

Climate Change and Society: About the Rediscovery of Climatic Causation

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Abstract:

In the 18th and 19th century western thinkers spend enormous intellectual energy to argue about the climatic determinants of the civilizational peculiarities of entire nations. There was an endless number of writers who ascribe supreme efficacy to climate. Nearly all aspects and processes of human life were tied to climatic causes. In the face of climate change this historically discredited doctrine of climatic determinism has experienced a renaissance. Scholarly literature, media coverage and public discourse of climate change tend to portray it as a single, independent phenomenon or set of phenomena that directly causes other events to happen and is therefore thematically and methodically related to historical climatic determinism. This essay argues that this mode of thought builds on problematic assumption of the relationship between climate and society. Drawing on numerous examples it examines the roots and contemporary forms, as well as the theoretical and political presumptions of climatic determinism, paying particular attention to the development of academic geography.

Key Words: *climatic determinism, climate impact research, climate and society, history of geography, environmental determinism.*

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I Introduction

Since the beginning of time, humans have consistently reflected on climate and weather. Conversations routinely start with a reference to the weather, and mass media reports on the weather daily. Besides this general social interest, climate has also been central to the scientific community for centuries. It has been repeatedly contended that climate is not only the foundation of human civilization, but that it also influences its particular forms, successes, and failures (cf. Glacken 1967, Fleming 1998). Those familiar with Emil Durkheim's influential work *Suicide* (first 1896) know that modern social sciences self-restrict by explaining social facts *only* through social factors. Durkheim argued that social facts are *sui generis*. He argued that they have an independent existence, and that even the most "individualistic" or "subjective" phenomena, such as suicide, should be regarded as objective social facts. Eventually, many scientists advanced a contrary view: They were more sympathetic in positing a close, causal connection between climate and suicide. Durkheim, however, openly rejected this view. He argued:

The relation is not readily discernible between temperate climate and the tendency to suicide; to require such a hypothesis the facts must be unusual agreement. Now, far from there being a relation between suicide and a given climate, we know suicide to have flourished in all climates. [...] We must therefore seek the cause of the unequal inclination of peoples for suicide, not in the mysterious effects of climate but in the nature of this civilization, in the manner of its distribution among the different countries (Durkheim 1897[1952], 105).

Durkheim's essay had a widespread influence on the advancement of modern science. This divide between the natural and social sciences influenced the debate between the different

scientific communities. Whereas most scientific disciplines internalized and implemented this divide, geography did not. Indeed, had geography done so, it would have rendered its intellectual core, the causal relationship between nature and society, obsolete (Sluyter 2002). Meticulously, geography devoted itself to an examination of climate and its consequences on men and society. In a quantitative and therefore "scientific" approach, nearly all aspects and processes of human life were tied to climatic causes (cf. Livingstone 1992, Stehr & von Storch 1999). In the first decades of the 20th century, some of these crude deterministic writings, especially those of the American geographer Ellsworth Huntington, gained immense popularity and allowed the geography academic community to flourish (Freeman 1961).

This climate determinism/geography boom came to an abrupt end in the middle of the 20th century. After World War II, the issue of the influence of climate on people and society played an extremely limited role among social scientists. The proximity of climate determinism to taboo racial theories silenced climate determinism in both intellectual and political circles. Climate determinism was largely ignored in scholarly discourse, in both natural and social sciences. Only in some minute parts of the now largely irrelevant discipline of geography, could the ideas of climate determinism survive (e.g. Taylor 1951, Manley 1958, Chappel 1981). Yet, whereas climatic determinism was on the wane in academia, its common sense made it remain ubiquitous in public debates.

