A focusing event is defined by Birkland as an occasion that is "sudden, relatively rare, can be reasonably defined as harmful or revealing the possibility of potentially greater future harms, inflicts harms or suggests potential harms that are or could be concentrated on a definable geographical area or community of interest, and that is known to policy makers and the public virtually simultaneously" (Birkland 1997, p. 22). Several definitions of catastrophic events requiring policy response exist in literature, which commonly share similar attributes. Kapucu (2008) characterized "trigger events" for an evaluation of emergency responses to Hurricane "Katrina" in 2005 as rare, large-scale disasters of massive size, unusual urgency, extraordinary range of devastation and high loss of life (cf. Kapucu 2008, p. 10). In a study on strategic decision making amidst "extreme events", Wilson et al. (2010) characterized such events as unprecedented or unplanned occurrences which impact business as usual and disrupt or destroy resources (cf. Wilson et al. 2010, p. 707). The common ground of these definitions is the sudden and damaging nature of such events which affect many people and force a response of some kind.

Defining focusing events based on such attributes allows for very diverse occasions to be allocated to this category. Generally, these occasions are denominated and remembered based on a simple name, such as "September 11th", "Hurricane Katrina", "Deepwater Horizon", "Fukushima", et cetera. As Birkland explicates, aforementioned attributes are prerequisites of making such events focal: An event that is rare, generally unplanned and difficult to predict carries much more focal power than an event which happens on a day to day basis that may be harmful in its own right but can be predicted and met with precautions to mitigate it. While it is fairly safe to say that something like an earthquake, a terrorist attack or an oil spill

will happen again, it is typically not possible to predict with reasonable accuracy when and where, nor is it possible to establish patterns. Furthermore, the higher the number of people affected by geography, ethnicity or demographic group and the more visible the harm caused by the event, the more media and institutional interest it is likely to attract. With the general public and policy makers learning about the event virtually simultaneously, there is little to no possibility for policy makers to hide the news - which in turn further increases the pressure for a proper response (cf. Birkland 1997, p. 23f; 28).

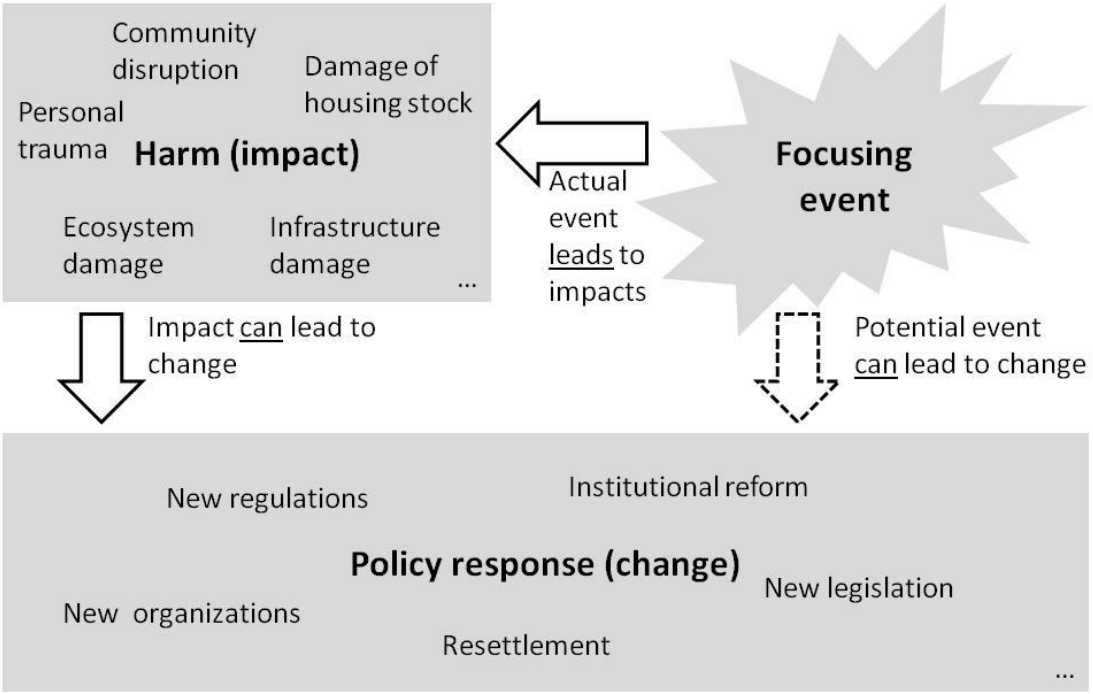
The consequences of such events are twofold. First, focusing events are generally followed by intense media coverage that peaks within weeks after the occasion. Due to their sudden nature and depending on their scale, focusing events are particularly attractive for the news media to cover. A large and unexpected disaster makes for a much more compelling "story" than regular small scale occasions, even though they might be more harmful in combination. The level of press coverage thereby depends not only on the scale, potential harm and number of people affected, but also quite significantly on the density of news media personnel within the geographic region where the event took place (cf. Birkland 1997, p. 23; 30f).

Second, focusing events are followed by a response of government institutions and policy makers. The news media plays a decisive role in elevating attention of diverse stakeholder groups to a topic which may not have been addressed otherwise. Groups in favor of change may use the event to push for policy adjustments, while groups in favor of the status quo are likely to downplay the significance of the event. In this context, focusing events provide a strategic opportunity for groups which have had difficulty promoting their topics of interest. By definition, an event is only focal if it mobilizes more pro-change forces than forces supporting the status quo (cf. Birkland 1997, p. 23; 33f). Scholars have commonly agreed that organizational structures such as government agencies are usually ill prepared for adequately responding to a sudden, disastrous event, as large government organizations tend to be bureaucratic structures with too little flexibility and communication between organizational sub-units to roll out an immediate and comprehensive response. This potentially causes situations to escalate further before more appropriately coordinated responses can take effect (cf. Wilson et al. 2010, p. 701). Besides triggering institutional response for immediate relief and policy adjustment, the attention generated by a focusing

event has the potential to increase public scrutiny over an issue in the long term, thus making a return to policies prior to the event less likely (cf. Birkland 1997, p. 30f).

Birkmann et al. analyzed disasters as "windows of opportunity" for policy change that provide unique chances to push forward a solution to a problem that has been unveiled by the event. In this context Birkmann distinguished between *impact* and *change*. The direct consequences of an event, such as human trauma, infrastructure damage, environmental damage and so forth are the *impact* of a disaster which potentially (but not necessarily) lead to long term *change*, that can take quite diverse forms such as new legislation, institutional reform, the founding of new organizations or the alteration of ecosystems. *Change* in this case is actively undertaken by stakeholders and driven by the desire to mitigate or prevent similar potential events in the future, while impact is forced upon stakeholders by the event (cf. Birkmann et al. 2008, p. 4ff). Using Birkland's terminology, we can define the *impact* of an event as the amount of tangible harm caused to humans and environment, and the *change* triggered by an event as the long-term policy response. While Birkmann et al. have used a broader definition for *change* (e.g. including change in livelihood patterns or migration), the model originally provided by Birkmann may be usefully adapted to provide a framework for this study, in which policy response to the "Airpocalypse" in Beijing and its enabling factors are the focus (Figure 18).

Figure 18: Causality between an event, harm done and response



(Source: own adaption based on Birkmann et al. 2008, p. 7)

The manner and existence of a policy response to a disastrous event depends on three main requirements, namely the existence of organized stakeholder groups lobbying for change, public interest and tangible harm. These constitute pre-requirements for building up sufficient pressure for a substantial policy response:

1) **The degree of organization** of a policy community and its composition. Simply put, the more organized a stakeholder group is, the more effectively it will use an event to push forward its agenda for policy reform or maintain the status quo. For a weakly organized interest group, a focusing event is less likely to be relevant, as the group will not be able to take advantage of the opportunity to alter the policy equilibrium (cf. Birkland 1997, p. 36f). Giger and Klüver (2012) view interest groups and political parties as the main types of stakeholders which have the leverage to press for policy change. A focusing event thereby offers such groups the opportunity to translate public discussion into political pressure by exploiting short-term public attention to lobby for policy change. If such groups are not involved in political decision making, a focusing event offers a rare strategic opportunity to influence policies towards a desired direction (cf. Giger and Klüver 2012, p. 2, 4).

2) **Public interest.** The focal power of an event is closely correlated with the degree of interest which the general public takes on an issue. More specifically, public

interest seems to depend on the policy options that are at hand for response. For focusing events which can only be mitigated in the aftermath (such as earthquakes) empirical evidence showed little public advocacy for policy change, while man-made or avoidable disasters such as oil spills spark stronger citizen discontent. Without the existence of sustained public interest an event is unlikely to become focal. Simply put, a short and disorganized public outcry is not likely to have a sustained influence on the policy agenda. Whereas organized citizen movements, committees, and newly found NGOs may establish themselves as influencers of the policy making process, thus breaking up the policy monopoly of previous stakeholders (cf. Birkland 1997, p. 42).

3) **The revelation of tangible harm** by an event. The more tangible harm an event causes the more focal power it can unfold. In this context, the visibility and quantifiability of the damage is important. On one hand, the more obvious and simple the measures of damage, such as number of casualties, number of people displaced or monetary damage, the easier it will be for media to cover the news in a compelling way and for the general public to estimate the relevance of the event. On the other hand, the more ambiguous the potential damage, the more difficult it will be to significantly elevate attention and advocacy for proper policy response. Graphic pictures play a decisive role in generating attention in the first place, but this does not necessarily mean that long term policy adjustments follow. Natural disasters such as hurricanes and earthquakes cause obvious damage which can be immediately captured and distributed through the news without need to extensively explain the subject matter. Other occasions such as nuclear power plant incidents cause less obvious initial damage and are more complicated to understand which makes it more difficult to immediately elevate attention to the issue (cf. Birkland 1997, p. 43ff).

These factors are intertwined and have a decisive influence on how the policy response to a focusing event will take shape: 1). Whether the event will be met with short-term actionism to mitigate the most obvious harms; 2). Whether a long-term fundamental policy change will take place to improve mechanisms of prevention and mitigation; or, 3). Whether the event will not be met with any significant response at all (for example, due to lack of a sufficiently strong advocacy groups in favor of change).

As described above, an integral part of a focusing event is the elevation of public and government attention towards the issue that caused the event to happen in the first place. This increase in attention is enabled through extensive media coverage in the aftermath of the event, providing an opportunity to those interest groups which advocate for policy change in order to either prevent or mitigate such events in the future (cf. Birkland 1997, p.30f). This approach implicitly assumes that mass media are free to report on such events without constraints on content, opinion or prominence that is attached to the issue. Furthermore, it assumes the existence of organized interest groups with access to policy makers. These assumptions are valid for numerous case studies on focusing events which have been conducted within a contexts of democratic, non-authoritarian systems, such as the United States and Japan, for which events such as hurricanes, earthquakes terrorist attacks and nuclear power plant disasters have been examined in the past (cf. Birkland 1997, p. 47ff; Birkland 2006, p. 27ff; Kapucu 2008; Giger and Klüver 2012; Bishop 2013).

In order to examine whether the January 2013 "Airpocalypse" in Beijing can be described as a *focusing event*, we need to take into account the authoritarian nature of the Chinese system, with a tightly controlled media landscape and policy makers that depend not on the general public but on their respective superiors. Interest groups and the general public in China therefore have less access to policy makers than in the USA, for example. The mechanisms of translating public attention into political pressure in general are not yet sufficiently understood (cf. Giger and Klüver 2012, p. 2), and this is particularly true when examining decision making of the Chinese central government.

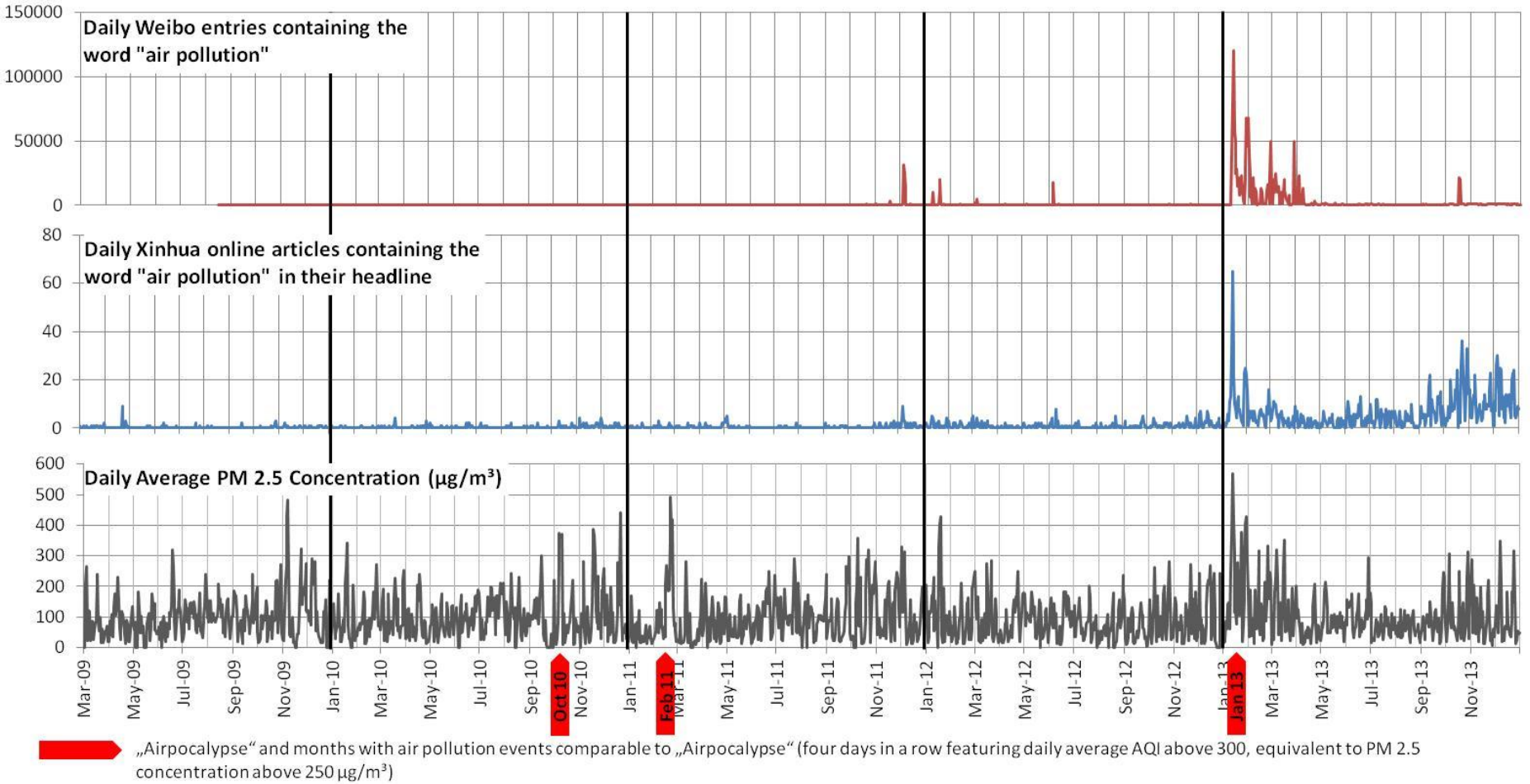
6.4. The "Airpocalypse" as a Focusing Event

For evaluating the focal power of the "Airpocalypse", we examine the occasion by the attributes that constitute a focusing event: a sudden, rare and harmful occasion that is followed by intense media coverage and policy response. After evaluating the focal power of the "Airpocalypse", the underlying factors which determine the nature of the policy response are examined.

A closer look at the history of PM 2.5 concentrations in Beijing helps evaluating the suddenness and rarity of the "Airpocalypse" as an event. For this purpose, we examine the air quality monitor provided by the U.S. Embassy in Beijing. The dataset of the U.S. Embassy is the only publicly available source which has

consistently tracked hourly and daily average PM 2.5 levels since 2008 and is one of the most referred to databases for analyzing air quality in Beijing. Accuracy of the U.S. Embassy air quality monitor is limited insofar as it provides data from only one station. Therefore the data does not represent an accurate picture for the whole of Beijing. We can observe that between 2008 and 2013, air pollution in Beijing did not show a visible trend towards improvement or exacerbation. Seasonal patterns are somewhat pronounced with April tending to be a period of relatively low pollution, while October and November usually feature high levels of pollution. Accordingly, periods of severe air pollution are distributed fairly evenly during cold seasons, with one to two of such events within every observed year. The "Airpocalypse" constitutes the worst period of air pollution during this time frame and occurred from January 11 to 14, 2013. During these few days, maximum daily average PM 2.5 concentration increased rapidly and reached 569 µg/m³(January 12th), far beyond the safe level of 25 µg/m³which is recommended by the World Health Organization (cf. WHO 2005, p. 5). Other episodes of severe air pollution in which at least four consecutive days reached an average PM 2.5 concentration of over 250 µg/m³ happened during October 2010 and February 2011 (cf. Embassy of the United States to China n.d.; Figure 19).

Figure 19: Air quality, Xinhua reporting and Weibo discussion from 2009 to 2013



(Source: Own compilation based on U.S. Embassy n.d., Baidu News search and Weibo advanced search; dotted red line: time of the "Airpocalypse")

The annual average PM 2.5 concentrations between 2009 and 2013 ranged between 91 and 105 µg/m³ (cf. Embassy of the United States to China n.d.). While the timeline in Figure 19 displays no obvious trend in air quality, the record pollution in January 2013 is clearly visible. However, the "Airpocalypse" was not the first case of severe air pollution in Beijing and high PM 2.5 concentrations have been somewhat predictable over the years since they mostly occurred during autumn and winter. Nevertheless, the "Airpocalypse" itself does qualify as a sudden and rare event because of the sheer level of PM 2.5 concentration which was unprecedented in recorded history. While it was somewhat foreseeable that air pollution levels would increase during winter season, the exact timing and scale of the pollution of January 12, 2013 was at the time largely unpredictable and unexpected.

When estimating the tangible harm caused by the "Airpocalypse" the picture is ambivalent. On the one hand it is difficult to quantify exactly what kind of damage can be directly traced back to this single period of severe air pollution. Unlike events such as earthquakes, hurricanes or terrorist attacks, there is no obvious amount of attributable casualties, injuries, infrastructure damage, forced migrations or other harms. Zhang (2013) estimated the overall economic loss caused by air pollution in January 2013 for China as a whole to be 23 billion Chinese Yuan, most of which could be attributed to hospitalizations. Zhang identified four areas in which economic harm was caused by the haze. These were flight delays, loss of highway toll revenue, traffic accidents and health costs, which took place in each Chinese province. While overall costs related to traffic amounted to 538 million RMB, overall health costs such as hospitalizations and emergency treatments amounted to 22,6 billion RMB overall comprising 97,7% of the total economic damage. It is notable that the air pollution during January 2013 showed adverse economic effects in most Chinese provinces. Beijing, which was the center of attention during the "Airpocalypse", suffered "only" 8% of overall economic cost (cf. Zhang 2013, p. 6ff; Table 2).

Table 2: Economic losses attributable to the air pollution in January 2013 in mil. RMB

	China		**Beijing**
	Total	Percentage	Total
Flight delays	271,4	1,2%	48,4
Lost highway toll revenue	187,55	0,8%	14,6
Traffic accidents	79,35	0,3%	4,1
Health costs	22577,06	97,7%	1776,7
Total cost	**23115,36**		**1843,8**

(Source: Zhang 2013, p. 6ff).

Such estimates are abstract and relatively ambiguous. They require effort and methodological expertise to develop and are not immediately understandable to non-experts. The ambiguous nature of damage done by air pollution is by itself not suitable for generating immediate attention and providing a compelling "story" for the media to report. However, severe air pollution is a very graphic event and the "Airpocalypse" was particularly intense. Owing to the exceptionally high PM 2.5 concentrations, the sky was visibly darkened during daytime and the view in Beijing was limited to a few hundred meters, providing a drastic sight on the streets, visible for anyone. While the harm done by such haze is difficult to quantify, it is generally known to the public that such air pollution is damaging to human health. The reality that air pollution adversely affects everybody and the difficulty to quickly escape the problem makes this an issue that people generally care about. It can thus be argued that the "Airpocalypse" did indeed possess a certain degree of suddenness and rarity and that it caused harm.

6.5. Media Reporting, Public Discussion and Policy Response

As a sudden and harmful event, the "Airpocalypse" generally fulfilled the preconditions for generating attention among the media, the general public and policy makers, which leads to the question as to whether or not the "Airpocalypse" actually led to significant media coverage. This aspect is explored through a timeline analysis using the daily number of Xinhua online articles containing the word "air pollution" ("空气污染") within their headline as an indicator. Xinhua is the official

Chinese news agency and provides a meaningful proxy in this context because its articles are adopted and multiplied by most Chinese news portals. The degree of public discussion generated by the "Airpocalypse" is evaluated in a similar way by providing daily counts of Weibo-posts containing the word "air pollution". Sina Weibo was one of the most frequently used social media platforms in China from 2009 to 2013, with more than 500 million registered and 60 million active daily users as of beginning 2013. As such, Weibo is a major catalyst of public opinion in China (cf. China Labs; Zhejiang Institute of Media and Communications 2013, p. 3).

Based on the timeline in Figure 19 it can be plausibly concluded that the "Airpocalypse" led to intense media coverage and public discussion during the days following January 12th, 2013, when air pollution in Beijing reached the highest daily average in recorded history. While Xinhua online articles about air pollution were almost non-existent during the years of 2010, 2011 and 2012, the number increased rapidly in January 2013, when daily numbers of Xinhua articles headlining with "air pollution" picked up to over 20 for several consecutive days (peaking at 65 on January 14, 2013), while on most days before, there were less than five such articles going online. Discussion on Weibo offers a similar picture. Since Weibo was established in 2009, discussion about air pollution among users from Beijing remained at a negligible level of less than 20 daily posts until September 2010, then increasing to a daily average number of 409 in 2012. January 10th to 11th 2013 featured a striking jump in Weibo discussion when entry numbers went from less than 739 to 37,904 within just one day. Weibo discussion then remained vibrant for the following weeks, with daily posts on air pollution regularly exceeding 20.000 (Figure 19).

The striking peaks in Xinhua reporting and Weibo discussion on air pollution during the time of the "Airpocalypse" show that the event did spark intense media coverage and public discussion. Another notable observation is the relative absence of Xinhua articles and Weibo discussion during previous periods of intense air pollution that were comparable to the "Airpocalypse", specifically in October and November 2010, February 2011 and January 2012. While none of those events quite reached the intensity of the "Airpocalypse" they were nevertheless periods of prolonged PM 2.5 concentrations with daily average values which were considered "hazardous" according to the criteria applied by the air quality monitor of the U.S. Embassy (cf. Embassy of the United States to China n.d.).

The question regarding what kind of policy responses can be attributed to the "Airpocalypse" has been assessed by Schwabe & Hassler (2016) based on a series of interviews. Schwabe & Hassler concluded that the event was indeed the cause for stricter targets and policies in terms of air pollution reduction. Immediately after the "Airpocalypse", the Chinese central government and the government of Beijing reacted with strong rhetoric and announcements for stricter regulations such as vehicle emission standards. Li Keqiang, Vice Premier at the time, called for immediate action, while acknowledging that air pollution reduction is a long term process (cf. Schwabe & Hassler 2016, p. 60). More relevant and impactful are the long-term air pollution reduction plans issued by the Chinese central government and the government of Beijing which provide stricter targets and priority measures for air pollution control. In September 2013, Beijing announced an action plan with the goal of reducing annual average PM 2.5 concentration to 60 μg/m³ by 2017 - an extremely ambitious goal considering that the reported annual average concentration of PM 2.5 in Beijing was 89 μg/m³ in 2013 (cf. Beijing EPB 2014). The plan states in unprecedented detail the list of measures to be taken and the department (and even person) that would be accountable for implementing specific measures (cf. Beijing Municipal Government 2013). At the national level, the State Council published the "Action Plan on Air Pollution Prevention and Control", containing targets for PM 2.5 reduction for the period from 2013 to 2017. This plan tasks the region of Beijing, Tianjin and Hebei to reduce annual average PM 2.5 concentrations by 25%, a drastic increase from the PM 2.5 reduction goal of the 12th Five Year Plan (in force from 2011 to 2015), that called for PM 2.5 reductions of 15% for Beijing and 6% for Tianjin and Hebei respectively (cf. State Council 2013).

The specific policy responses to the "Airpocalypse", namely stricter pollution control targets, have been accompanied by an amendment of the environmental protection law and the issuing of adjusted performance indicators for local officials, who were to be penalized, should they fail to reach air pollution control targets within their area of jurisdiction. These measures were aimed at more effectively implementing air pollution control policies. In combination with stricter goals as stated in the Action Plan for Air Pollution Prevention and Control, local and provincial governments face significant pressure to more effectively curb air pollution (cf. Schwabe & Hassler 2016, p. 61ff).

The short term responses, as well as longer term plans that were issued as a consequence of the "Airpocalypse" had been developed before the event took place, but according to interviewee statements had only been able to meet approval after this event of historic air pollution (Schwabe & Hassler 2016, p. 60). This notion confirms one general characteristic of focusing events, which provide a strategic opportunity to interest groups in favor of policy change, as they receive public support for an issue that seemed to be neglected previously.

In the following section we will explore the question why the "Airpocalypse" evidently triggered media coverage, public discussion and policy response, while this has not been the case for previous comparable periods of intense air pollution in Beijing.

6.6. Situational Factors Determining Policy Response to the "Airpocalypse"

Unlike previous events of heavy air pollution in Beijing, the "Airpocalypse" triggered intense media coverage, public discussion and policy response. This leads to the assumption that the "Airpocalypse" happened within a different situational environment. Based on interview comments, several factors stood out as differentiators from other events of severe air pollution in Beijing:

First, the "Airpocalypse" took place during a time when the Chinese central government transitioned from the presidency of Hu Jintao to the administration of Xi Jinping and Li Keqiang. While Li Keqiang was not officially appointed as prime minister yet, he was elected in November 2012 as a member of the standing committee of the politbureau of the Chinese Communist Party, with designated President Xi Jinping as new general secretary. The transition was finished in March 2013, when Xi Jinping and Li Keqiang were elected as state president and prime minister respectively (cf. Brødsgaard & Grünberg 2013, p. 81f). The time of government transition may have provided a particular window of opportunity for policy adjustments as the new administration defined its set of priorities, making it easier for the new government to put a stronger emphasis on environmental policy.

An interview partner who has been working as a policy consultant for a non-governmental organization at the time during the "Airpocalypse" stated:

> "(...) for the first time, this is going all to the top. Li Keqiang is coming in and the State Council with action plans and such. The government is so hierarchical

that when decisions are made on the highest level it triggers down. For the top level leadership this is a matter of stabilization. The top level leadership sees environmental pollution as one core issue. The middle class maybe unhappy to the point of unrest."

Other interview partners shared the viewpoint that the government transition made may have elevated attention to air pollution as a priority issue. A policy consultant working for a non-Chinese government agency suggested that Li Keqiang could distinguish himself with environment protection and blame the previous government. Indeed, Prime Minister Li has been unusually outspoken on the air quality issue as he famously declared "war against pollution" during the 2014 annual meeting of the National People's Congress (cf. State Council 2014b).

However, the policy responses directly attributable to the "Airpocalypse" generally took place in a political environment in which air pollution control has been taken increasingly seriously for some time. In 2012, for the first time the Chinese government issued a standard and national targets specifically directed at PM 2.5 reduction in the 12th Five Year Plan (cf. Satikawa 2014) and a discussion of amending the environmental protection law was underway. Therefore, the policy response to the "Airpocalypse" cannot be interpreted as a change in course, but rather as a significant acceleration of an existing policy trend that likely would not have happened had the "Airpocalypse" not hit in its length and scale.

Second, the media coverage during the "Airpocalypse" was far more intense than previous comparable periods of air pollution. Within the context of China's authoritarian system, in which the state exercises strict control over the media landscape, this change indicates that for the first time the government allowed the issue to be covered extensively in the media. Media censorship in China is a sophisticated system which employs several tools to prevent the publication of contents deemed unfavorable by the Communist Party. Every week, the Communist Party circulates a guideline of topics which are prohibited or encouraged to report on. Journalists who violate censorship rules are at risk of facing harsh punishments which has encouraged media outlets to exercise self-censorship in order to avoid penalties (cf. Xu 2014, p. 2). In this context, the press has usually played down the issue of air quality and referred to pollution as "fog", while avoiding to put a spin on

the topic that could be interpreted as critical towards the government (cf. Schiavenza 2013).

The reasons why for the first time the press covered the topic more or less unrestricted during the "Airpocalypse" seem to be manifold. One interview partner (who represented an NGO consulting the Chinese government on environmental standards) stated that the government consciously allowed the topic to be covered without restrictions, whereas another interview partner (who acted as a government consultant on behalf of a foreign government agency) pointed out that the press mostly reflected what government officials stated themselves. Two more important aspects are the level of international attention the incident received and intense social media discussion on the topic. An interview partner, who worked as a correspondent of a German newspaper in Beijing commented:

> "[air pollution] has always been a topic among foreign media and then the Chinese media started to report on it. (...) 2011 and 2012 the data from the U.S.-Embassy was still censored, but not anymore afterwards. Then Chinese media were allowed to more and more report on the topic. The biggest international hit was this [PM 2.5 concentration of over] 800-value beginning of 2013. On this occasion we could get out all of our material on air pollution. This became a really big topic in Germany and other countries. It sold well as a headline. For one week we continuously reported on air pollution in China. This prompted the Chinese government to deal differently with the topic."

Schiavenza and van de Ven (2014) point out the importance of social media discussion and the impact it may have had on policy response. Weibo is used by celebrities and business decision makers who feature a high number of followers (several millions in some cases) to emphasize certain topics for discussion. The Weibo tweets by real estate developer Pan Shiyi, for instance, have been emphasized as impactful as he published a poll asking users whether the government should initiate a clean air act during an earlier period of heavy air pollution. The poll was answered by 55.000 users, 99% of which voted "yes". Such phenomena are monitored by the government which understands the need to respond more openly as soon as public sentiment on an issue has reached a certain critical mass (cf. Schiavenza 2013; van de Ven 2014). Some Chinese state media also acknowledged the issuance of new air quality standards by the central government in 2012 as a

response to social media discussions. However Kay et al. (2014) conclude in a study on the agenda setting function of social media in China, that social media platforms such as Weibo are to a large extent shaped by opinion leaders, including the government bodies, who can navigate the overall narrative of a discussion into a desired direction. According to Kay et al. the "most influential users in the debate [about air pollution] were almost entirely comprised of government sources, companies or famous individuals." (Kay et al. 2014, p. 6). The content of social media discussions on air pollution therefore tends to be less critical of government action (or respectively inaction) and focuses instead on possible measures an individual can take to reduce the personal exposure to pollution (cf. Kay et al. 2014, p. 7f). Thus, the function of Weibo in the process is likely to be hybrid. To a certain degree it may serve as an informal channel for the general public to influence policy making, on the other hand it serves as a tool for the central government to influence public opinion.

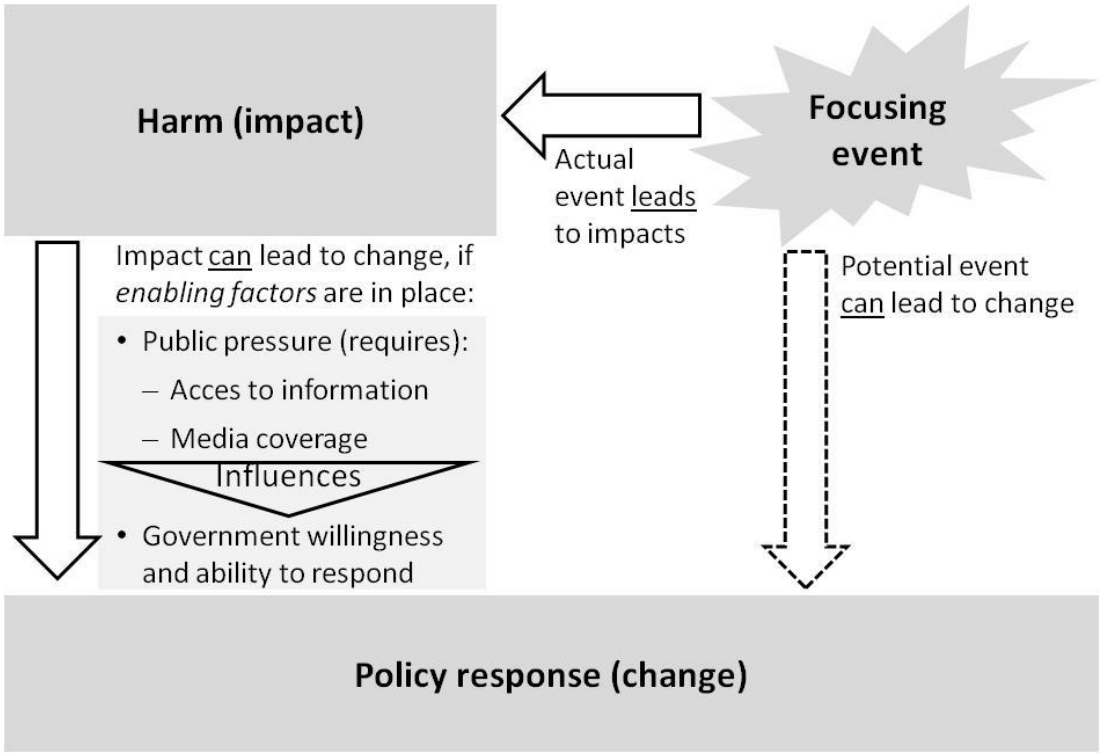
Another question is why there has been such a jump in intensity of Weibo discussion only during the "Airpocalypse" and not on comparable events before 2013. Interview partners offered improved data transparency as a main reason for this. Since November 2012, the ministry of environmental protection disclosed hourly PM 2.5 readings from several stations in Beijing as well as 74 other major cities (cf. IPE et al. 2014, p. 5), dramatically improving public access to air quality data and informing discussion. An interview partner, who worked as a policy consultant for a foreign government agency, suggested that before public disclosure of official pollution data, there has been some discontent about the fact that the U.S. Embassy was the only entity in China publishing real time values of PM 2.5 concentration, while the Chinese government apparently chose to cover up or downplay the issue at times of obviously high pollution. Another main reason for a striking peak in intensity of Weibo discussion is the apparent correlation with online media reporting. Social media discussion appear to be reflective of traditional media reporting, therefore high intensity of mass media coverage is likely to lead to high intensity of social media discussion (cf. Neuman 2008, p. 194ff).

These factors paint a complex picture of interrelations between access to information, public discussion, media reporting and government transition which influenced each other and ultimately influenced the way that the Chinese government responded to the "Airpocalypse". In summary, we observe that comprehensive public access to

real time information on air pollution and high pollution levels in January 2013 sparked media coverage and a general discussion on the issue that was more informed and more intense than ever before, thus creating the preconditions of increased public pressure and expectation for the government to take more effective steps in pollution control. These factors were met with increased government willingness to prioritize air pollution control and respond to the "Airpocalypse" by publishing significantly more ambitious targets for PM 2.5 reduction, enabling this period of severe pollution to be more impactful than comparable previous events. While the government response was apparently due to increased public pressure, the factors outlined above (such as media being allowed to cover the issue, the disclosure of real time information on pollution and political willingness to reduce pollution) were ultimately directly controlled by the government itself. Therefore, the Chinese central government appears to have significant control as to whether or not an event of severe pollution is allowed to develop focal power in the first place.

These findings partly contradict the aforementioned variables that determine policy response to a focusing event, namely the 1) degree of organization of interest groups, 2) public interest and 3) the revelation of tangible harm. In the case of the "Airpocalypse" the government seemed to respond to an increasing but more or less disorganized and obscure public sentiment, while organized proposal for policy change (as attempted by non-governmental organizations) did not seem to influence either public sentiment or policy decision making (cf. van de Ven 2014). Due to the nature of the Chinese system, opposing political parties are absent as lobbyists of policy change. Moreover, the causal mechanisms, which in the case of the "Airpocalypse" enabled public concern to translate into political pressure for policy adjustment, remain to be further examined. It appears plausible to conclude that interest groups and opposing bodies within the Chinese government compete for political influence, whereas the degree of public attention to an issue may indirectly influence the way that the balance between competing central government bodies plays out.

Figure 20: Causality between an event, harm done and response - expanded by *enabling factors* for response



(Source: own adaption based on Birkmann et al. 2008, p. 7)

Based on the findings of this study, the model outlined by Birkmann (2008) can be meaningfully expanded to also include the factors which enable an impactful event to actually trigger *change*. We propose to complement this scheme as shown in Figure 20, which may be further adjusted by empirical studies conducted in the future. The interrelationship of enabling factors, their validity across diverse political systems and event domains, and the existence of further aspects not outlined in this study are valid questions for future research in order to refine and expand this model. As for the Chinese context, additional examination on the mechanisms of public influence on central government policy would contribute further understanding on the potential relevance of focusing events.

6.7. Conclusion

Applying the theory of focusing events as a framework, this study analyzed the period of heavy air pollution in Beijing in January 2013. In a second step, it explored the variety of factors that enabled the "Airpocalypse" of January 2013 to be more relevant in terms of media reporting, public discussion and government response than similar periods of pollution before 2013. Foremost, we conclude that the

"Airpocalypse" was indeed a rare, sudden and harmful event that triggered media coverage and policy response and hence can be considered to be a focusing event by the criteria outlined by Birkland (1997). Second, the main factors contributing to the relevance of the "Airpocalypse" as opposed to previous events of severe air pollution included improved access to information, less restricted media reporting and an increased willingness by political decision makers to address the problem. The timing was important in this context: Historically high pollution met with sharply increased public scrutiny and a newly reshuffled central government which was more willing to openly prioritize air pollution control. These factors coming together led to a political response that cannot be interpreted as a change in course, but as an acceleration of existing policy trends. A knowledge gap continues to exist as to how exactly public pressure prompted the Chinese central government to respond. The causal mechanisms of how public concern influences central level government decision making remains to be further examined in this context.

6.8. References

Beijing Environmental Protection Bureau (Beijing EPB) (2014): 2013年北京市PM2.5年均浓度89.5微克/立方米 [The average PM2.5 concentration in Beijing in 2013 was 89µg/m³]. - http://www.bjepb.gov.cn/bjepb/323474/331443/331937/333896/383912/index.html (accessed: January 18, 2015)

Beijing Municipal Government (2013): 北京市人民政府办公厅关于印发北京市2013-2017年清洁空气行动计划重点任务分解的通知[The office of the People's government of Beijing publishes 2013-2017 Action Plan on Air Pollution Prevention and Control]. - http://www.bjyj.gov.cn/flfg/bs/zr/t1139285.html (access: August 09, 2014)

Beyer, S. (2006): Environmental Law and Policy in the People's Republic of China. in: Chinese Journal of International Law 2006, Vol. 5, No. 1, 185–211

Birkland, T. A. (1997): After Disaster: Agenda Setting, Public Policy, and Focusing Events. Washington D.C.