For the past two decades, however, the issue of anthropogenic climate change has made its long march back into scientific and political institutions. Although the idea of an anthropogenic enhancement of the greenhouse effect can be traced back to the end the 19th century (e.g. Tyndall 1861, Arrhenius 1896), it was not until the mid 1980s that the issue attracted broader scientific and public attention. While the detection and attribution of anthropogenic climate change has become the centre of this *scientific* endeavour, questions about potential ecological and social impacts have drawn the most *public* attention. Thus, in 1986, the Energy Study Group of the German Physical Society (AKE) coined the term *Klimakatastrophe* (climate catastrophe). The topic of "catastrophe" was promptly picked of by mass media and environmental NGOs, which resulted in a further dramatisation and escalation of the debates (Weingart et al. 2000). Due to the hype of this semantic "catastrophe," the investigation into the potential consequences of climate change on society became increasingly important. In the wake of this contemporary climate impact research, the historically discredited doctrine of climatic determinism has experienced a renaissance. Nowadays, the amount of scientific papers dealing with this classical question of the significance of climate on people and society are too numerous to count. With respect to the scope of these articles, they embrace nearly all facets of human life, ranging from health related aspects (e.g. Endlicher et al. 2006, McMichael et al. 1996) to economic impacts (e.g. Stern 2006, Timmerman & Grima 1988) to security issues (e.g. UNEP 2007, CNA 2007, Smith und Vivekananda 2007). Even the historical topic of the relationship between climate and suicide has been taken up anew (Dixon & Kalkstein 2009).

Most contemporary climate impact research is thematically and methodically related to historical climatic determinism. In order to make climate impacts calculable and predictable, only the climate system is allegorized in a variable and dynamic manner. Social factors are circumscribed as dependent variables. Society remains a defensive victim of climate. The consequences of climate change are naturalized and appear inevitable.

Importantly, this *neo-climatic determinism* is not a single or un-contextual phenomenon. It is one facet of a broader discourse on “academic environmental talk” (which includes, not only climatology, but also environmental history, evolutionary psychology, socio-biology, bioregionalism, etc.). This environmental talk is characterized by an emphasis on the explanatory power of biophysical material components in shaping human or social outcomes (cf. Radcliffe et al. 2010).

This influential discourse illustrates that the divide between the natural and social science is beginning to crumble once more. Similar to the early days of climatic determinism, the boundaries of these disciplines are porous. Indeed, Durkheim’s initial hypothesis is increasingly called into question – usually without being aware of the long history analyzing the consequences of nature on people and society. Environmental determinism is, in most cases, only treated as part of geography’s distant past – a topic reserved for lectures on geographic thought. However, there has recently been a resurgence of academic interest in environmental determinism (cf. Radcliffe et al. 2010, Judkins et al. 2008, Sluyter 2003). Nevertheless, there has been a surprising lack of systematic research regarding the implications of the rise of climatic determinist arguments in conjunction with its intellectual pitfalls (as an exception Stehr & von Storch 1999, 2009). It is therefore unsurprising that “climatic determinism” is no longer in contemporary encyclopedias or textbooks on climate change. For example, in the recent *Encyclopedia of Global Warming and Climate Change* (Philander 2008) no entry is linked to the lemma *climatic determinism*.

To alleviate this problem, this essay examines the roots, as well as the theoretical and political presumptions of climatic determinism, paying particular attention to the development of academic geography – a focus which is valuable in that it provides a novel and constructive critique of contemporary climate impact research and, en passant, touches on its political implications. First, in order to set up the claim that contemporary climate impact research is mostly old wine in new bottles, I will define the parameters of “climatic determinism”. In so doing, some crucial conceptual and methodical enhancements are added to the classical definitions of climatic determinism. I explain how these old forms of thinking are revisited in current debates about climate change (II). In the following section the roots and branches of climatic determinism are briefly outlined (III). Lastly, I will discuss the options available for a more adequate approach to climate impact research (IV).

II Retrofitting the definitions of climatic determinism

In order to clarify my argumentation and to afford a more multilayer understanding of climatic determinism a brief overview of the theories of causal connections is necessary.