Birkland, T. A. (2006): Lessons of Disaster: Policy Change after Catastrophic Events. Washington D.C.

Birkmann, J.; Buckle, P.; Jaeger, J.; Pelling, M.; Setiadi, N.; Garschagen, M.; Fernando, N.; Kropp, J. (2008): Extreme events and disasters: a window of opportunity for change? Analysis of organizational, institutional and political changes, formal and informal responses after mega-disasters. in: Nat Hazards DOI 10.1007/s11069-008-9319-2

Bishop, B. H. (2013): Focusing Events and Public Opinion: Evidence from the Deepwater Horizon Disaster. in: Polit Behav (2014) 36:1–22 DOI 10.1007/s11109-013-9223-7

Brødsgaard, K. E.; Grünberg, N. (2013): Leadership Changes and Structural Reform After the 18th Party Congress in China. in: The Copenhagen Journal of Asia Studies Vol 31, No 1 (2013)

China Labs; Zhejiang Institute of Media and Communications (2013): 2012年~2013年微博发展研究报告. - http://video.zj.com/cns/20122013weibo.pdf (access: August 16, 2014)

Embassy of the United States to China (n.d.): Beijing - Historical Data. - http://www.stateair.net/web/historical/1/1.html (access: June 15, 2014)

Giger, N.; Klüver, H. (2012): Focusing events and policy change: The aftermath of Fukushima. - https://www.researchgate.net/profile/Heike_Kluever2/publication/262412496_Focusing_events_and_policy_change_The_aftermath_of_Fukushima/links/02e7e537a0d96d512f000000.pdf (access: August 15, 2016)

Harris, P. G. (2006): Environmental Perspectives and Behavior in China - Synopsis and Bibliography. - http://envpsych.voices.wooster.edu/files/2011/08/Harris.pdf (access: April 3, 2015)

Institute of Public and Environmental Affairs (IPE); Society of Entrepreneurs & Ecology; Renmin University of China; Friends of Nature; Envirofriends; Nature University (2014): Real-Time Disclosure Begins. - http://www.ipe.org.cn/Upload/IPE-Reports/Report-Blue-Sky-Roadmap-II-EN.pdf (access: August 09, 2014)

Kapucu, N. (2008): Making Matters Worse - An Anatomy f Leadership Failures in Managing Catastrophic Events. in: Administration and Society; doi:10.1177/0095399708323143

Kay, S.; Zhao, B.; Sui, D. (2014): Can Social Media Clear the Air? A Case Study of the Air Pollution Problem in Chinese Cities. in: The Professional Geographer, DOI: 10.1080/00330124.2014.970838

Neuman, W. R.; Guggenheim, L.; Jang, S. M.; Bae, S. Y. (2014): The Dynamics of Public Attention: Agenda-Setting Theory Meets Big Data. in: Journal of Communication 64 (2014) 193–214

Ran, R. (2013): Perverse Incentive Structure and Policy Implementation Gap in China's Local Environmental Politics. in: Journal of Environmental Policy & Planning, 15:1, 17-39, DOI: 10.1080/1523908X.2012.752186

Satikawa, E. (2014): China’s War on Air Pollution. - http://www.chinacenter.net/2014/china_currents/13-2/chinas-war-on-air-pollution/ (accessed: June 17, 2016)

Schiavenza, M. (2013): Beijing's Air Quality Crisis May Have Had a Siver Lining. in: Citylab - http://www.citylab.com/politics/2013/01/beijings-air-quality-crisis-may-have-had-silver-lining/4428/ (Accessed: June 16, 2016)

Schwabe, J.; Hassler, M. (2016): The impact of periodic air pollution peaks in Beijing on air quality governance in China. in: Die Erde Vol. 147 No. 1/2016

State Council of the People's Republic of China (2013): 国务院关于印发大气污染防治行动计划的通知[State council announces Action Plan on Air Pollution Prevention and Control]. - http://www.gov.cn/zwgk/2013-09/12/content_2486773.htm (access: August 16, 2014)

State Council of the People's Republic of China (2014b): 李克强：要像对贫困宣战一样 坚决向污染宣战[Li Keqiang: We will fight pollution as resolutely as we fought poverty].- http://www.gov.cn/zhuanti/2014-03/06/content_2631811.htm (access: August 13, 2014)

van de Ven, J. (2014): Air pollution policy making and social media in Beijing, 2011-2013. - http://www.danwei.com/beijing-fog-investigating-air-pollution-policy-making-in-beijing-between-2011-and-2013/ (accessed: August 28th, 2014)

Wilson, D. C.; Branicki, L.; Sullivan-Taylor, B; Wilson, A. D. (2010): Extreme events, organizations and the politics of strategic decision making. in: Accounting, Auditing & Accountability Journal, Vol. 23 Iss 5 pp. 699 - 721

World Health Organization (WHO) (2005): WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. - http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf (accessed: January 18, 2015)

Xu, B. (2014): Media Censorship in China. in: Council of Foreign Relations - http://www.cfr.org/china/media-censorship-china/p11515 (accessed on June 17, 2016)

Zhang, M. Q. (2013): 2013 年 1 月中国大面积雾霾事件直接社会经济损失评估 [An evaluation of the economic loss due to the heavy haze during January 2013 in China]. in: 中国环境科学[China Environmental Science] 2013,33 (11): 2087-2094.

7. Results and Discussion

In this dissertation the case of severe air pollution in Beijing in January 2013 was reconstructed and evaluated regarding its sociopolitical implications. Hence, this study can be classified as an explorative study with the aim to gather as much information as possible about our case in order to explain the causal mechanisms which were at work (cf. Gläser and Laudel 2009, p. 37). A mix of theoretical approaches and methods was employed for generating empirical data in order to construct a plausible set of hypotheses, identify the consequences of the "Airpocalypse" and explore their significance and cause.

The papers written and published for this study were allocated based on the research questions outlined in section 2.4. The main findings are summarized in the following.

What is the significance of political responses to the "Airpocalypse"?

This question implicitly assumes the existence of political actions which can be directly attributed to the "Airpocalypse". In the course of this research, the question was thus further broken down in two sub-questions: First, "Which, if any, political actions can be directly attributed to the 'Airpocalypse'?" and second, "What is the significance of those actions?". Regarding the former, the main focus of analysis were mid-to long term responses rather than official statements which have been made in the direct aftermath of the event. Within this premise, the answer to the first question appears to be quite straight forward: As a direct consequence of the "Airpocalypse" the Action Plans for Air Pollution and Control were published in September 2013, respectively for the national level as well as for Beijing. In other words, had Beijing in January 2013 not experienced such striking air pollution, these action plans would not have been put in place. These action plans drastically strengthened PM 2.5 reduction targets for the regions Beijing, Tianjin, Hebei as well as the Yangtze river delta and the Pearl river delta to 25%, 20% and 15% respectively by 2017 compared to 2012. Five-year Plan targets for these regions, which were in force at the time of publishing the action plans, only called for a reduction by 5% (Yangtze river delta and pearl river delta), 6% (Hebei and Tianjin) and 15% (Beijing) respectively. Additionally, Beijing committed to reaching an average annual PM 2.5 concentration of 60 µg/m³ by 2017, which would represent a reduction by 32% compared to the annual average concentration officially reported for 2012.

Evaluating the significance of the action plans is a more complex matter. It can be argued that these plans led to accelerated adoption of pollution control measures and in this context, a more effective implementation of existing laws and regulations on environmental protection. During the course of 2013 and 2014, the amendment of the environmental protection law was in the process. The updated law, which was put into force in 2015, addressed some of the misalignments that incentivized governments on a local level to ignore enforcement of existing regulations and increased penalties not only for unlawful pollution, but also explicitly for government officials who would turn a blind eye on unlawfully polluting premises. The amendment of the environmental protection law was not a consequence of the "Airpocalypse", however the combination of drastically increased PM 2.5 reduction targets of the Action plan likely increased pressure on the local government level to effectively implement measures for improving air quality. The amended environmental protection law in this context can contribute to increased local government pressure but also provide the instruments for more efficient pollution control on the local level.

In the context of China's governance institutions for air quality, the "Airpocalypse" thus directly triggered alterations on the formal institutional setup (level 2, or "the rules of the game", according to Williamson 2000, p. 598), which arguably has implications on the implementation of existing formal regulations (level 3, "the play of the game" Williamson 2000, p 598), in the sense that the leeway for non-implementation of existing rules was reduced.

This does not comprise a change that could be attributed as revolutionary or erratic, however, the policy response to the "Airpocalypse" was significant in a sense that it accelerated an existing policy trend of more forcefully addressing the problem of air pollution. In this sense, the assumption within the concept of new institutional economics holds true that institutional change, even though it was triggered by a focusing event, continued to be incremental and not "revolutionary". The fact that the action plans were published more than half a year after the timing of the "Airpocalypse" may be another indicator supporting this conclusion.

> How (if at all) did the "Airpocalypse" influence public perception on air pollution among Beijing residents?

This research question was examined by testing the hypothesis formulated for focusing events and the media agenda setting theory. Using this approach, a causal chain was assumed in which the "Airpocalypse" (as a focusing event) triggered massive media coverage on air pollution, that in turn elevated public attention on the issue to a new level. Besides the question if the "Airpocalypse" elevated public attention, the longevity of elevated attention was explored. In other words, it was estimated whether the "Airpocalypse" simply led to a short-term public outcry which would fade again with improving air quality, or whether it would elevate the issue of air pollution in the public mind in the mid- to long-term.

The intensity of media coverage was measured in a timeline, counting the daily frequency of the words "air pollution" and "Beijing" in online news articles. Parallel to the timeline on media reporting, the development of public attention to air pollution was indicated by a timeline on the number of daily Weibo posts by Beijing users in which the word "air pollution" appeared. Complementing the data from Weibo, a standardized survey was conducted among Beijing residents to gain further insights how they feel about air pollution as a problem.

The obtained empirical raw data was evaluated through visual analysis of timeline trends and distributions of survey responses. The most obvious finding was that the "Airpocalypse" indeed triggered massive news reporting in air pollution, which sustained high levels during the weeks after the event. Intense media coverage was likely the main factor which caused social media discussion (as expressed by Weibo post-frequencies) to dramatically increase as well during the days of the "Airpocalypse". From viewing qualitative timeline data, it can therefore be concluded that the "Airpocalypse" did elevate public attention at least in the short term, as the issue was under intensive discussion in online media and social media platforms. Media reporting and social media discussion decreased again towards the middle of 2013, leading to the question whether public attention was elevated only during the time of the "Airpocalypse" and its immediate aftermath or whether concern about air pollution increased over a longer term.

This question was explored through a standardized survey, the results of which indicated that as of 2014, respondents did view the problem of air pollution to be more important and more urgent to address compared to 2012. Conclusive judgements are however difficult, since results from other surveys conducted by the

Renmin University of China and the PEW Research Center are more ambiguous: While findings from the PEW Research center found a significant increase in respondent numbers considering air pollution to be a "very big" problem between 2012 and 2013, the Chinese General Social Survey (CGSS) conducted by the Renmin University is too inconsistent in its design over the years for extracting tendencies on how the public feels about air pollution. According to the CGSS, the majority of Beijing residents already felt air pollution to be the most significant environmental problem in 2010 and that environmental problems were considered either "relatively severe" or "very severe" by most respondents. The picture is roughly the same for the CGSS survey in 2013, in which most respondents stated air pollution to be either "relatively severe" or "very severe"; however, this feeling did not seem to translate into increased expectation towards the Chinese government on solving the problem, as most respondents attributed the government to diligently spend effort in improving the environmental situation.

While it is relatively clear that the "Airpocalypse" did lead to intense public discussion on air pollution in the short term, the available data is less indicative as to whether this elevated degree of public discussion translated into increased expectation and pressure towards the government to more effectively address the problem in the mid- and long term. This shortcoming is partly due to the lack of a consistent survey on environmental attitudes over time, thus the question on long-term alterations in public awareness about air pollution needs further exploration, which, due to the lack of consistent historic data can only be conducted in an ex post-approach.

The quantitative timeline-data set appears to be a useful indicator for measuring the short term intensity of media coverage and public discussion that was caused by historically high levels of air pollution in January 2013. Due to its quantitative nature however, the empirical timeline data did not take into account possible factors other than high PM 2.5 concentrations which may have impacted media coverage and public discussion as well. For example, it is likely that the publication of the government action plans on air pollution control did lead to visibly increased media reporting from September 2013 onwards, while public discussion on Weibo was not visibly elevated. Further inaccuracies of timeline data on media coverage and Weibo discussion may occur, as daily frequencies may also include posts or articles which are irrelevant for this study. Keeping such shortcomings in mind, the timeline data

extracted from online sources can be viewed as an insightful tool that is relatively easy to be implemented, but should be complemented by further empirical data in order to validate findings.

> How did the "Airpocalypse" differ from other instances of heavy air pollution in Beijing?

The study of this research question to some degree constitutes the core of the dissertation. This question builds upon the previous research on government response and public concern caused by the "Airpocalypse" and explores how the sociopolitical context during the "Airpocalypse" may have been different compared to previous events of severe air pollution in Beijing. In other words, based on the premise that the air pollution in January 2013 in Beijing did constitute a focusing event, the question of why the "Airpocalypse" developed focal power and other occurrences of heavy air pollution did not was examined. Thus, while the concept of focusing events was relevant but not central for evaluating the other two main research questions, this question was approached solely within the framework of focusing events. Regarding empirical material, timeline data on air pollution, media reporting and Weibo discussion was used to identify the "Airpocalypse" as a focusing event and the statements from expert interviews were evaluated in a qualitative content analysis to explore the main determining context factors which differentiated the "Airpocalypse" from other events of air pollution in Beijing.

While the other two research questions were explored with the more or less tacit assumption that the "Airpocalypse" would constitute a focusing event, the first step in evaluating this question was to identify the attributes which constituted the focal power of the "Airpocalypse" in more detail. Based on the timeline analysis, expert interview comments and also external literature it can be concluded that the "Airpocalypse" did show the typical attributes of a focusing event: In its intensity it was sudden and unexpected, it did cause considerable harm, was followed by media coverage and triggered government response.

The "Airpocalypse" showed the highest PM 2.5 concentrations in history, however there have been numerous previous events of severe air pollution showing several consecutive daily average concentrations which were "hazardous" by the classification of the air quality index and did not appear to be particularly impactful. Based on expert interviews, it can plausibly be concluded that four main factors

played a decisive role in differentiating the "Airpocalypse" from other events of air pollution, three of which more or less go back to actions of different government bodies:

First, the "Airpocalypse" did feature the highest air pollution levels in recorded history. Even though PM 2.5 concentrations reached "hazardous" levels before at a relatively regular basis, daily average concentrations exceeding 500 µg/m³ and hourly values even exceeding 800 µg/m³ were the absolute exception. Visibly darkened air outside made it obvious for any Beijing resident that this level of pollution was unusual.

Second, during the time of the "Airpocalypse", the Chinese government was in the process of transitioning from the presidency of President Hu Jintao to the administration of Xi Jinping. To a certain degree, this process opened a time window for readjusting government priorities. Based on interview statements, prime minister-to be Li Keqiang was said to be particular influential in promoting a more liberal government stance in terms of providing information about pollution and allowing the issue to be more openly discussed. Compared to the previous administration, the new government under Xi Jinping and Li Keqiang may also have been more willing to respond to the "Airpocalypse" with more ambitious plans.

Third, parallel timelines of air pollution levels and media coverage show little correlation except for a striking increase in media reporting during January 2013. Previous levels of air pollution were obviously not met with high media coverage. Interview comments suggest that this is due to the Chinese government consciously allowing media to report about the issue more intensely, while air pollution as a problem previously had to be downplayed. This intense media coverage was reflected by an unprecedented increase social media discussion, indicating that for the first time, air pollution was widely discussed in the general public.

Fourth, access to information: At the end of 2012, hourly PM 2.5 data from several hundred stations in 74 cities was published, dramatically improving publicly accessible information about air pollution and thus giving the general public official data allowing them to estimate precisely how serious the pollution of January 2013 actually was. Detailed information on air pollution informed and intensified media reporting and public discussion to an extent that would not have been possible previously.

These factors made it possible for the "Airpocalypse" to actually develop the attributes of a focusing event. In the Chinese context it becomes apparent that the causal dynamics which were triggered by the "Airpocalypse" were to a decisive degree enabled by the government. Relating back to the framework of this dissertation as a whole, the set of chosen theories appeared to be useful in explaining and interpreting the subject matter, however, shortcomings exist as well and a few remaining gaps need further empirical validation.

By and large, the “Airpocalypse” met the criteria of a focusing event. Sudden and obvious harm, followed by intense media coverage are the most important defining attributes in this context. Chinese media censorship, and the lack thereof during the “Airpocalypse” further highlighted the paramount importance of the media in elevating public attention and enabling an event to develop focal power. It is not entirely clear however, how elevated public attention through media coverage actually translated into pressure towards the government to respond adequately. The role of social media in this context was explored and it appears plausible that the Chinese government to a certain degree responded to sentiments expressed in microblogs such as Weibo, but on the other hand, the government also used social media as a tool to influence public opinion. The assumption made in this study, that the Chinese government response to the “Airpocalypse” was indeed caused by public pressure, is therefore plausible but remains speculative to a certain degree. In the case of the "Airpocalypse", public pressure did not visibly manifest itself in organized street protests but arguably in intense social media discussion. The extent to which the different levels of the Chinese government react to diffuse public sentiments and the role of social media in influencing government decisions remains to be further explored.

The defining attributes of focusing events implicitly suggest that the impacts and the political responses caused by them are by nature sudden, erratic or perhaps “revolutionary”. This notion slightly contradicts the framework of new institutional economics in which it is assumed that sudden, or revolutionary institutional changes are the exception and not the rule. The case of the “Airpocalypse”, while showing the attributes of a focusing event, did not appear to cause “revolutionary” changes either, but accelerated existing policy trends.