Determinism as a way of thinking has a very deep philosophical ancestry. Ever since Aristotle the theory of science has distinguished between different kinds of causes. In the broadest and most common sense, causality is the belief that an event (a) directly preceding and giving rise to another (b): (b) is determined by (a). This assumption is the basis of nomological cause-and-effect-thinking. It gives answers to the questions *where* something came from and *why* something happened. In the philosophical taxonomy this is called *causa efficiens* or *Newtonian causation* (latter reveals its close connection to the natural sciences). Besides this commonly used theory two further types of causation, *causa materialis* and *causa finalis*, are relevant for my argumentation. *Causa materialis* signifies an occurrence or process that enables but does not directly lead to other subsequent events. The effect would not have been possible without the previous causation, however, it did not follow in a strictly deterministic way. In a more metaphysical or teleological manner *causa finalis* instead focuses on *what happened in order to reach something*. Following this understanding of causality an occasion always serves a particular purpose, a *telos* (cf. Gloy 1995). Whereas the two former theories of causality serve as general model for scientific research, the latter is broadly disapproved within the scientific community – at least in official usage – as antiquated and irrational.

Climatic determinism as a linear cause-and-effect model

Although the origins of climatic determinism are closely connected with all those three ideas of causality, scientific research restricted the view of climatic determinism to specific cause-and-effect relationships. Thus, the theory of climate determinism as well as criticism related to it are often based on insufficient definitions.

As an example, Kent McGregor gives the following definition:

Environmental determinism is the notion that the physical environment controls or molds human behaviour and limits human societies to a restricted range of outcomes, or perhaps only one possible outcome, which is thus preordained. Climatic determinism specifically concerns the impact of climate on individuals and societies (2004, 238).

Although the coverage of this definition is not satisfying, it can be applicatively applied to 20th century climatic determinism and even to some current forms of climate impact research. The substance of the work of 20th century's generation of scholars – especially geographers – favouring climatic determinism, like Ellsworth Huntington, was the almost enthusiastic and naive manner in which they tried to find linear, law-like connections in the climate-society relationship based on quantitative deductions. Thereby the efficacy of climate was chalked to many differing climatic parameters. The list of suggested climate variables and their alleged effects is almost arbitrary. It extends from conventional measurements as temperature, humidity or windiness to more exotic measurements as magnetic storms or concentration of ozone in the atmosphere. An enumeration of the effects includes, for example, life expectancy, crime rates, suicide rates, intelligence or economic efficiency; but also more comical effects such as divorces or the number of "serious" books checked out of public libraries (cf. Stehr & von Storch 2009, 50).

The shortcomings of these explanations are obvious, especially when they pretend to explain human behaviour. If one considers what the term climate scientifically denotes, namely [...] *the sum total of the meteorological phenomena that characterise the average condition of the atmosphere at any one place at the earth's surface* (von Hann 1883 [2010], 1), it is impossible to deduce human behaviour from any climate conditions. Because climate is artless *the statistics of weather* (von Storch 2009, 741) – and therewith an environmental factor which cannot be experienced directly – it is completely improper to explain decision based human behaviour. At best, when it comes to unintended direct or indirect physiological responses of the human body to atmospheric states or alterations, these naturalistic explanations gain a limited plausibility. The intensity of UV radiation or the thriving of some germs is for instance strictly linked to climatic conditions. But even in this narrow scope climatic determinism is not a satisfying approach. Because if and to which degree someone is exposed to these climate factors depends on different socio-economic circumstances. The impact of heat, coldness, extreme weather-events, germs or parasites is not a diachronic constant, but varies according to culture, standard of living or the organization of every day life of an individual.

A simplistic linear deterministic reasoning is nonetheless typical in some fields of climate impact assessment, especially in the research on health consequences of climate change. A representative example of this strictly naturalistic thinking is the technocratically employed term *heat deaths*. In spring 2007 a EU-report caused a sensation claiming that ongoing climate change would cause 86.000 heat deaths a year within the European Union (Robine et al. 2007). But this and similar extrapolations account exclusively for the climate factor and thereby descend consistently, that behavioural patterns and social microstructures affect "heat-caused" mortality to a much larger degree (cf. Klinenberg 2002).