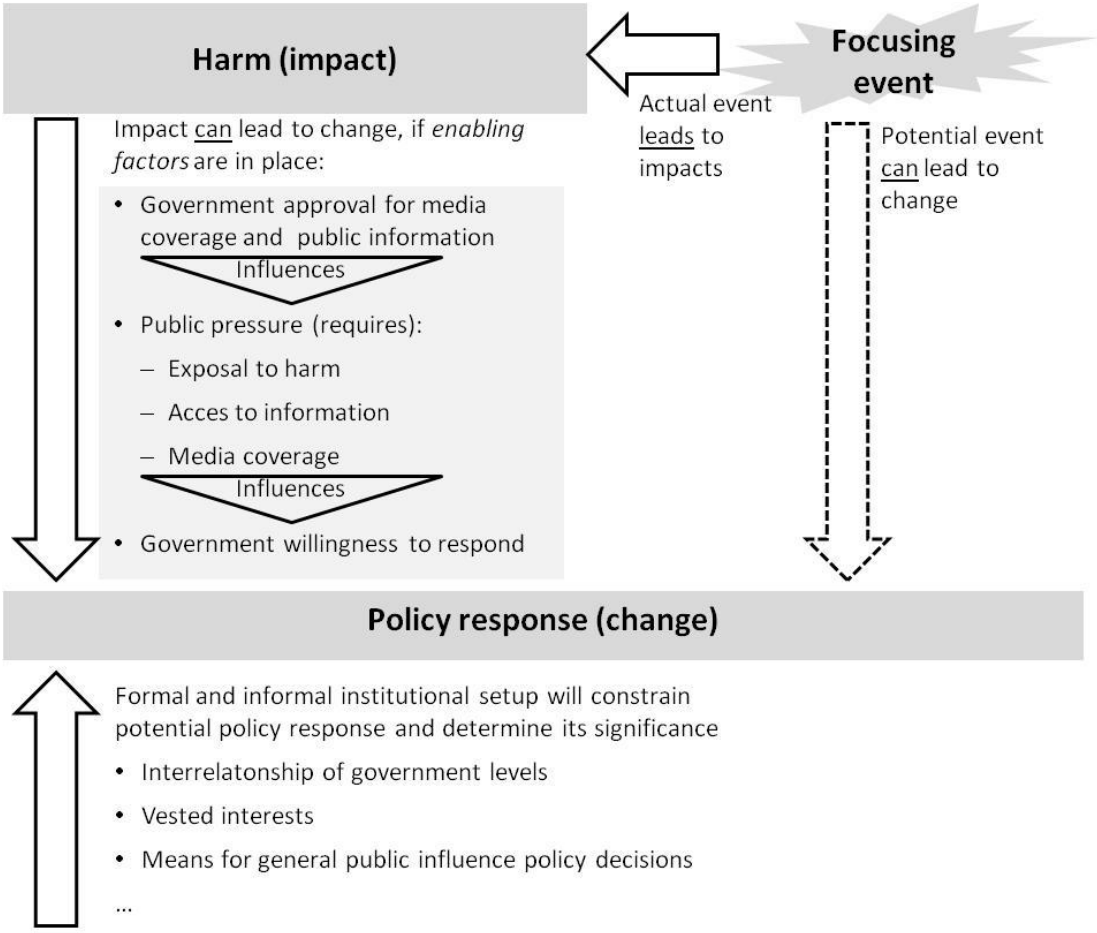
The focal potential of a catastrophic event and its impact on public attention and government policy appears to depend significantly on the surrounding institutional environment. In the Chinese context, this basically means that the central government possesses a high degree of control as to whether or not an event can develop focal power in the first place. The means for the government to influence the focal power of an event are through controlling media reporting and through directives towards lower government levels. It is important to note that the Chinese central government is a diffuse entity in which diverse organizations partly compete over influence and resources. Thus, actions and policies by different central government bodies are not necessarily aligned and diverse government agencies may react very differently towards a potentially focusing event, which in turn limits the overall leverage of the Chinese central government in terms of allowing an event to develop focal power and also in terms of establishing a response.

The three theoretical approaches used for this study may be meaningfully integrated to an abstract scheme that hypothetically explains the causalities, enabling factors and constraints which shape the political response to a focusing event (Figure 21).

This scheme is based on the findings of this study and constitutes an adaption of the model provided by Birkmann (2008). It may assist in identifying and explaining focusing events in the Chinese context. The main premise of this model is that the policy response to focusing events is influenced from two different sides: On one side, a focusing event by definition leads to tangible harm, however whether or not the the event leads to any significant political response depends largely on the degree of media coverage generated by it. Media coverage can translate into public attention and concern and build up pressure towards the government to respond adequately.

On the other side, the institutional framework of the governance system within which the focusing event took its course constraints the policy response and determines the options available to policy makers. The character of the policy response will in turn lead to an alteration of the institutional setup either on the level of formal laws and regulations, policy implementation or daily resource allocation, thus determining the overall relevance of the policy response in terms of scale and longevity. This sketch is speculative to some extent, and it may be further adapted with findings from similar case studies in the future.

Figure 21: Formation of policy response as a consequence of a focusing event



(Source: Own adaption based on Birkmann 2008, p. 7)

As a conclusive remark, this dissertation generally provided further empirical validation of the potential focal power of disastrous events in terms of impacting the public agenda and government policy. Case studies about environmental protests in China commonly explored local-level incidents which were caused by an identified single source and prompt citizens to protest because their livelihoods are under direct and obvious threat. The case of the "Airpocalypse" is different and touched an area which has been researched less extensively. The "Airpocalypse" was a hazardous event on a regional level, with no identifiable single source, no organized street protests and a policy response that goes back to the initiative of the central government. Arguably the causal mechanisms explored in local level case studies and regional hazards such as the "Airpocalypse" are different. This dissertation contributes to filling this gap in explaining the causalities of a large scale environmental hazard in China.

8. Zusammenfassung

Die beispiellose wirtschaftliche Entwicklung in China seit Ende der 1970er Jahre hat einen Großteil der chinesischen Bevölkerung aus existenzieller Armut befreit. Diese Entwicklung ging jedoch einher mit starker Umweltverschmutzung. Die teilweise extreme Luftverschmutzung in chinesischen Städten ist das offensichtlichste Symptom dieses Problems. Eine Hauptursache für die Umweltzerstörung in China liegt in den institutionellen Rahmenbedingungen für den Umweltschutz: Dadurch, dass die Zentralregierung stets das Wirtschaftswachstum priorisiert hat, hatten Regierungen auf Provinz- und lokaler Ebene wenig Anreiz, gültige Umweltschutzgesetze und -regularien tatsächlich umzusetzen. Auch in der öffentlichen Wahrnehmung spielte die Umweltproblematik meist eine untergeordnete Rolle.

Feinstaub mit einem Durchmesser von maximal 2,5 Mikrometern ("PM 2,5") gilt als einer der bedeutendsten Luftschadstoffe. Feinstaub mit dieser niedrigen Korngröße tritt bei Einatmung direkt in den menschlichen Blutkreislauf ein, erhöht das Lungenkrebsrisiko und reduziert die Lebenserwartung. Je nach Region und Jahreszeit gehören die Stromerzeugung durch Kohleverbrennung, die Stahlproduktion, Lastwagen mit veralteten Dieselmotoren oder die Verbrennung von Agrarabfällen zu den wichtigsten Entstehungsquellen für Feinstaub. Diese Quellen emittieren sowohl primären Feinstaub als auch Vorläufergase, die sich in der Atmosphäre zu sekundärem Feinstaub zusammensetzen und über lange Distanzen transportiert werden können.

Die Stadt Peking wird regelmäßig von starker Luftverschmutzung und hohen Feinstaubkonzentrationen heimgesucht, was auch an ungünstigen geographischen Bedingungen vor Ort liegt: Die Stadt ist im Norden und Nordwesten vom Yan-Gebirgszug umschlossen. Südlich der Stadt, in der Provinz Hebei, liegen mehrere Zentren der Schwerindustrie (wie z.B. Stahl- und Zementproduktion), die große Mengen an Feinstaub emittieren. Diese Feinstaubmengen akkumulieren sich bei Süd und Südostwind im Raum Peking, wo der Yan-Gebirgszug die weitere Verteilung der Feinstaubpartikel verhindert und dadurch mit ursächlich für regelmäßige Phasen starker Luftverschmutzung in Peking ist.

Vom 12. bis 14. Januar 2013 hat die Stadt Peking die bis dato stärkste Luftverschmutzung, mit historischen Höchstwerten in der tagesdurchschnittlichen Feinstaubkonzentration erfahren. Über diese Phase berichteten auch internationale Medien, welche dem Ereignis den Namen "Airpocalypse" gaben. Aus Gesprächen mit Fachexperten zur chinesischen Umweltpolitik entstand der Eindruck, dass diese Phase extremer Luftverschmutzung einen öffentlichen Bewusstseinswandel und Politikwechsel in der Luftreinhaltung bewirkt haben könnte.

Ziel dieser Dissertation ist es, die Signifikanz der "Airpocalypse" zu erforschen. Speziell wird den Fragen nachgegangen, ob 1) die "Airpocalypse" direkter Auslöser für bestimmte politische Reaktionen war, 2) ob die "Airpocalypse" einen Wandel im öffentlichen Problembewusstsein hinsichtlich Luftverschmutzung ausgelöst hat und 3) welche Situationsfaktoren die "Airpocalypse" von früheren Phasen extremer Luftverschmutzung unterschieden.

In dieser Studie wird die "Airpocalypse" im Rahmen des theoretischen Ansatzes der *Focusing Events* (nach Birkland 1997) als ein plötzliches und schädliches Ereignis charakterisiert, welches intensive Medienberichterstattung auslöste, das öffentliche Bewusstsein zum Thema Luftverschmutzung zumindest kurzfristig anhob und damit die Regierung unter Druck setzte zu Reagieren. Die Dissertation stützt sich zudem auf die Annahmen aus zwei weiteren theoretischen Konzepten, namentlich *Media Agenda Setting* (McCombs and Shaw 1972) zur Evaluierung des öffentlichen Problembewusstseins zum Thema Luftverschmutzung, so wie *New Institutional Economics* (nach Williamson 1975) für den Analyserahmen der politischen Reaktionen, welche durch die "Airpocalypse" ausgelöst wurden.

Die empirischen Daten für dieses Dissertationsprojekt wurden durch qualitative Interviews mit Fachexperten zur chinesischen Umweltpolitik, durch quantitative Zeitreihendaten für Feinstaubkonzentration, Medienberichterstattung und Online-Diskussion sowie durch die Durchführung einer standardisierten Umfrage zum Problembewusstsein für Luftverschmutzung erhoben.

Ergebnisse der Studie zeigen, dass die "Airpocalypse" tatsächlich eine Reaktion der chinesischen Zentralregierung und der Stadtregierung Pekings ausgelöst hat. Beide Ebenen haben für den Zeitraum 2012 bis 2017 verbindliche Feinstaubreduktionsziele veröffentlicht, welche deutlich ehrgeiziger sind als die Ziele im bis dato gültigen 12.

Fünfjahresplan. Das nach der "Airpocalypse" veröffentlichte Feinstaubreduktionsziel für Peking entspricht einer Verringerung der tagesdurchschnittlichen Feinstaubkonzentration um 32%, von offiziell 89 µg/m³ im Jahr 2013, auf angestrebte 60 µg/m³ für 2017. Angesichts der mehr oder weniger stagnierenden Durchschnittswerte der vorangegangenen Jahre (nach Daten der US-Botschaft in Peking variierte der Jahresdurchschnitt in der Feinstaubkonzentration zwischen 91 µg/m³ und 105 µg/m³ von 2009 bis 2013) ist dieses Ziel äußerst ehrgeizig. Dieser Plan ist ungewöhnlich in der Klarheit der Zielsetzung und lässt (im Gegensatz zu vielen vorherigen Umweltplanungen) eine unabhängige Überprüfung der Erreichung des Feinstaubreduktionszieles zu. Ähnlich ehrgeizige Zielsetzungen für die Feinstaubreduzierung wurden auch für andere Regionen (speziell für Tianjin, Hebei, das Yangtze-Delta und das Perlflussdelta) veröffentlicht, wodurch Stadtregierungen landesweit unter Druck gesetzt wurden Umweltschutzmaßnahmen effektiver durchzusetzen.

Die Frage, inwieweit die "Airpocalypse" zu einer Änderung des öffentlichen Bewusstseins zu Luftverschmutzung beigetragen hat, ist indes weniger eindeutig zu beantworten. Die "Airpocalypse" hat erstmalig intensive Berichterstattung seitens chinesischer Medien und online-Diskussion auf der Plattform Weibo ausgelöst. Die eigens durchgeführte Umfrage impliziert ebenfalls, dass das Thema Luftverschmutzung in der Öffentlichkeit zwischen 2012 und 2014 an Wichtigkeit zugenommen hat. Es ist allerdings nicht ganz eindeutig, inwieweit dieser Wahrnehmungswandel eine direkte Auswirkung der "Airpocalypse" ist. Ein erschwerender Umstand in diesem Zusammenhang ist, dass eine solche Erhebung lediglich ex-post durchgeführt werden kann, da keine über mehrere Jahre konsistenten Umfrageergebnisse zum Thema Umweltbewusstsein verfügbar sind. Durch die außergewöhnliche Intensität der Luftverschmutzung und Medienberichterstattung während der "Airpocalypse" ist jedoch die Schlussfolgerung naheliegend, dass sich durch dieses Ereignis auch die mittel- bis langfristige öffentliche Wahrnehmung zu Luftverschmutzung erhöht hat.

Im Gegensatz zu vorherigen Ereignissen extremer Luftverschmutzung in Peking hat die "Airpocalypse" intensive Medienberichterstattung, öffentliche Diskussion und eine politische Reaktion ausgelöst. Die wichtigsten Situationsfaktoren, welche im Unterschied zu vorherigen Verschmutzungsereignissen zu einer solchen Reaktion

während und nach der "Airpocalypse" geführt haben wurden von Interviewpartnern beschrieben und können wie folgt zusammengefasst werden:

1) Historisch hohe Feinstaubkonzentration: Es gab schon vor der "Airpocalypse" Phasen extremer Luftverschmutzung, jedoch markiert dieser Abschnitt am 12. Januar 2013 die höchste bis dato gemessene Feinstaubkonzentration nach Tagesdurchschnitt, so dass dieses Ereignis selbst im Kontext der generell hohen Luftverschmutzung in Peking als extrem zu bezeichnen ist.
2) Stärkerer politischer Wille, die Luftverschmutzung effektiv zu bekämpfen: Die "Airpocalypse" fand im Zeitrum des Regierungswechsels von der Präsidentschaft Hu Jintaos zur Präsidentschaft Xi Jinpings statt, was möglicherweise gewisse Gestaltungsspielräume eröffnet hat. Speziell der designierte Premierminister Li Keqiang hat sich laut Interviewkommentaren persönlich für eine aggressivere Linie im Bereich Umweltschutz eingesetzt.
3) Zulassung einer intensiven Diskussion und Medienberichterstattung zum Thema: Eine intensive Berichterstattung zu Luftverschmutzung fand vor der "Aipocalypse" in den chinesischen Medien nicht statt. Die Zentralregierung hat während der "Airpocalypse" diese Art der Berichterstattung und Diskussion bewusst zugelassen um auf diese Weise den Druck auf die lokale Regierungsebene zu erhöhen, das Problem der Luftverschmutzung effektiver anzugehen.
4) Zugang zu Informationen: Wenige Wochen vor der extremen Luftverschmutzung im Januar 2013 wurden stündliche Feinstaubkonzentrationswerte in 74 chinesischen Städten fortlaufend veröffentlicht, wodurch die Ernsthaftigkeit des Problems erstmalig auch mit aktuellen Daten einer breiteren chinesischen Öffentlichkeit vermittelt wurde. Somit bestand auch während der "Airpocalypse" ein wesentlich besserer Informationszugang für die Einschätzung des Problems.

Diese Arbeit bestätigt die hohe Bedeutung von Medienberichterstattung für die Priorisierung bestimmter Themen in der Öffentlichkeit und die Hervorrufung einer politischen Reaktion. Ein weiteres wichtiges Resultat im spezifischen Kontext Chinas ist, dass die politische Reaktion auf die "Airpocalypse" zwar einerseits auf öffentlichen Druck hin hervorgerufen wurde, andererseits jedoch die kritische Diskussion zunächst bewusst durch die Regierung selbst zugelassen wurde. Durch

die hohe Kontrolle des chinesischen Staates über die Medienberichterstattung hat die chinesische Regierung - im Gegensatz zu demokratischen Systemen - eine hohe Kontrolle darüber, welche Signifikanz ein potentielles disruptives Ereignis (bzw. ein *Focusing Event*) tatsächlich entfaltet.

Die Ergebnisse dieser Arbeit lassen sich in ein theoretisches Modell integrieren, welches auf den Ansätzen von *Focusing Events*, *Media Agenda Setting* und *New Institutional Economics* aufbaut. Kernaussage dieses Konzeptes ist, dass die politische Reaktion auf ein potentielles disruptives Ereignis in China im wesentlichen von 1) der Intensität der Medienberichterstattung und dem politischen Willen für eine Reaktion und 2) von den institutionellen Rahmenbedingungen des Regierungssystems abhängt, welches die Optionen einer politischen Reaktion determiniert.

Literature

Andrews, S. Q. (2011): Beijing's hazardous blue sky. in: China Dialogue, 05.12.2011 - https://www.chinadialogue.net/article/show/single/en/4661-Beijing-s-hazardous-blue-sky (access: August 7, 2014)

Andrews-Speed, P. 2010: The Institutions of Energy Governance in China. - www.ifri.org/downloads/noteandrewsspeedenergychina_1.pdf (access: Nov. 22, 2013)

Beijing Environmental Protection Bureau (Beijing EPB) (2014): 2013年北京市PM2.5年均浓度89.5微克/立方米 [The average PM2.5 concentration in Beijing in 2013 was 89μg/m³]. - http://www.bjepb.gov.cn/bjepb/323474/331443/331937/333896/383912/index.html (accessed: January 18, 2015)

Beijing Municipal Government (2013): 北京市人民政府办公厅关于印发北京市2013-2017年清洁空气行动计划重点任务分解的通知[The office of the People's government of Beijing publishes 2013-2017 Action Plan on Air Pollution Prevention and Control]. - http://www.bjyj.gov.cn/flfg/bs/zr/t1139285.html (access: August 09, 2014)

Beyer, S. (2006): Environmental Law and Policy in the People's Republic of China. in: Chinese Journal of International Law 2006, Vol. 5, No. 1, 185–211

Birkland, T. A. (1996): Natural Disasters as Focusing Events: Policy Communities and Political Response. in: International Journal of Mass Emergencies and Disasters, August 1996, Vol. 14, No. 2, pp. 221-243

Birkland, T. A. (1997): After Disaster: Agenda Setting, Public Policy, and Focusing Events. Washington D.C.

Birkland, T. A. (2006): Lessons of Disaster: Policy Change after Catastrophic Events. Washington D.C.

Birkmann, J.; Buckle, P.; Jaeger, J.; Pelling, M.; Setiadi, N.; Garschagen, M.; Fernando, N.; Kropp, J. (2008): Extreme events and disasters: a window of opportunity for change? Analysis of organizational, institutional and political changes, formal and informal responses after mega-disasters. in: Nat Hazards DOI 10.1007/s11069-008-9319-2

Bishop, B. H. (2013): Focusing Events and Public Opinion: Evidence from the Deepwater Horizon Disaster. in: Polit Behav (2014) 36:1–22 DOI 10.1007/s11109-013-9223-7

Brødsgaard, K. E.; Grünberg, N. (2013): Leadership Changes and Structural Reform After the 18th Party Congress in China. in: The Copenhagen Journal of Asia Studies Vol 31, No 1 (2013)

Central People's Government of the People's Republic of China (Central People's Government; 2012): 74个城市将按空气质量新标准发布PM2.5等数据 [74 Major Cities will according to new air quality standard publish PM 2.5 and other data]. - http://www.gov.cn/jrzg/2012-12/28/content_2301334.htm (access: July 20, 2016)

Chen Y.; Ebenstein, A.; Greenstone, M.; Li, H. (2013): Evidence on the impact of sustained exposure to air pollution on life expectancy from China's Huai River policy. - http://poseidon01.ssrn.com/delivery.php?ID=004020091089126115018087006089004075120015077012021005105005109113074127101112097030041107053119007034112081093103126068026001053026022082043003070000118072078100090015042078011127112093029074121099101104004105096113094000094103015119111014083097017&EXT=pdf (access: February 13, 2016)

China Labs; Zhejiang Institute of Media and Communications (2013): 2012年~2013年微博发展研究报告[2012 to 2013 Weibo Development Research Report]. - http://video.zj.com/cns/20122013weibo.pdf (access: August 16, 2014)

Cohen, B. C. (1963): The press and foreign policy. Princeton.

Downs, E. S. (2008): China's "New" Energy Administration. - http://frankhaugwitz.eu/doks/policy/2008_11_China_NEA_Brookings.pdf (access: Nov. 22, 2013)

Embassy of the United States to China (n.d.): Beijing - Historical Data. - http://www.stateair.net/web/historical/1/1.html (access: June 15, 2014)

Finamore, B. (2014): New Weapons in the War on Pollution: China's Environmental Protection Law Amendments. - http://switchboard.nrdc.org/blogs/bfinamore/new_weapons_in_the_war_on_poll.html (access: June 15, 2014)

Joel R. Evans, J. R. and Mathur, A. (2005),"The value of online surveys", Internet Research, Vol. 15 Iss 2 pp. 195 - 219

Giger, N.; Klüver, H. (2012): Focusing events and policy change: The aftermath of Fukushima. - https://www.researchgate.net/profile/Heike_Kluever2/publication/262412496_Focusing_events_and_policy_change_The_aftermath_of_Fukushima/links/02e7e537a0d96d512f000000.pdf (access: August 15, 2016)

Gläser, J.; Laudel, G. (2009): Experteninterviews und qualitative Inhaltsanalyse als Instrumente rekonstruierender Untersuchungen. Wiesbaden.Guan, D.; Liu, Z. (2013): Tracing back the Smog: Source Analysis and Control Strategies for PM2.5 Pollution in Beijing-Tianjin-Hebei. - http://www.greenpeace.org/eastasia/Global/eastasia/publications/reports/climate-energy/2013/Tracing%20back%20the%20smog%20(English%20full%20report).pdf (access: July 20, 2016)

Guo, X. (2001): Dimensions of guanxi in Chinese elite politics. in: The China Journal 46, p. 69-90

Harris, P. G. (2006): Environmental Perspectives and Behavior in China - Synopsis and Bibliography. - http://envpsych.voices.wooster.edu/files/2011/08/Harris.pdf (access: April 3, 2015)

Howell, J. (2006): Reflections on the Chinese state. in: Development and Change 37 (2), p. 273-297

Hu, D.; Jiang, J. (2013): A Study of Smog Issues and PM2-5 Pollutant Control Strategies in China. in: Journal of Environmental Protection, 2013, 4, 746-752

Institute for Global Environmental Strategies (IGES) (2014): Major Developments in China's National Air Pollution Policies in the Early 12th Five-Year Plan. http://pub.iges.or.jp/modules/envirolib/upload/4954/attach/Major_Developments_in_China's_Air_Pollution_Policies_March2014.pdf (access: October 14, 2014)

Institute of Public and Environmental Affairs (IPE); Society of Entrepreneurs & Ecology; Renmin University of China; Friends of Nature; Envirofriends; Nature University (2014): Real-Time Disclosure Begins. - http://www.ipe.org.cn/Upload/IPE-Reports/Report-Blue-Sky-Roadmap-II-EN.pdf (access: August 09, 2014)

Ji, D.; Li, L.; Wang, Y.; Zhang, J.; Cheng, M.; Sun, Y.; Liu, Z.; Wang, L.; Tang, G.; Hu, B.; Chao, N.; Wen, T.; Miao, H. (2014): The heaviest particulate air-pollution episodes occurred in northern China in January, 2013: Insights gained from observation. in: Atmospheric Environment 92 (2014) 546e556

Kapucu, N. (2008): Making Matters Worse - An Anatomy f Leadership Failures in Managing Catastrophic Events. in: Administration and Society; doi:10.1177/0095399708323143

Kay, S.; Zhao, B.; Sui, D. (2014): Can Social Media Clear the Air? A Case Study of the Air Pollution Problem in Chinese Cities. in: The Professional Geographer, DOI: 10.1080/00330124.2014.970838

Kim, S. T.; Lee, Y. H. (2006): New functions of Internet mediated agenda-setting:

Agenda-rippling and reversed agenda-setting. in: Korean Journal of Journalism and

Communication Studies, 50(3), 175–205.

Malhotra, N. K. (2006): Questionnaire Design and Scale Development. in: Grover, R.; Vriens, M. (ed.): The handbook of marketing research: uses, misuses, and future advances. SAGE Publications.

McCombs, M.; Shaw, D. (1972). The agenda-setting function of mass media. in: Public Opinion Quarterly, 36, 176-185.

McCombs, M., T. (2002). The Agenda-Setting Role of the Mass Media in the Shaping of Public Opinion. http://www.infoamerica.org/documentos_pdf/mccombs01.pdf (access: July 5, 2015)

Meraz, S. (2009): Is There an Elite Hold? Traditional Media to Social Media Agenda Setting Influence in Blog Networks. in: Journal of Computer-Mediated Communication, doi:10.1111/j.1083-6101.2009.01458.x

Ministry of Environmental Protection of the People's Republic of China (MEP) (n.d.): 北京市空气质量日报分析 [Daily analysis of air quality in Beijing]. - http://datacenter.mep.gov.cn (access: April 13, 2014)

Ministry of Environmental Protection of the People's Republic of China (MEP) (2008): Mission. - http://english.mep.gov.cn/About_SEPA/Mission/200803/t20080318_119444.htm (access: July 27, 2014)

Ministry of Environmental Protection of the People's Republic of China (MEP) (2008a): China National Environmental Protection Plan in the Eleventh Five-Years（2006-2010). - http://english.mep.gov.cn/down_load/Documents/200803/P020080306440313293094.pdf (access: August 15, 2014)

Ministry of Environmental Protection of the People's Republic of China (MEP) (2012): 重点区域大气污染防治“十二五”规划[12th Five Year-Plan on air pollution control in key regions]. - http://www.zhb.gov.cn/gkml/hbb/gwy/201212/W020121205566730379412.pdf (access: August 15, 2014)

Ministry of Environmental Protection of the People's Republic of China (MEP) (2013): 李克强谈空气污染治理问题：我们必须有所作为[Li Keqiang on air pollution: We must act]. - http://www.mep.gov.cn/zhxx/hjyw/201301/t20130115_245169.htm (access: August 09, 2014)

Ministry of Environmental Protection of the People's Republic of China (MEP) (2013a): 2013 年中国环境状况公报[2013 Report on the Environmental Situation]. - http://jcs.mep.gov.cn/hjzl/zkgb/2013zkgb/ (access: August 14, 2014)

Ministry of Environmental Protection of the People’s Republic of China (MEP; 2014): 环境保护部发布 2013 年重点区域和 74 个城市空气质量状况[Ministry of Environmental Protection Announcement on Air Quality Situation of 74 Focus Cities]. - http://www.zhb.gov.cn/gkml/hbb/qt/201403/t20140325_269648.htm (access: February 2, 2016)

Mol, A. P. J. (2010): Sustainability as global attractor: The greening of the (2008) Beijing Olympics. In: Global Networks, February 2010. - https://www.researchgate.net/profile/Arthur_Mol/publication/229480151_Sustainability_as_global_attractor_the_greening_of_the_2008_Beijing_Olympics/links/02e7e515d20960ad09000000.pdf (access: December 17, 2015)

National Aeronautics and Space Administration (NASA; n.d.): Worldview. - https://earthdata.nasa.gov/labs/worldview/ (access: January 31, 2016)

National People's Congress of the People's Republic of China (2014): 北京市大气污染防治条例[Key measures to control air pollution in Beijing]. - http://www.npc.gov.cn/npc/xinwen/dfrd/bj/2014-01/22/content_1824468.htm (access: August 09, 2014)

Neuman, W. R.; Guggenheim, L.; Jang, S. M.; Bae, S. Y. (2014): The Dynamics of Public Attention: Agenda-Setting Theory Meets Big Data. in: Journal of Communication 64 (2014) 193–214

North, D. C. (1990): Institutions, Institutional Change and Economic Performance. Cambridge.

North, D. C. (1991): Institutions. in: Journal of Economic Perspectives, 5(1): 97-113.

PEW Research Center (2013): Environmental Concerns on the Rise in China. - http://www.pewglobal.org/files/2013/09/Pew-Global-Attitudes-Project-China-Report-FINAL-9-19-132.pdf (access: April 4, 2015)

Rafiqui, P. S. (2009): Evolving economic landscapes: Why new institutional economics matters for economic geography. in: Journal of Economic Geography, 9(3): 329-353.

Ran, R. (2013): Perverse Incentive Structure and Policy Implementation Gap in China's Local Environmental Politics. in: Journal of Environmental Policy & Planning, 15:1, 17-39, DOI: 10.1080/1523908X.2012.752186

Renmin University of China (2010): 中国综合社会调查 [Chinese General Social Survey]. - http://www.cnsda.org/index.php?r=projects/view&id=15553986 (access: July 27, 2016)

Renmin University of China (2013): 中国综合社会调查 [Chinese General Social Survey]. - http://www.cnsda.org/index.php?r=projects/view&id=93281139 (access: July 27, 2016)

Richter, R. (2005): The New Institutional Economics - Its Start, Its Meaning , Its Prospects. - http://www.uni-saarland.de/fak1/fr12/richter/institut/the_new_institutional_economics.pdf (access: August 10, 2014)

Rössler, P. (2016): The Agenda-Setting Function of Mass Media von Maxwell E. McCombs und Donald L. Shaw (1972). in: Potthoff M. (ed.): Schlüsselwerke der Medienwirkungsforschung. Wiesbaden.

Satikawa, E. (2014): China's War on Air Pollution. - http://www.chinacenter.net/2014/china_currents/13-2/chinas-war-on-air-pollution/ (access: June 17, 2016)

Schiavenza, M. (2013): Beijing's Air Quality Crisis May Have Had a Siver Lining. in: Citylab - http://www.citylab.com/politics/2013/01/beijings-air-quality-crisis-may-have-had-silver-lining/4428/ (access: June 16, 2016)

Schwabe, J.; Hassler, M. (2016): The impact of periodic air pollution peaks in Beijing on air quality governance in China. in: Die Erde Vol. 147 No. 1/2016

Schreifels, J.; Fu, Y.; Wilson, E. (2012): Sulfur dioxide control in China: policy evolution during the 10th and 11th Five-year Plans and lessons for the future. in: Energy Policy 48 (2012) 779–789

Shoemaker, P. J.; Reese, S. D. (2014): Mediating the message in the 21st century: A media sociology perspective. New York, NY: Allyn and Bacon.

State Council of the People's Republic of China (2013): 国务院关于印发大气污染防治行动计划的通知[State council announces Action Plan on Air Pollution Prevention and Control]. - http://www.gov.cn/zwgk/2013-09/12/content_2486773.htm (access: August 16, 2014)

State Council of the People's Republic of China (2014): 中华人民共和国环境保护法（主席令第九号）[Environmental Protection Law of the People's Republic of China (9th Issue, signed by Chairman)]. - http://www.gov.cn/zhengce/2014-04/25/content_2666434.htm (access: June 15th, 2014)

State Council of the People's Republic of China (2014a): 国务院办公厅关于印发大气污染防治行动计划实施情况考核办法（试行）的通知 [Office of the State Council on the implementation of the Air Pollution Control and Prevention Action Plan]. - http://www.gov.cn/zhengce/content/2014-05/27/content_8830.htm, (access: June 15th, 2014)

State Council of the People's Republic of China (2014b): 李克强：要像对贫困宣战一样 坚决向污染宣战[Li Keqiang: We will fight pollution as resolutely as we

fought poverty].- http://www.gov.cn/zhuanti/2014-03/06/content_2631811.htm (access: August 13, 2014)

State Environmental Protection Agency (SEPA) (n.d.): The National Tenth Five-Year Plan for Environmental Protection (Abstract). - http://english.sepa.gov.cn/plan/Tenth.htm (access: August 15, 2014)

Sun, Y.; Zhuang, G.; Wang, Y.; Han, L.; Guo, J.; Dan, M.; Zhang, Z.; Hao, Z. (2004): The air-borne particulate pollution in Beijing - concentration, composition, distribution and sources. in: Atmospheric Environent vol. 38, 2004, p. 5991-6004.

The Central People's Government of the People's Republic of China (2012): 中华人民共和国环境保护法[Environmental Protection Law of the People's Republic of China]. - http://www.gov.cn/fwxx/bw/hbzj/content_810469.htm (access: August 15, 2014)

The International Council on Clean Transportation (ICCT) (2014): China V Gasoline and Diesel Fuel Quality Standards. - http://www.theicct.org/sites/default/files/publications/ICCTupdate_ChinaVfuelquality_jan2014.pdf (access: August 09, 2014)

Tiezzi, S. 2014: China Revises Environmental Law for the First Time Since 1989. in: The Diplomat. - http://thediplomat.com/2014/04/china-revises-environmental-law-for-the-first-time-since-1989/ (access: January 18, 2015)

Trenaman, J., and McQuail, D. (1961): Television and the political image.

United States Environmental Protection Agency (EPA; 2015): Particulate Matter (PM). - http://www3.epa.gov/pm/health.html (access: February 13, 2016)

U.S. Geological survey (n.d.): http://edcftp.cr.usgs.gov/pub/data/gtopo30/global (access: August 17, 2016)

van Acken, T. (2013): Making the Grade. in: China Environment Series (Special Water and Energy Issue), p. 121-128. - http://issuu.com/wilsoncef/docs/cef_ces_vol12/7?e=8516579/5495194 (access: January 18, 2015)

van de Ven, J. (2014): Air pollution policy making and social media in Beijing, 2011-2013. - http://www.danwei.com/beijing-fog-investigating-air-pollution-policy-making-in-beijing-between-2011-and-2013/ (access: August 28th, 2014)

van Rooj, B. (2010): The People vs. Pollution: understanding citizen Action against pollution in China. In: Jornal of Contemporary China, 19:63, 55-77

Wagner, D. V. (2013): timeline of china's official responses to recent severe pollution. - http://www.livefrombeijing.com/2013/01/timeline-of-chinas-official-resonses-to-recent-severe-pollution/ (access: August 09, 2014)

Weibo (2016): Business Overview. - http://ir.weibo.com/phoenix.zhtml?c=253076&p=irol-homeprofile (access: July 7, 2016)

Williams, L. (2009): Managing the Air - Environmental Governance of China's Air Quality. - http://www.american.edu/sis/gep/upload/Larke-Williams-s-SRP-Managing-the-Air.pdf (access: July 20, 2014)

Williamson, O. E. (1975): Markets and Hierarchies: Analysis and Antitrust Implications. New York.

Williamson, O. E. (2000): The new institutional economics: taking stock and looking ahead. - Journal of Economic Literature vol.37, p. 595-613

Wilson, D. C.; Branicki, L.; Sullivan-Taylor, B; Wilson, A. D. (2010): Extreme events, organizations and the politics of strategic decision making. in: Accounting, Auditing & Accountability Journal, Vol. 23 Iss 5 pp. 699 - 721

Wolfe, M.; Jones, B. D.; Baumgartner, F. R. (2013): A Failure to Communicate: Agenda Setting in Media and Policy Studies. in: Political Communication, 30:2, 175-192, DOI: 10.1080/10584609.2012.737419

World Bank; Development Research Center of the State Council (2014): "中国：推进高效、包容、可持续的城镇化" [China: Promoting Highly Efficient, Inclusive and Sustainable Cities and Municipalities]. - http://www.cssn.cn/dybg/gqdy_ttxw/201403/W020140328524920426573.pdf (access: January 18, 2015)

World Bank (2014a): GDP growth (annual %). - http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?page=1 (access: August 14, 2014)

World Health Organization (WHO) (2005): WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. -

http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf (access: January 18, 2015)

World Health Organization (WHO) (2013): Health Effects of Particulate Matter. http://www.euro.who.int/__data/assets/pdf_file/0006/189051/Health-effects-of-particulate-matter-final-Eng.pdf (access: January 18, 2015)

Xu, B. (2014): Media Censorship in China. in: Council of Foreign Relations - http://www.cfr.org/china/media-censorship-china/p11515 (access on June 17, 2016)

Xue, B; Mitchell, B.; Geng, Y.; Ren, W.; Müller, K.; Ma, Z.; Puppim de Oliveira, J. A.; Fujita, T.; Tobias, M. (2013): A review on China's pollutant emissions reduction assessment. in: Ecological Indicators 38 (2014) 272– 278

Yu, L.; Wang, G.; Zhang, R.; Zhang, L.; Song, Y.; Yu, B.; Li, X.; An, K.; Chu, J. (2013): Characterization and Source Apportionment of PM2.5 in an Urban Environment in Beijing. in: Aerosol and Air Quality Research, vol. 13, 2013, p. 574–583

Zhang, M. Q. (2013): 2013 年 1 月中国大面积雾霾事件直接社会经济损失评估 [An evaluation of the economic loss due to the heavy haze during January 2013 in China]. in: 中国环境科学[China Environmental Science] 2013,33 (11): 2087-2094.

Appendix I

Interviewpartner

Da die interviews anonym geführt wurden, werden an dieser Stelle die Organisationsarten genannt, welche die Interviewpartner vertraten. Es wurden insgesamt elf offene Interviews mit Fachexperten geführt, welche sich beruflich mit dem Thema Umwelt und Luftverschmutzung in China auseinandergesetzt haben. Folgende Organisationsarten waren dabei vertreten:

- (Nichtchinesische) Regierungsorganisationen (2 Interviews)
- Nichtregierungsorganisationen (2 Interviews)
- Universitäten (4 Interviews)
- Unternehmen (3 Interviews)

Interviewguideline

Anmerkung: Die Gespräche wurden als offene Interviews geführt. Die tatsächlichen Gesprächsverläufe konnten je nach individueller Expertise des Gesprächspartners und inhaltlichem Schwerpunkt des Interviews leicht von dieser Guideline abweichen.

- What was the overall significance of the air pollution in January 2013 in Beijing ("Airpocalypse")?

- Which, if any, actions by the central and local governments can be directly attributed as a response to the "Airpocalypse"?

- How will those actions presumably influence pollution control in China in terms of:
    - Central government guidelines?
    - Enforcement of central government guidelines?
    - Local government implementation?

- What is the difference of the "Airpocalypse" compared to previous events of heavy air pollution in Beijing in terms of:
    - Government response?
    - Government reasoning?
    - Media reporting?
    - Public concern?

- Why did following factors play out differently during the "Airpocalypse" compared to previous events of heavy air pollution:
    - Government response?
    - Media reporting?
    - Public concern?

Standardisierter Fragebogen

161 responses from Beijing citizens

Age groups:

Age	N
<=20	0
21-30	84
31-40	71
41-50	5
51-60	1
61-70	0
>70	2

您第一次注意到空气污染问题是什么时候？

When did the air pollution problem first come to your attention?

1985	1
1986	0
1987	0
1988	0
1989	0
1990	1
1991	0
1992	0
1993	0
1994	0
1995	1
1996	1
1997	0
1998	1
1999	2
2000	3
2001	2
2002	3
2003	1

2004	0
2005	3
2006	3
2007	4
2008	17
2009	11
2010	14
2011	14
2012	32
2013	35
2014	3
(blank)	9
Grand Total	161

您通过什么渠道第一次了解到空气污染问题？（多选）

Through which channels did you first learn about the air pollution problem? (Multiple choice)

Through NGO activities	14
Ministry of Environmental Protection air quality index	32
Traditional media (newspapers, magazines, TV)	44
U.S. Embassy air quality index reporting	53
Social media (e.g. Weibo, Weixin, QQ, etc...)	61
Personal conversations with colleagues, friends and/or relatives	65
Online news portals	88
Outside air visibily bad	144

空气污染问题与其他影响日常生活的问题，例如食品安全、交通安全、经济危机等相比，您如何评价空气污染问题的重要性？

When comparing air pollution to other problems affecting daily life (e.g. food safety, safety on the streets, economic crimes and others...): How do you currently evaluate the importance of air pollution?

Air pollution is not an important problem	0

Air pollution is less important than most other problems	3
Air pollution is equally important compared to other problems	56
Air pollution is more important than most other problems	52
Air pollution is the most important problem	50
Grand Total	161

与 2012 年相比，目前在您心中，空气污染问题的重要性有变化吗？

How did your current opinion on the importance of air pollution change compared to 2012?

Now it is much less important	0
Now it is less important	2
My opinion did not change since 2012	34
Now it is more important	51
Now it is much more important	74
Grand Total	161

对于解决空气污染问题的紧迫性，您怎么看？

How do you currently perceive the urgency of addressing air pollution?