Anyhow, given this well established and narrowed definition, it is hardly possible, to comprehend the complete amplitude of climatic deterministic ideas within climate science and public. Limiting the definition of climatic determinism not only to linear cause-and-effect relationships (*causa efficiens*), but also implicating more diffuse and mythological interpretations of causality (*causa materialis* and *causa finalis*), will enhance expedient conceptual results, which can fruitfully be applied to analyse current models of climate impact assessment.

Diffuse climatic determinism

Today in scientific debates about potential climate change impacts it is often stressed, that climate should not be considered as the sole cause for social aspects, structures or processes, but should be regarded as one causal factor *pari passu* influencing social and economic processes. In the sense of *causa materialis* climate and society are described as coequal parts in an interactive system. In this system climate factors serve as an initial point or a catalyser of social processes. Social and climatic factors were linked to each other and considered as a holistic entity. At this point it is reasonable to draw parallels between geography's traditional

intellectual core – namely the relationship between human and environment, technique and nature – and current climate impact research. Such a combination of natural and social variables leads inevitably to a diffuse form of environmental determinism, as the German geographer and philosopher of science Gerhard Hard elaborated in his 1973 work *Geographie – Eine wissenschaftstheoretische Einführung*. Accordingly Hard indicated the attempt to compass nature and society holistically as the *deformation professionnelle* of academic and educational geography. According to my opinion this term is without restrictions suitable to describe climate impact research.

Both, the *diffuse climatic determinism* as well as the cause-and-effect model of climatic determinism are based on the *ad hoc hypothesis*, that alterations of the climate system are above all responsible for implications on society. Genuine social processes, such as perception and communication of climate change are considered secondary. Indeed climatic aspects can be considered to be socially embedded, but again in a naturalistic manner. Climate change is still being regarded as an independent variable. However, these climatic variables are never self-explanatory, because it is impossible to isolate them to explain or understand social phenomena. They are no independent parts of a system, because they will only be suitable to explain social processes in connection with *non-natural variables*, and only when they are translated into *social variables*; climate for example into *perceived climate* or – more appropriate – *climate as a subject of communication*.

To illustrate this type of climatic deterministic thinking I will cite, in the following, three demonstrative examples: The first one deals with the current debates about winners and losers in the context of climate change, whereas the second one concerns Neo-Malthusianism and the last example describes the political background of climate change.

The idea that climate change produces winners and losers is meanwhile widely accepted and a firm subject of political and scientific discourse, at which two major underlying theoretical perspectives on winners and losers can be identified: While the first theory suggests that winners and losers are socially and politically generated, the second theory suggests that winners and losers are natural and inevitable – the latter being the dominating line of discourse (cf. O'Brien & Leichenko 2003). Interestingly enough winners are by far more often traced to socio-economic parameters than losers. According to the naturalistic way of arguing, winners are likely to be associated with favourable environments conducive to productivity and efficiency, whereas losers are likely to be products of difficult, marginal or hazardous climates. In a Eurocentric and diffuse deterministic way and based on general circulation models (GCM) the countries of the mid and high latitudes are represented as winners, whereas African and some coastal countries are placed at the losing side. Which countries or regions and who in these regions should be considered as losers, is based exclusively on such abstract and natural scientific terms as climate sensitivity and biophysical vulnerability. Climatic aspects are hierarchically placed over socio-economic ones.