Air pollution does not urgently need to be addressed	0
Air pollution can be addressed less urgently than most other problems	2
Air pollution needs to be addressed about equally urgent compared to other problems	38
Air pollution needs to be addressed more urgently than most other problems	52
Air pollution is the most urgent problem that needs to be addressed immediately	69
Grand Total	161

与 2012 年相比，目前在您心中，解决空气污染问题的紧迫性有变化吗？

How did your opinion on the urgency of addressing air pollution change compared to 2012?

Now it is much less urgent	1
Now it is less urgent	1
My opinion did not change since 2012	26

Now it is more urgent	65
Now it is much more urgent	65
Grand Total	158

Primärdaten der Zeitreihenanalysen

Date	Daily Average AQI	Daily Weibo entries from Beijing users containing the word "air pollution"	Daily Xinhua online articles containing the word "air pollution" in headline	Overall online news articles containing the words "air pollution" and "Beijing" in text or headline
17.2.09	154		0	
18.2.09	167		0	
19.2.09	167		0	
20.2.09	87		0	
21.2.09	87		0	
22.2.09	87		0	
23.2.09	87		0	
24.2.09	87		0	
25.2.09	87		0	
26.2.09	87		0	
27.2.09			1	
28.2.09			0	
1.3.09			1	
2.3.09			0	
3.3.09	263		0	
4.3.09	316		0	
5.3.09	119		0	
6.3.09	70		1	
7.3.09	190		0	
8.3.09	186		0	
9.3.09	71		1	
10.3.09	159		0	
11.3.09	166		0	
12.3.09	136		0	
13.3.09	82		0	
14.3.09	135		0	
15.3.09	139		1	
16.3.09	156		0	
17.3.09	261		1	
18.3.09	295		0	
19.3.09	162		1	
20.3.09	136		0	
21.3.09	163		1	
22.3.09	58		1	
23.3.09	150		0	

24.3.09	70		0	
25.3.09	58		0	
26.3.09	81		1	
27.3.09	138		0	
28.3.09	136		0	
29.3.09	153		0	
30.3.09	152		1	
31.3.09	64		2	
1.4.09	62		0	
2.4.09	166		0	
3.4.09	163		0	
4.4.09	179		0	
5.4.09	97		0	
6.4.09	99		0	
7.4.09	194		0	
8.4.09	234		0	
9.4.09	176		0	
10.4.09	180		0	
11.4.09	200		0	
12.4.09	281		0	
13.4.09	207		0	
14.4.09	135		0	
15.4.09	77		0	
16.4.09	152		0	
17.4.09	183		0	
18.4.09	179		0	
19.4.09	167		0	
20.4.09	106		0	
21.4.09	54		1	
22.4.09	148		9	
23.4.09	167		0	
24.4.09	143		1	
25.4.09	64		0	
26.4.09	69		3	
27.4.09	135		1	
28.4.09	156		0	
29.4.09	174		1	
30.4.09	197		0	
1.5.09	141		0	
2.5.09	141		0	
3.5.09	164		0	
4.5.09			0	
5.5.09			0	
6.5.09			0	
7.5.09	234		0	
8.5.09	187		0	
9.5.09	164		0	

10.5.09	124		0	
11.5.09	176		0	
12.5.09	120		0	
13.5.09	153		0	
14.5.09			0	
15.5.09			0	
16.5.09			0	
17.5.09			0	
18.5.09	163		0	
19.5.09	174		0	
20.5.09	180		0	
21.5.09	120		0	
22.5.09	74		1	
23.5.09	148		0	
24.5.09	231		1	
25.5.09	209		0	
26.5.09	168		1	
27.5.09	200		0	
28.5.09	129		0	
29.5.09	118		0	
30.5.09	110		0	
31.5.09	116		0	
1.6.09	143		0	
2.6.09	84		0	
3.6.09	114		0	
4.6.09	160		0	
5.6.09			0	
6.6.09	168		0	
7.6.09	176		0	
8.6.09	154		0	
9.6.09	103		0	
10.6.09	62		1	
11.6.09	154		0	
12.6.09	98		2	
13.6.09	161		0	
14.6.09	143		0	
15.6.09	183		1	
16.6.09	176		1	
17.6.09	193		0	
18.6.09	350		0	
19.6.09	310		0	
20.6.09	210		0	
21.6.09	139		0	
22.6.09	80		0	
23.6.09	158		0	
24.6.09	194		0	
25.6.09	185		0	

26.6.09	249		0	
27.6.09	198		1	
28.6.09	184		0	
29.6.09	136		0	
30.6.09	67		0	
1.7.09	85		0	
2.7.09	132		0	
3.7.09	174		0	
4.7.09	210		0	
5.7.09	194		0	
6.7.09	165		0	
7.7.09	192		0	
8.7.09	131		0	
9.7.09	145		0	
10.7.09	200		0	
11.7.09	210		0	
12.7.09	178		0	
13.7.09	193		0	
14.7.09	175		0	
15.7.09	208		0	
16.7.09	192		0	
17.7.09	145		0	
18.7.09	128		0	
19.7.09	178		0	
20.7.09	142		0	
21.7.09	177		2	
22.7.09	242		0	
23.7.09	132		0	
24.7.09	125		0	
25.7.09	97		0	
26.7.09	166		1	
27.7.09	176		0	
28.7.09	202		0	
29.7.09	285		0	
30.7.09	243		0	
31.7.09	167		0	
1.8.09	212		0	
2.8.09	163		0	
3.8.09	200		0	
4.8.09	216		0	
5.8.09	162		1	
6.8.09	169		0	
7.8.09	180		0	
8.8.09	176		0	
9.8.09	164		0	
10.8.09	159		1	
11.8.09	164		0	

12.8.09	177		0	
13.8.09	201		0	
14.8.09	263		0	
15.8.09	206		0	
16.8.09	222	0	0	
17.8.09	173	0	0	
18.8.09	198	0	0	
19.8.09	146	0	0	
20.8.09	124	0	0	
21.8.09	132	0	0	
22.8.09	101	0	0	
23.8.09	183	0	0	
24.8.09	209	0	0	
25.8.09	212	0	0	
26.8.09	202	0	0	
27.8.09	146	0	0	
28.8.09	84	0	0	
29.8.09	139	0	0	
30.8.09	174	0	0	
31.8.09	175	1	0	
1.9.09	177	1	0	
2.9.09	237	0	0	
3.9.09	226	0	0	
4.9.09	225	0	0	
5.9.09	188	0	0	
6.9.09	69	0	0	
7.9.09	83	0	0	
8.9.09	141	0	0	
9.9.09	159	0	0	
10.9.09	160	0	0	
11.9.09	98	0	0	
12.9.09	51	0	0	
13.9.09	147	0	0	
14.9.09	188	0	0	
15.9.09	119	0	0	
16.9.09	228	0	2	
17.9.09	197	0	0	
18.9.09	194	2	0	
19.9.09	176	0	0	
20.9.09	166	0	0	
21.9.09	115	0	0	
22.9.09	167	0	0	
23.9.09	179	0	0	
24.9.09	211	0	0	
25.9.09	290	2	0	
26.9.09	154	0	0	
27.9.09	177	0	0	

28.9.09	157	0	0	
29.9.09	231	0	0	
30.9.09	248	0	0	
1.10.09	101	1	0	
2.10.09	56	0	0	
3.10.09	60	0	0	
4.10.09	85	0	0	
5.10.09	179	0	0	
6.10.09	134	0	0	
7.10.09	136	0	0	
8.10.09	164	0	0	
9.10.09	176	0	1	
10.10.09	166	0	0	
11.10.09	208	0	0	
12.10.09	180	0	0	
13.10.09	62	0	0	
14.10.09	100	0	0	
15.10.09	179	0	0	
16.10.09	153	0	0	
17.10.09	123	0	0	
18.10.09	179	1	0	
19.10.09	81	0	0	
20.10.09	160	0	0	
21.10.09	165	0	0	
22.10.09	166	2	1	
23.10.09	267	0	0	
24.10.09	257	0	0	
25.10.09	270	0	1	
26.10.09	111	0	1	
27.10.09	166	1	2	
28.10.09	239	1	3	
29.10.09	320	1	0	
30.10.09	156	0	0	
31.10.09	119	0	0	
1.11.09	76	0	0	
2.11.09	66	0	0	
3.11.09	194	0	0	
4.11.09	270	0	0	
5.11.09	315	0	0	
6.11.09	447	0	1	
7.11.09	488	3	1	
8.11.09	304	0	2	
9.11.09	117	0	1	
10.11.09	94	4	0	
11.11.09	99	0	1	
12.11.09	142	1	0	
13.11.09	172	0	0	

14.11.09	59	1	0	
15.11.09	56	0	0	
16.11.09		0	0	
17.11.09		0	0	
18.11.09	68	0	0	
19.11.09	116	0	0	
20.11.09	98	0	1	
21.11.09	186	0	0	
22.11.09	276	0	0	
23.11.09	358	1	0	
24.11.09	281	1	0	
25.11.09	206	3	1	
26.11.09	252	5	1	
27.11.09	228	2	1	
28.11.09	263	2	0	
29.11.09	318	1	0	
30.11.09	194	1	0	
1.12.09	191	7	1	
2.12.09	173	5	0	
3.12.09	149	4	1	
4.12.09	140	1	0	
5.12.09	136	2	0	
6.12.09	236	1	0	
7.12.09	336	2	0	
8.12.09	262	2	1	
9.12.09	274	7	0	
10.12.09	332	3	1	
11.12.09	139	1	0	
12.12.09	122	2	0	
13.12.09	190	1	0	
14.12.09	124	1	0	
15.12.09	98	1	0	
16.12.09	91	0	0	
17.12.09	63	2	0	
18.12.09	56	0	1	
19.12.09	56	1	0	
20.12.09	57	0	1	
21.12.09	189	2	1	
22.12.09	185	1	1	
23.12.09	215	5	1	
24.12.09	211	1	0	
25.12.09		1	0	
26.12.09		1	0	
27.12.09		1	0	
28.12.09	270	1	1	
29.12.09	167	3	0	
30.12.09	72	1	0	

31.12.09	129	1	0	
1.1.10	189	2	0	
2.1.10	200	1	0	
3.1.10	163	0	1	
4.1.10	87	1	1	
5.1.10	114	1	0	
6.1.10	129	4	0	
7.1.10	142	4	0	
8.1.10	232	1	0	
9.1.10	159	3	0	
10.1.10	130	4	0	
11.1.10	67	3	0	
12.1.10	68	1	0	
13.1.10	109	4	0	
14.1.10	164	2	0	
15.1.10	113	4	1	
16.1.10	237	1	1	
17.1.10	260	1	0	
18.1.10	309	16	0	
19.1.10	386	2	0	
20.1.10	129	1	0	
21.1.10	84	1	1	
22.1.10	90	0	0	
23.1.10	71	0	0	
24.1.10		4	0	
25.1.10		2	0	
26.1.10	262	1	0	
27.1.10	173	2	0	
28.1.10	70	10	0	
29.1.10	80	1	0	
30.1.10	115	2	0	
31.1.10	93	0	0	
1.2.10	153	1	0	
2.2.10	143	2	0	
3.2.10	148	3	0	
4.2.10	129	1	0	
5.2.10	161	3	0	
6.2.10	160	3	0	
7.2.10	183	2	0	
8.2.10	232	10	0	
9.2.10	208	6	1	
10.2.10	47	2	1	
11.2.10	55	6	0	
12.2.10	78	0	0	
13.2.10	156	4	0	
14.2.10	127	5	0	
15.2.10	85	1	0	

16.2.10	158	3	0	
17.2.10	113	3	0	
18.2.10	152	4	0	
19.2.10	182	0	0	
20.2.10	232	5	0	
21.2.10	180	1	0	
22.2.10	170	1	0	
23.2.10	230	1	1	
24.2.10	322	2	0	
25.2.10	223	6	0	
26.2.10	152	2	0	
27.2.10	150	3	0	
28.2.10	143	4	0	
1.3.10	133	1	0	
2.3.10	156	1	1	
3.3.10	215	3	0	
4.3.10	248	1	0	
5.3.10	69	10	0	
6.3.10	117	1	1	
7.3.10	167	1	0	
8.3.10	118	1	0	
9.3.10	66	2	0	
10.3.10	141	8	1	
11.3.10	228	1	0	
12.3.10	102	0	0	
13.3.10	144	0	0	
14.3.10	166	4	0	
15.3.10	127	3	0	
16.3.10	154	1	1	
17.3.10	106	3	0	
18.3.10	225	7	0	
19.3.10	276	12	0	
20.3.10	213	4	1	
21.3.10	153	2	0	
22.3.10	212	16	1	
23.3.10	138	9	4	
24.3.10	142	6	0	
25.3.10	91	1	0	
26.3.10	152	0	0	
27.3.10	154	3	0	
28.3.10	157	0	0	
29.3.10	274	4	0	
30.3.10	302	2	0	
31.3.10	178	15	0	
1.4.10	85	2	0	
2.4.10	92	2	0	
3.4.10	178	3	0	

4.4.10	186	1	0	
5.4.10	182	2	0	
6.4.10	71	4	0	
7.4.10	171	6	0	
8.4.10	178	4	0	
9.4.10	165	3	0	
10.4.10	94	1	0	
11.4.10	155	5	0	
12.4.10	101	7	1	
13.4.10	72	2	1	
14.4.10	133	3	1	
15.4.10	233	6	0	
16.4.10	260	1	0	
17.4.10	207	2	0	
18.4.10	290	5	0	
19.4.10	250	0	0	
20.4.10	163	2	1	
21.4.10	110	2	0	
22.4.10	111	5	0	
23.4.10	96	3	1	
24.4.10	168	10	0	
25.4.10	139	2	0	
26.4.10	50	2	1	
27.4.10	79	19	1	
28.4.10	59	1	0	
29.4.10	66	5	0	
30.4.10	87	5	3	
1.5.10	152	8	1	
2.5.10	148	11	0	
3.5.10	178	1	0	
4.5.10	199	3	0	
5.5.10	166	4	2	
6.5.10	68	3	0	
7.5.10	171	3	1	
8.5.10	195	5	0	
9.5.10	145	3	0	
10.5.10	109	5	0	
11.5.10	59	2	0	
12.5.10	121	5	0	
13.5.10	155	4	0	
14.5.10	203	9	0	
15.5.10	232	5	0	
16.5.10	177	4	0	
17.5.10	151	9	0	
18.5.10	122	5	1	
19.5.10	99	3	1	
20.5.10	145	3	0	

21.5.10	185	3	0	
22.5.10	206	7	0	
23.5.10	187	0	0	
24.5.10	109	1	0	
25.5.10	100	5	0	
26.5.10	163	1	1	
27.5.10	166	2	0	
28.5.10	196	2	0	
29.5.10	193	2	0	
30.5.10	106	2	0	
31.5.10	167	0	1	
1.6.10	179	2	0	
2.6.10	192	2	0	
3.6.10	180	10	0	
4.6.10	164	3	0	
5.6.10		3	1	
6.6.10		3	0	
7.6.10	191	11	1	
8.6.10	222	3	0	
9.6.10	126	2	0	
10.6.10	131	16	0	
11.6.10	167	2	0	
12.6.10	174	2	0	
13.6.10	175	2	0	
14.6.10	168	0	0	
15.6.10	205	4	0	
16.6.10	155	8	0	
17.6.10	106	5	0	
18.6.10	150	1	2	
19.6.10	175	2	1	
20.6.10	140	1	0	
21.6.10	160	6	2	
22.6.10	189	1	2	
23.6.10	140	2	0	
24.6.10	160	2	1	
25.6.10	220	2	1	
26.6.10	225	4	1	
27.6.10	184	9	0	
28.6.10	212	7	0	
29.6.10	239	1	0	
30.6.10	229	3	0	
1.7.10	179	2	0	
2.7.10	83	7	0	
3.7.10	155	1	0	
4.7.10	169	4	0	
5.7.10	102	1	1	
6.7.10	76	13	2	

7.7.10	140	10	0	
8.7.10	120	1	1	
9.7.10	164	3	0	
10.7.10	163	0	0	
11.7.10	222	3	1	
12.7.10	189	1	0	
13.7.10	177	1	0	
14.7.10	192	15	1	
15.7.10	249	2	0	
16.7.10	251	8	0	
17.7.10	189	6	0	
18.7.10	209	3	0	
19.7.10	230	8	0	
20.7.10	118	5	0	
21.7.10	157	4	0	
22.7.10	223	3	0	
23.7.10	228	1	0	
24.7.10	173	1	0	
25.7.10	220	3	0	
26.7.10	262	2	0	
27.7.10	234	5	0	
28.7.10	227	8	0	
29.7.10	252	1	0	
30.7.10	262	2	0	
31.7.10	171	1	0	
1.8.10	116	1	0	
2.8.10	146	3	0	
3.8.10	209	2	0	
4.8.10	175	4	0	
5.8.10	69	7	0	
6.8.10	72	2	1	
7.8.10	154	0	0	
8.8.10	175	2	0	
9.8.10	293	8	1	
10.8.10	202	12	0	
11.8.10	184	7	0	
12.8.10	169	1	2	
13.8.10	196	5	0	
14.8.10		6	0	
15.8.10		3	0	
16.8.10	159	4	0	
17.8.10	204	6	0	
18.8.10	284	5	0	
19.8.10	183	2	0	
20.8.10	181	4	0	
21.8.10	106	2	0	
22.8.10	74	3	0	

23.8.10	168	4	0	
24.8.10	189	6	0	
25.8.10	170	3	0	
26.8.10	132	2	0	
27.8.10	111	1	0	
28.8.10	120	3	1	
29.8.10	183	5	0	
30.8.10	183	2	0	
31.8.10	167	7	0	
1.9.10	152	4	1	
2.9.10	175	11	0	
3.9.10	180	5	0	
4.9.10	170	4	0	
5.9.10	185	4	1	
6.9.10	215	3	0	
7.9.10	198	10	0	
8.9.10	172	5	1	
9.9.10	218	7	0	
10.9.10	167	7	0	
11.9.10	147	1	0	
12.9.10	191	1	0	
13.9.10	215	7	0	
14.9.10	251	1	2	
15.9.10	347	1	0	
16.9.10	244	4	0	
17.9.10	101	3	0	
18.9.10	73	4	0	
19.9.10	155	0	0	
20.9.10	162	0	0	
21.9.10	34	7	0	
22.9.10		2	0	
23.9.10		9	0	
24.9.10		6	0	
25.9.10		18	0	
26.9.10		26	1	
27.9.10	124	21	0	
28.9.10		18	0	
29.9.10		19	0	
30.9.10	266	6	0	
1.10.10	271	7	0	
2.10.10	79	4	0	
3.10.10	41	19	0	
4.10.10	83	0	0	
5.10.10	158	4	0	
6.10.10	322	14	0	
7.10.10	412	14	0	
8.10.10	400	13	0	

9.10.10	402	16	1	
10.10.10	408	25	3	
11.10.10	39	15	0	
12.10.10	128	11	1	
13.10.10	181	7	0	
14.10.10	54	3	1	
15.10.10	109	5	0	
16.10.10	145	1	1	
17.10.10	123	5	0	
18.10.10	149	11	0	
19.10.10	157	6	1	
20.10.10	165	8	0	
21.10.10	192	4	0	
22.10.10	220	4	0	
23.10.10	270	4	0	
24.10.10	134	6	0	
25.10.10	44	7	0	
26.10.10	49	10	2	
27.10.10	169	13	1	
28.10.10	148	5	0	
29.10.10	128	4	1	
30.10.10	125	1	0	
31.10.10	149	40	0	
1.11.10	153	2	0	
2.11.10		5	0	
3.11.10	179	7	0	
4.11.10	144	6	1	
5.11.10	180	19	4	
6.11.10	325	5	0	
7.11.10	91	12	1	
8.11.10	48	6	1	
9.11.10	131	4	2	
10.11.10	199	12	1	
11.11.10	107	7	0	
12.11.10	134	8	0	
13.11.10	56	2	2	
14.11.10	70	6	0	
15.11.10	122	5	1	
16.11.10	207	3	0	
17.11.10	362	13	0	
18.11.10	420	10	0	
19.11.10	391	14	1	
20.11.10	340	13	1	
21.11.10	161	4	0	
22.11.10	152	5	0	
23.11.10	282	11	1	
24.11.10	110	8	1	

25.11.10	144	22	2	
26.11.10	181	13	2	
27.11.10	83	4	1	
28.11.10	249	5	0	
29.11.10	236	5	1	
30.11.10	275	5	2	
1.12.10	308	12	4	
2.12.10	127	7	2	
3.12.10	148	3	0	
4.12.10	229	2	0	
5.12.10	110	3	1	
6.12.10	66	5	0	
7.12.10	138	4	1	
8.12.10	103	21	0	
9.12.10	250	18	0	
10.12.10	144	9	0	
11.12.10	115	3	0	
12.12.10	184	18	1	
13.12.10	56	51	0	
14.12.10	61	61	1	
15.12.10	74	33	0	
16.12.10	134	19	0	
17.12.10	191	18	0	
18.12.10	324	12	2	
19.12.10	198	19	2	
20.12.10	264	13	1	
21.12.10	456	38	0	
22.12.10	169	19	2	
23.12.10	76	27	0	
24.12.10	109	18	1	
25.12.10	113	7	0	
26.12.10	119	9	0	
27.12.10	137	17	0	
28.12.10	84	21	0	
29.12.10	98	10	0	
30.12.10	63	3	0	
31.12.10	65	8	1	
1.1.11	102	1	0	
2.1.11	102	11	0	
3.1.11	226	36	0	
4.1.11	163	16	0	
5.1.11	67	13	0	
6.1.11	58	11	1	
7.1.11	121	18	0	
8.1.11	130	17	1	
9.1.11		13	0	
10.1.11	161	18	0	

11.1.11	76	16	0	
12.1.11	145	18	0	
13.1.11	189	11	0	
14.1.11	61	9	1	
15.1.11	60	5	0	
16.1.11	103	13	0	
17.1.11	88	8	0	
18.1.11	69	27	0	
19.1.11	69	9	0	
20.1.11	106	14	2	
21.1.11	136	14	1	
22.1.11	121	59	0	
23.1.11	55	0	0	
24.1.11	117	19	0	
25.1.11	86	8	0	
26.1.11	144	19	0	
27.1.11	75	13	0	
28.1.11	60	19	0	
29.1.11	47	7	0	
30.1.11	69	6	0	
31.1.11	86	6	0	
1.2.11	104	10	0	
2.2.11	131	15	0	
3.2.11	173	45	0	
4.2.11	185	12	1	
5.2.11	188	12	1	
6.2.11	110	28	0	
7.2.11	208	53	1	
8.2.11	157	21	0	
9.2.11	189	77	2	
10.2.11	147	35	3	
11.2.11	109	12	0	
12.2.11	88	14	1	
13.2.11	149	9	0	
14.2.11	97	14	0	
15.2.11	265	37	0	
16.2.11	317	21	0	
17.2.11	273	82	0	
18.2.11	248	39	0	
19.2.11	245	24	0	
20.2.11	389	16	0	
21.2.11	495	101	0	
22.2.11	430	201	1	
23.2.11	445	476	2	
24.2.11	185	168	0	
25.2.11	155	70	1	
26.2.11	154	38	0	

27.2.11	119	21	0	
28.2.11	64	27	0	
1.3.11	71	42	0	
2.3.11	79	42	0	
3.3.11	59	20	1	
4.3.11	146	37	0	
5.3.11	172	24	1	
6.3.11	54	19	0	
7.3.11	66	15	1	
8.3.11	60	18	0	
9.3.11	71	29	0	
10.3.11	119	18	0	
11.3.11	169	26	0	
12.3.11	328	28	0	
13.3.11	207	35	0	
14.3.11	54	29	0	
15.3.11	58	60	0	
16.3.11	102	43	0	
17.3.11	181	90	2	
18.3.11		41	1	
19.3.11		24	0	
20.3.11		24	1	
21.3.11	69	26	1	
22.3.11	62	28	1	
23.3.11	70	23	0	
24.3.11	42	28	0	
25.3.11	72	28	1	
26.3.11	122	12	0	
27.3.11	75	15	0	
28.3.11	126	14	0	
29.3.11	163	26	0	
30.3.11	175	42	0	
31.3.11	275	83	0	
1.4.11	90	37	2	
2.4.11	129	38	0	
3.4.11	194	12	0	
4.4.11	189	21	0	
5.4.11	261	17	0	
6.4.11	198	23	0	
7.4.11		33	0	
8.4.11	106	32	2	
9.4.11	173	19	0	
10.4.11	65	19	0	
11.4.11	71	15	1	
12.4.11	181	24	0	
13.4.11	219	29	0	
14.4.11	176	15	1	

15.4.11	85	18	0	
16.4.11	169	13	0	
17.4.11	124	10	0	
18.4.11	58	20	0	
19.4.11	160	35	0	
20.4.11	205	20	0	
21.4.11	188	21	0	
22.4.11	114	19	0	
23.4.11	52	8	0	
24.4.11	63	18	0	
25.4.11	182	21	0	
26.4.11	138	23	0	
27.4.11	118	22	0	
28.4.11	167	21	2	
29.4.11	218	8	1	
30.4.11	221	33	2	
1.5.11	136	51	2	
2.5.11	75	43	3	
3.5.11	71	100	4	
4.5.11	151	54	2	
5.5.11	177	63	5	
6.5.11	120	23	1	
7.5.11	98	20	0	
8.5.11	146	14	0	
9.5.11	117	27	1	
10.5.11	99	27	0	
11.5.11	175	41	0	
12.5.11	109	25	0	
13.5.11	93	29	1	
14.5.11	91	17	0	
15.5.11	110	17	0	
16.5.11	127	29	0	
17.5.11	214	74	0	
18.5.11	224	40	0	
19.5.11	49	34	1	
20.5.11	87	68	0	
21.5.11	116	26	0	
22.5.11	142	19	0	
23.5.11	175	31	0	
24.5.11	155	62	0	
25.5.11	150	33	0	
26.5.11	177	29	0	
27.5.11	180	36	0	
28.5.11	202	21	1	
29.5.11	178	17	0	
30.5.11	129	33	0	
31.5.11	49	52	0	

1.6.11	62	35	1	
2.6.11	156	36	0	
3.6.11	87	31	0	
4.6.11	110	15	0	
5.6.11	165	11	0	
6.6.11	172	53	0	
7.6.11	203	63	0	
8.6.11	80	20	0	
9.6.11	197	30	0	
10.6.11	184	68	0	
11.6.11	141	131	0	
12.6.11	75	37	0	
13.6.11	168	43	0	
14.6.11	210	30	0	
15.6.11	206	39	0	
16.6.11	183	58	0	
17.6.11	175	32	0	
18.6.11	241	23	0	
19.6.11	246	15	0	
20.6.11	232	22	0	
21.6.11	203	23	0	
22.6.11	295	40	0	
23.6.11	192	33	0	
24.6.11	83	27	0	
25.6.11	97	17	0	
26.6.11	118	17	0	
27.6.11	137	27	0	
28.6.11	201	36	0	
29.6.11	286	43	0	
30.6.11	205	36	0	
1.7.11	202	34	0	
2.7.11	214	24	0	
3.7.11	168	27	0	
4.7.11	146	42	0	
5.7.11	188	36	0	
6.7.11	221	44	0	
7.7.11	81	23	1	
8.7.11	74	29	0	
9.7.11	74	30	1	
10.7.11	167	43	0	
11.7.11	248	41	0	
12.7.11	180	26	0	
13.7.11	171	34	0	
14.7.11	175	39	1	
15.7.11	158	26	0	
16.7.11	158	34	1	
17.7.11	179	30	0	

18.7.11	178	37	0	
19.7.11	171	91	0	
20.7.11	110	33	0	
21.7.11	169	34	0	
22.7.11	234	40	0	
23.7.11	342	31	0	
24.7.11	284	40	0	
25.7.11	125	24	0	
26.7.11	120	97	0	
27.7.11	149	48	0	
28.7.11	260	47	2	
29.7.11	200	41	0	
30.7.11	116	24	0	
31.7.11	142	82	0	
1.8.11		55	0	
2.8.11		50	1	
3.8.11	149	38	0	
4.8.11	177	113	0	
5.8.11	205	43	0	
6.8.11	178	36	0	
7.8.11		48	0	
8.8.11	174	56	0	
9.8.11	228	47	0	
10.8.11	154	57	0	
11.8.11	174	62	0	
12.8.11	193	47	0	
13.8.11	185	62	0	
14.8.11	172	36	0	
15.8.11	176	55	0	
16.8.11	56	51	0	
17.8.11	123	58	0	
18.8.11	68	112	0	
19.8.11	146	48	0	
20.8.11	159	47	0	
21.8.11	166	42	0	
22.8.11	177	49	0	
23.8.11	170	42	0	
24.8.11	176	57	0	
25.8.11	174	36	0	
26.8.11	164	36	0	
27.8.11	168	32	0	
28.8.11	167	24	0	
29.8.11	191	41	0	
30.8.11	216	46	0	
31.8.11	289	80	0	
1.9.11	84	65	0	
2.9.11	137	35	2	

3.9.11	167	23	0	
4.9.11	163	21	0	
5.9.11	164	33	0	
6.9.11	186	58	1	
7.9.11	222	75	0	
8.9.11	104	50	0	
9.9.11	68	34	0	
10.9.11	69	39	0	
11.9.11	121	98	0	
12.9.11	188	27	0	
13.9.11	185	37	1	
14.9.11	212	32	0	
15.9.11	207	40	0	
16.9.11	73	45	0	
17.9.11	61	38	0	
18.9.11	68	29	0	
19.9.11	88	50	0	
20.9.11	100	30	0	
21.9.11	111	41	1	
22.9.11	120	56	1	
23.9.11	189	35	1	
24.9.11	202	23	1	
25.9.11	315	50	0	
26.9.11	267	50	0	
27.9.11	268	86	1	
28.9.11	345	74	1	
29.9.11	96	108	0	
30.9.11	82	35	0	
1.10.11	105	27	0	
2.10.11	79	18	0	
3.10.11	105	21	0	
4.10.11		19	0	
5.10.11		23	0	
6.10.11		20	0	
7.10.11	202	21	0	
8.10.11	253	49	0	
9.10.11	396	123	0	
10.10.11	157	197	0	
11.10.11	184	116	0	
12.10.11	280	179	1	
13.10.11	150	97	0	
14.10.11	47	59	1	
15.10.11	54	32	0	
16.10.11	55	40	0	
17.10.11	90	27	0	
18.10.11	171	48	0	
19.10.11	236	55	0	

20.10.11	338	293	0	
21.10.11	303	771	0	
22.10.11	363	280	0	
23.10.11	210	411	0	
24.10.11	57	237	0	
25.10.11	82	85	0	
26.10.11	190	81	0	
27.10.11	256	100	0	
28.10.11	235	155	0	
29.10.11	283	109	0	
30.10.11	329	580	0	
31.10.11	297	734	1	
1.11.11	255	948	1	
2.11.11	109	436	2	
3.11.11	151	298	0	
4.11.11	171	289	0	
5.11.11	91	131	0	
6.11.11	146	369	0	
7.11.11	132	245	2	
8.11.11	118	149	2	
9.11.11	103	112	0	
10.11.11	145	91	1	
11.11.11	216	104	0	
12.11.11	115	147	0	
13.11.11	77	56	0	
14.11.11	211	108	0	
15.11.11	254	126	1	
16.11.11	269	406	2	
17.11.11	186	164	0	
18.11.11	163	3296	0	
19.11.11	61	81	0	
20.11.11	127	59	0	
21.11.11	208	683	1	
22.11.11	195	204	2	
23.11.11	69	153	1	
24.11.11	246	95	0	
25.11.11	268	103	3	
26.11.11	297	108	0	
27.11.11	281	142	0	
28.11.11	189	202	1	
29.11.11	144	100	2	
30.11.11	161	92	0	
1.12.11	225	75	2	
2.12.11	372	237	0	
3.12.11	171	182	0	
4.12.11	314	949	0	
5.12.11	361	31312	3	

6.12.11	292	24720	9	
7.12.11	160	13184	3	
8.12.11	44	559	3	
9.12.11	65	418	3	
10.12.11	95	527	0	
11.12.11	154	422	0	
12.12.11	123	343	2	
13.12.11	220	911	0	
14.12.11	55	466	1	
15.12.11	54	420	0	
16.12.11	75	306	2	
17.12.11	179	458	0	
18.12.11	118	290	0	
19.12.11	121	313	2	
20.12.11	160	274	2	
21.12.11	67	249	1	
22.12.11	86	249	2	
23.12.11	115	198	0	
24.12.11	98	169	0	
25.12.11	162	254	0	
26.12.11	215	509	0	
27.12.11	252	621	1	
28.12.11	221	672	1	
29.12.11	145	315	1	
30.12.11	203	384	0	
31.12.11	223	355	0	
1.1.12	135	261	0	2
2.1.12	120	246	1	4
3.1.12	56	212	1	5
4.1.12	89	642	2	3
5.1.12	188	432	1	6
6.1.12	184	265	0	8
7.1.12	185	298	0	11
8.1.12	225	297	0	5
9.1.12	239	605	0	149
10.1.12	259	9888	2	14
11.1.12	124	550	5	83
12.1.12	207	469	4	106
13.1.12	143	206	2	13
14.1.12	156	173	0	16
15.1.12		169	0	7
16.1.12		243	0	15
17.1.12	374	976	2	9
18.1.12	435	11536	1	9
19.1.12	453	19776	0	122
20.1.12	92	767	3	12
21.1.12	57	347	0	15

22.1.12	110	385	0	4
23.1.12	233	984	1	14
24.1.12	61	390	0	9
25.1.12	146	196	0	4
26.1.12	180	206	1	2
27.1.12	135	253	0	3
28.1.12	170	270	1	6
29.1.12	105	234	4	10
30.1.12	185	259	0	5
31.1.12	120	309	1	4
1.2.12	65	283	3	9
2.2.12	82	321	1	8
3.2.12	151	271	0	7
4.2.12	97	238	0	4
5.2.12	199	410	0	3
6.2.12	127	529	0	1
7.2.12	47	344	2	5
8.2.12	55	198	2	8
9.2.12	121	258	2	11
10.2.12	81	216	0	6
11.2.12	161	214	0	0
12.2.12	178	253	1	5
13.2.12	262	949	0	3
14.2.12	156	405	1	3
15.2.12	172	381	3	1
16.2.12	52	355	2	2
17.2.12	53	203	1	8
18.2.12	96	198	0	2
19.2.12	146	176	0	0
20.2.12	207	405	0	3
21.2.12	185	234	0	3
22.2.12	212	527	0	7
23.2.12	77	251	1	4
24.2.12	156	198	1	1
25.2.12	77	129	0	4
26.2.12	131	319	2	3
27.2.12	247	539	1	3
28.2.12	261	321	0	2
29.2.12	279	196	4	3
1.3.12	301	1648	0	3
2.3.12	186	253	5	10
3.3.12	170	260	0	5
4.3.12	193	4944	0	1
5.3.12	218	292	1	3
6.3.12	73	215	4	3
7.3.12	64	171	1	2
8.3.12	62	179	1	6

9.3.12	170	139	2	1
10.3.12	85	449	0	1
11.3.12	73	465	0	0
12.3.12	153	172	3	1
13.3.12	174	252	0	1
14.3.12	89	190	0	6
15.3.12	176	151	0	0
16.3.12	324	323	2	0
17.3.12	247	476	0	8
18.3.12	106	204	0	4
19.3.12	175	166	3	3
20.3.12	196	181	1	1
21.3.12	332	331	1	3
22.3.12	225	236	1	1
23.3.12	88	174	0	4
24.3.12	66	143	1	12
25.3.12	103	98	0	6
26.3.12	215	138	1	3
27.3.12	175	136	0	1
28.3.12	118	209	0	3
29.3.12	114	150	0	1
30.3.12	58	185	0	2
31.3.12	82	215	0	7
1.4.12	140	111	1	4
2.4.12	115	99	0	7
3.4.12	69	84	0	2
4.4.12	59	85	0	0
5.4.12	59	143	1	1
6.4.12	89	174	0	0
7.4.12	156	78	0	0
8.4.12	115	777	0	0
9.4.12	190	178	0	0
10.4.12	143	199	2	2
11.4.12	65	116	0	1
12.4.12	95	142	0	1
13.4.12	126	91	1	0
14.4.12	137	69	0	2
15.4.12	146	92	0	0
16.4.12	95	121	1	0
17.4.12	189	146	0	2
18.4.12	213	243	1	0
19.4.12	183	151	0	1
20.4.12	204	212	0	8
21.4.12	218	160	0	2
22.4.12	225	140	0	1
23.4.12	300	326	0	1
24.4.12	154	174	1	4

25.4.12	62	204	0	0
26.4.12	156	204	1	1
27.4.12	139	181	0	2
28.4.12	185	203	0	5
29.4.12	229	242	0	1
30.4.12	235	247	0	10
1.5.12	235	551	0	2
2.5.12	174	273	1	9
3.5.12	144	155	2	2
4.5.12	183	836	1	1
5.5.12	171	108	0	0
6.5.12	180	84	0	0
7.5.12	168	160	0	0
8.5.12	166	175	0	0
9.5.12	181	170	1	4
10.5.12	232	322	1	1
11.5.12	208	157	0	2
12.5.12	170	83	0	0
13.5.12	199	112	1	2
14.5.12	115	119	1	9
15.5.12	98	171	1	0
16.5.12	86	127	0	1
17.5.12	134	188	2	2
18.5.12	165	187	0	1
19.5.12	209	95	0	2
20.5.12		77	0	1
21.5.12	202	251	2	2
22.5.12	167	114	1	1
23.5.12	84	181	1	2
24.5.12	98	143	2	3
25.5.12	130	119	0	1
26.5.12	148	107	0	1
27.5.12	183	78	0	0
28.5.12	188	107	1	0
29.5.12	133	330	0	1
30.5.12	54	181	0	11
31.5.12	145	96	1	2
1.6.12	162	83	1	1
2.6.12	191	105	0	0
3.6.12	227	140	0	0
4.6.12	181	127	2	0
5.6.12	129	483	2	12
6.6.12	205	18128	4	7
7.6.12	142	420	1	1
8.6.12	155	203	0	1
9.6.12	173	237	0	0
10.6.12	45	338	1	0

11.6.12	87	423	8	3
12.6.12	59	398	0	43
13.6.12	140	929	0	2
14.6.12	40	261	3	1
15.6.12	43	253	0	1
16.6.12	77	123	0	0
17.6.12	157	65	0	0
18.6.12	235	241	1	2
19.6.12	236	225	1	5
20.6.12	237	165	0	2
21.6.12	237	142	0	0
22.6.12	178	80	1	1
23.6.12	220	106	0	1
24.6.12	214	86	0	0
25.6.12	169	103	1	1
26.6.12	176	108	0	0
27.6.12	145	81	0	0
28.6.12	187	123	1	1
29.6.12	165	89	0	1
30.6.12	141	65	0	1
1.7.12	198	73	0	0
2.7.12	87	102	0	2
3.7.12	97	100	1	3
4.7.12	166	106	0	1
5.7.12	168	137	2	1
6.7.12	192	125	0	1
7.7.12	217	120	0	1
8.7.12	200	147	0	0
9.7.12	171	164	3	3
10.7.12	122	124	0	1
11.7.12	142	126	0	0
12.7.12	75	126	0	0
13.7.12	79	117	0	1
14.7.12	95	87	0	0
15.7.12	113	180	0	0
16.7.12	159	126	0	0
17.7.12	165	109	0	2
18.7.12	167	104	0	1
19.7.12	187	109	0	3
20.7.12	252	186	0	6
21.7.12	216	283	0	3
22.7.12	57	267	0	0
23.7.12	90	142	0	0
24.7.12	155	129	0	0
25.7.12	165	244	0	0
26.7.12	140	206	0	0
27.7.12	163	150	1	2

28.7.12	178	133	0	1
29.7.12		104	0	0
30.7.12	138	172	2	5
31.7.12	78	228	0	9
1.8.12	49	202	1	4
2.8.12	69	144	0	1
3.8.12	136	107	0	1
4.8.12	79	118	0	0
5.8.12	127	130	0	0
6.8.12	147	128	2	0
7.8.12	157	148	0	2
8.8.12	143	209	0	0
9.8.12	109	194	0	0
10.8.12	161	138	0	0
11.8.12	179	367	0	0
12.8.12		117	1	0
13.8.12	79	165	0	1
14.8.12	134	190	0	5
15.8.12	131	136	0	0
16.8.12	159	106	1	14
17.8.12	192	144	0	1
18.8.12	228	201	0	1
19.8.12		131	1	2
20.8.12		179	2	1
21.8.12	55	172	0	4
22.8.12	66	232	0	0
23.8.12	162	133	1	1
24.8.12	166	170	5	3
25.8.12	188	118	0	1
26.8.12	208	165	1	0
27.8.12	150	146	1	0
28.8.12	168	158	0	7
29.8.12	169	188	0	0
30.8.12	287	468	1	2
31.8.12	236	346	0	3
1.9.12	215	214	0	0
2.9.12	69	199	0	0
3.9.12	39	238	0	0
4.9.12	52	213	3	2
5.9.12	95	150	0	6
6.9.12	169	189	0	0
7.9.12	145	187	0	14
8.9.12	132	141	0	0
9.9.12	180	159	0	2
10.9.12	193	181	1	1
11.9.12	175	180	0	5
12.9.12	57	188	0	1

13.9.12	55	147	0	1
14.9.12	59	152	1	0
15.9.12	99	85	0	0
16.9.12	138	90	0	1
17.9.12	113	93	1	2
18.9.12	90	352	1	3
19.9.12	121	190	0	3
20.9.12	181	129	1	3
21.9.12	210	209	0	0
22.9.12	180	112	0	0
23.9.12	177	110	0	0
24.9.12	144	155	2	3
25.9.12	133	168	3	2
26.9.12	84	170	5	3
27.9.12	92	215	2	3
28.9.12	12	280	1	5
29.9.12	49	136	0	3
30.9.12	51	90	1	0
1.10.12	125	60	0	0
2.10.12	217	162	0	1
3.10.12	92	67	0	2
4.10.12	52	76	0	1
5.10.12	106	89	1	1
6.10.12	158	69	0	1
7.10.12	191	91	1	4
8.10.12	311	344	1	2
9.10.12	141	263	4	4
10.10.12	62	161	2	12
11.10.12	194	127	1	3
12.10.12	224	229	2	5
13.10.12	81	120	1	2
14.10.12	104	115	0	4
15.10.12	175	198	1	13
16.10.12	91	179	1	1
17.10.12	76	178	1	0
18.10.12	133	206	0	0
19.10.12	239	271	1	1
20.10.12	257	260	0	0
21.10.12	132	210	0	0
22.10.12	79	220	2	0
23.10.12	156	158	2	3
24.10.12	174	180	1	1
25.10.12	255	390	2	3
26.10.12	330	714	2	5
27.10.12	194	377	1	5
28.10.12	80	246	0	0
29.10.12	103	261	2	2

30.10.12	88	454	1	12
31.10.12	82	403	1	10
1.11.12	169	312	0	1
2.11.12	218	330	0	1
3.11.12	185	338	0	1
4.11.12	65	302	1	1
5.11.12	84	250	0	1
6.11.12	162	236	1	0
7.11.12	139	232	1	0
8.11.12	129	313	1	0
9.11.12	176	261	2	0
10.11.12	136	208	1	0
11.11.12	48	201	0	0
12.11.12	69	259	1	0
13.11.12	51	270	1	2
14.11.12	96	237	2	0
15.11.12	202	228	0	0
16.11.12	165	358	0	1
17.11.12	148	547	1	1
18.11.12	169	385	1	0
19.11.12	74	350	5	0
20.11.12	188	428	2	0
21.11.12	319	757	1	1
22.11.12	189	532	2	2
23.11.12	107	264	0	1
24.11.12	220	199	2	0
25.11.12	194	564	1	0
26.11.12	85	208	0	0
27.11.12	240	295	0	1
28.11.12	72	279	0	0
29.11.12	151	244	1	0
30.11.12	84	236	4	1
1.12.12	162	180	1	0
2.12.12	294	394	0	0
3.12.12	104	278	0	0
4.12.12	166	370	1	2
5.12.12	51	263	6	5
6.12.12	147	234	7	13
7.12.12	120	224	2	1
8.12.12	51	225	0	0
9.12.12	74	195	0	0
10.12.12	147	208	2	1
11.12.12	196	232	2	1
12.12.12	255	375	3	2
13.12.12	270	344	2	2
14.12.12	258	279	7	10
15.12.12	318	284	5	19

16.12.12	201	376	2	3
17.12.12	76	276	1	8
18.12.12	103	309	3	5
19.12.12	250	344	3	2
20.12.12	293	340	1	5
21.12.12	166	254	1	1
22.12.12	77	194	0	1
23.12.12	48	323	1	0
24.12.12		215	1	1
25.12.12		176	0	0
26.12.12		217	2	3
27.12.12		276	1	0
28.12.12	292	346	4	6
29.12.12	76	209	1	9
30.12.12	67	168	0	0
31.12.12	161	192	1	13
1.1.13	57	165	0	16
2.1.13	65	335	3	10
3.1.13	79	180	0	3
4.1.13	159	234	1	0
5.1.13	134	191	2	3
6.1.13	206	333	1	1
7.1.13	210	276	2	11
8.1.13	166	303	6	0
9.1.13	132	340	4	0
10.1.13	299	739	3	3
11.1.13	401	37904	11	197
12.1.13	539	79104	13	211
13.1.13	435	120304	30	636
14.1.13	346	57680	65	1050
15.1.13	187	49440	32	566
16.1.13	176	24720	22	179
17.1.13	140	28016	10	347
18.1.13	318	14832	8	16
19.1.13	251	21424	4	170
20.1.13	178	8240	11	249
21.1.13	206	9888	13	150
22.1.13	260	13184	8	161
23.1.13	415	23072	8	144
24.1.13	66	11536	5	140
25.1.13	152	3296	3	16
26.1.13	216	752	2	9
27.1.13	362	21424	1	15
28.1.13	438	31312	6	179
29.1.13	452	67568	23	404
30.1.13	328	46144	25	399
31.1.13	226	67568	22	349

1.2.13	85	39552	15	153
2.2.13	120	23072	4	11
3.2.13	241	6592	1	7
4.2.13	90	6592	4	18
5.2.13	169	977	7	173
6.2.13	131	21424	4	15
7.2.13	48	4944	7	17
8.2.13	117	842	3	17
9.2.13	240	13184	4	11
10.2.13	114	9888	7	168
11.2.13	134	520	4	15
12.2.13	186	823	2	5
13.2.13	364	832	3	6
14.2.13	118	799	2	4
15.2.13	107	854	1	2
16.2.13	208	13184	5	9
17.2.13	171	9888	7	19
18.2.13	72	843	8	287
19.2.13	89	845	5	5
20.2.13	157	744	5	5
21.2.13	266	984	6	11
22.2.13	133	966	4	7
23.2.13	217	11536	1	4
24.2.13	377	16480	0	16
25.2.13	213	9888	9	213
26.2.13	265	866	7	13
27.2.13	295	23072	6	7
28.2.13	253	49440	16	340
1.3.13	42	9888	8	298
2.3.13	107	786	3	8
3.3.13	168	19776	4	18
4.3.13	73	9888	8	6
5.3.13	239	18128	10	18
6.3.13	276	24720	11	130
7.3.13	361	13184	10	74
8.3.13	281	9888	10	17
9.3.13	119	14832	6	7
10.3.13	107	6592	4	117
11.3.13	189	984	4	3
12.3.13	202	4944	0	3
13.3.13	71	9888	6	6
14.3.13	182	896	5	5
15.3.13	307	11536	7	10
16.3.13	315	19776	3	9
17.3.13	385	11536	1	4
18.3.13	97	8240	4	19
19.3.13	133	4944	2	11

20.3.13	146	3296	2	12
21.3.13	217	843	3	5
22.3.13	143	8240	1	3
23.3.13	124	660	2	0
24.3.13	73	728	4	3
25.3.13	181	647	0	12
26.3.13	248	697	1	5
27.3.13	143	944	2	9
28.3.13	86	49440	2	69
29.3.13	172	9888	5	334
30.3.13	171	901	1	9
31.3.13	254	869	0	2
1.4.13	146	879	9	20
2.4.13	178	11536	3	8
3.4.13	183	23072	7	6
4.4.13	162	811	1	3
5.4.13	112	4944	0	4
6.4.13	54	830	1	9
7.4.13	162	752	1	8
8.4.13	66	13184	6	15
9.4.13	46	942	2	6
10.4.13	48	841	2	3
11.4.13	63	788	5	2
12.4.13	136	661	3	16
13.4.13	116	536	0	12
14.4.13	87	583	0	1
15.4.13	154	682	1	2
16.4.13	146	643	4	3
17.4.13	127	605	3	0
18.4.13	43	726	0	3
19.4.13	139	1648	1	8
20.4.13	163	640	4	8
21.4.13	191	580	0	3
22.4.13	224	821	2	1
23.4.13	257	3296	1	4
24.4.13	130	860	2	5
25.4.13	55	724	3	12
26.4.13	155	662	3	4
27.4.13	157	610	0	3
28.4.13	145	651	0	2
29.4.13	87	551	2	0
30.4.13	69	490	0	0
1.5.13	119	716	0	0
2.5.13	165	867	0	6
3.5.13	152	777	2	5
4.5.13	167	585	2	4
5.5.13	237	884	1	0

6.5.13	271	1648	7	8
7.5.13	231	902	4	20
8.5.13	189	724	3	10
9.5.13	131	632	2	1
10.5.13	107	550	1	4
11.5.13	124	425	1	0
12.5.13	117	435	2	0
13.5.13	179	627	4	3
14.5.13	129	627	2	7
15.5.13	147	565	3	7
16.5.13	153	803	6	5
17.5.13	179	560	4	2
18.5.13	156	1648	1	1
19.5.13	129	520	0	1
20.5.13	117	499	0	4
21.5.13	175	455	0	5
22.5.13	143	521	0	2
23.5.13	164	570	3	3
24.5.13	183	525	4	2
25.5.13	147	661	0	0
26.5.13	175	956	0	1
27.5.13	162	797	4	4
28.5.13	164	511	1	0
29.5.13	68	581	3	3
30.5.13	146	453	3	3
31.5.13	167	405	3	11
1.6.13	139	328	0	12
2.6.13	216	471	0	8
3.6.13	195	510	6	6
4.6.13	193	480	7	3
5.6.13	208	487	11	8
6.6.13	208	517	8	13
7.6.13	194	522	1	7
8.6.13	227	469	5	9
9.6.13	107	395	0	3
10.6.13	94	361	0	3
11.6.13	139	374	3	3
12.6.13	147	353	6	11
13.6.13	178	393	1	9
14.6.13	178	496	5	2
15.6.13	190	751	6	5
16.6.13	226	426	6	3
17.6.13	100	777	4	11
18.6.13	133	477	10	17
19.6.13	124	609	5	14
20.6.13	161	594	13	18
21.6.13	150	505	2	9

22.6.13	144	432	1	6
23.6.13	148	432	1	1
24.6.13	178	947	3	20
25.6.13	191	772	1	7
26.6.13	216	454	4	17
27.6.13	163	718	1	6
28.6.13	338	883	2	7
29.6.13	176	673	5	20
30.6.13	232	747	2	9
1.7.13	200	903	4	18
2.7.13	62	745	10	20
3.7.13	94	524	5	9
4.7.13	85	479	2	4
5.7.13	74	454	3	2
6.7.13	139	461	2	2
7.7.13	167	369	0	1
8.7.13	169	403	3	0
9.7.13	153	888	4	4
10.7.13	105	948	12	9
11.7.13	115	879	12	3
12.7.13	157	532	6	3
13.7.13	178	494	4	0
14.7.13	168	439	0	1
15.7.13	150	731	2	3
16.7.13	80	700	8	5
17.7.13	131	560	5	2
18.7.13	195	580	6	10
19.7.13	187	505	4	12
20.7.13	156	429	0	0
21.7.13	156	425	0	1
22.7.13	174	384	8	18
23.7.13	115	404	1	5
24.7.13	105	390	5	17
25.7.13	95	348	7	78
26.7.13	142	343	2	17
27.7.13	181	288	0	4
28.7.13	120	277	2	1
29.7.13	154	343	7	15
30.7.13	173	383	5	3
31.7.13	111	478	4	11
1.8.13	124	347	7	8
2.8.13	152	307	4	8
3.8.13	98	271	2	1
4.8.13	156	230	1	0
5.8.13	125	394	1	3
6.8.13	189	436	3	2
7.8.13	93	275	7	4

8.8.13	95	311	1	7
9.8.13	105	327	3	1
10.8.13	164	224	0	0
11.8.13	191	268	0	1
12.8.13	141	280	2	3
13.8.13	160	265	1	3
14.8.13	148	320	7	5
15.8.13	178	323	4	11
16.8.13	178	320	3	2
17.8.13	92	304	6	4
18.8.13	57	296	3	2
19.8.13	80	277	3	2
20.8.13	171	285	5	3
21.8.13	174	300	2	3
22.8.13	185	307	10	5
23.8.13	122	385	3	2
24.8.13	105	307	2	6
25.8.13	115	280	0	1
26.8.13	130	327	0	2
27.8.13	141	362	1	2
28.8.13	157	330	0	3
29.8.13	75	344	0	2
30.8.13	58	365	0	4
31.8.13	78	298	1	0
1.9.13	127	269	2	4
2.9.13	140	561	8	119
3.9.13	175	740	9	573
4.9.13	158	468	4	62
5.9.13	81	373	4	8
6.9.13	164	931	6	11
7.9.13	147	352	1	3
8.9.13	175	330	3	1
9.9.13	167	418	4	79
10.9.13	125	337	6	16
11.9.13	148	373	5	68
12.9.13	206	468	17	235
13.9.13	179	441	22	176
14.9.13	133	381	3	6
15.9.13	76	292	1	2
16.9.13	143	367	12	108
17.9.13	176	352	8	14
18.9.13	182	368	7	160
19.9.13	186	341	6	12
20.9.13	127	333	2	6
21.9.13	131	311	3	4
22.9.13	167	321	3	8
23.9.13	84	376	13	17

24.9.13	53	483	13	201
25.9.13	62	491	10	54
26.9.13	132	412	15	20
27.9.13	247	407	6	11
28.9.13	297	445	1	9
29.9.13	277	990	9	128
30.9.13	209	644	5	189
1.10.13	127	470	2	10
2.10.13	63	317	1	5
3.10.13	144	336	1	2
4.10.13	232	396	4	11
5.10.13	355	960	3	111
6.10.13	264	934	9	162
7.10.13	154	824	4	142
8.10.13	146	865	7	105
9.10.13	208	937	20	239
10.10.13	124	946	11	134
11.10.13	127	525	7	59
12.10.13	156	497	9	8
13.10.13	141	337	8	6
14.10.13	93	557	15	9
15.10.13	72	512	16	14
16.10.13	138	463	12	7
17.10.13	217	21424	24	298
18.10.13	298	19776	0	444
19.10.13	117	787	7	58
20.10.13	88	689	2	6
21.10.13	174	975	6	54
22.10.13	205	975	26	299
23.10.13	80	851	36	380
24.10.13	76	621	23	103
25.10.13	116	546	15	20
26.10.13	146	544	3	1
27.10.13	280	702	3	16
28.10.13	362	965	15	152
29.10.13	82	799	33	171
30.10.13	166	692	25	12
31.10.13	223	770	14	71
1.11.13	267	777	16	289
2.11.13	336	895	9	195
3.11.13	87	767	4	121
4.11.13	120	890	4	19
5.11.13	254	815	12	51
6.11.13	158	928	14	77
7.11.13	99	764	10	138
8.11.13	216	976	22	5
9.11.13	144	933	10	8

10.11.13	58	622	2	3
11.11.13	104	795	4	94
12.11.13	132	828	7	10
13.11.13	252	874	10	209
14.11.13	129	661	7	62
15.11.13	189	606	7	20
16.11.13	89	600	3	4
17.11.13	51	625	4	4
18.11.13	46	665	11	20
19.11.13	99	594	11	7
20.11.13	145	614	14	8
21.11.13	198	994	8	49
22.11.13	240	914	8	9
23.11.13	273	779	10	235
24.11.13	169	727	10	11
25.11.13	73	806	9	9
26.11.13	76	974	16	9
27.11.13	31	911	23	116
28.11.13	70	713	7	13
29.11.13	129	792	10	5
30.11.13	94	696	1	1
1.12.13	158	622	1	0
2.12.13	203	838	11	8
3.12.13	159	701	7	68
4.12.13	181	910	26	13
5.12.13	109	949	30	18
6.12.13	222	904	22	251
7.12.13	383	944	14	226
8.12.13	256	932	5	64
9.12.13	63	966	25	19
10.12.13	82	914	24	16
11.12.13	84	948	8	11
12.12.13	72	940	13	19
13.12.13	150	820	4	18
14.12.13	134	679	8	6
15.12.13	127	693	2	1
16.12.13	244	702	14	98
17.12.13	131	748	9	6
18.12.13	110	638	10	6
19.12.13	97	752	13	9
20.12.13	99	744	14	107
21.12.13	150	650	8	11
22.12.13	243	713	4	11
23.12.13	207	777	20	61
24.12.13	363	844	23	95
25.12.13	226	905	12	121
26.12.13	56	649	24	16

27.12.13	87	968	5	13
28.12.13	72	812	4	3
29.12.13	131	673	6	3
30.12.13	113	651	9	6
31.12.13	112	673	8	17

Appendix II

Eigenständigkeitserklärung

Die vorgelegte Dissertation wurde allein von mir und ohne fremde Hilfe verfasst. Eine Erklärung zu den jeweils geleisteten Anteilen der Autoren der im Rahmen der kumulativen Dissertation verwendeten Publikationen wurde in einem separaten Schreiben mit dem Promotionsgesuch dem Promotionsausschuss vorgelegt. In der Dissertation wurden keine anderen als die angegebenen Quellen oder Hilfsmittel benutzt. Alle vollständig oder sinngemäß übernommenen Zitate sind als solche gekennzeichnet. Die Dissertation wurde weder in der vorliegenden noch in einer ähnlichen Form bei einer anderen in- oder ausländischen Hochschule anlässlich des Promotionsgesuchs oder zu anderen Prüfungszwecken eingereicht.

Ludwigshafen, den 20. Dezember 2016

Julian Schwabe