Diffuse climatic deterministic thoughts of pattern are not confined to discussions about direct consequences of climate change, but are also prominent in human ecology discourses. In a

Malthusian manner ecological impacts of climate change are annexed to typical themes of human ecology like population growth, environmental degradation or food security with questions about carrying capacity and sustainability of man-environment-systems being the center of attention. With emphasizing the role of climate change and downplaying the political and social interpretations in the understanding of famine, land-shortage and conflict, complex (social) problems are broken down to simplistic and naive narratives. As an example, in his work *Collapse* the popular American geographer Jared Diamond attributes the Rwandan genocide of 1994 to population pressure, climate change and soil degradation. In the end of his case study Diamond concludes with the warning that [...] *Malthus' worst-case scenario may sometimes be realized, and that Rwanda may be a distressing model of that scenario in operation* (2005, 327f.). One can also refer to the conflict in Sudan, which has often been explained in a similar vein (e.g. UNEP 2007, de Waal 2007). These Neo-Malthusian publications inaccurately describe which climatic alteration can be held responsible in what way and up to what extend for which level of escalation. Often a connection is simply assumed in an ad hoc hypothesis.

What is important is not to identify one factor as more determinant over the others, but to examine the way in which different factors link up and impact on each other. It is this network of process that requires investigation and understanding. By drawing only on GCMs rather than social science, climate impact research fall prey to the engaging simplifications of Malthusian arguments.

Even in the political framing of the climate issue diffuse deterministic assumptions are the daily fare. Exemplarily it is set out in Article 2 of the 1992 United Nations Framework Convention on Climate Change (UNFCCC), which is still the most important benchmark of international climate policy, that [...] *the ultimate objective of this convention is, to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system* (UN 1992:4). At what concentration of greenhouse gases a dangerous interference would occur, was politically configured in the last years. The European Union for example advocates a threshold that would lead to a maximal global warming of 2°C compared to pre-industrial global temperature. It is a matter of fact that these thresholds or tipping points are not imposed by nature, but are created through culture, which is often faded out in political discourses. This naturalistic colouring of the political discourse becomes additionally apparent in the way the concept of adaptation is currently used. The Intergovernmental Panel on Climate Change defines adaptation as [...] *the adjustment to in natural or human systems to expected climatic stimuli [...], which moderates harm or exploits beneficial opportunities* (Parry et al. 2007, 6). This definition focuses exclusively on climate as the relevant stimulus and neglect non-climatic factors at all. Again climate appears as a prior and external condition.

"Voluntary" climatic determinism

According to this Neo-Malthusian core concept of a holistic man-environment-system a further variation of deterministic thinking can be observed, which might be called *"voluntary" climatic determinism*. Whereas the classical and diffuse climatic determinism are based primarily on methodological distorting connections between climatic and social factors, "voluntary" climatic determinism is due to mythical and metaphysical assumptions. In a teleological tradition *causa finalis* replaces *causa efficiens* and *causa materialis*. The basic principle of this variation is the assumption that man, society and climate are bonded by nature. While acknowledging that people in modern society can – and have – escaped climate's imperative, according to this theory, climate has a *deterministic and instructional quality*, which, however, is not receiving the attention it deserves. Thus, the emancipation from climate's imperative during the process of modernisation is not considered as progress, but as cause for many undesirable social processes. Therefore climate change is the result of a pathologic, "unnatural" relationship of men, society and climate: in modern societies humans do not live in balance with climate anymore. The emancipation of society from climate is followed by a perceived emancipation of climate from society. Because of this latter emancipation climate is not only described as a scientific entity, but gets anthropomorphized. It is victim, patient and an independent protagonist at the same time: Climate becomes sick and causes sickness – *climate strikes back!*

The parallels between this framework of climate issue and some theological views are evident, although such a view is rarely explicitly articulated in the scientific community. However, it plays an important role in current mass media and public discourses using it as a sense making narrative. In the following, two examples from the field of popular science, the first dealing with James Lovelock's Gaia Hypothesis, the second with the syndrome concept of the German Advisory Council on Global Change, will be set showing the specific characters of this kind of deterministic thinking.

The teleological ideas of "voluntary" climatic determinism are championed most notably by the British biophysicist James Lovelock. Toward the end of the 20th century, James Lovelock developed a set of ideas collectively called Gaia hypothesis, named after the Greek goddess of Earth. He suggests that Earth functions as a single living organism, which thus has the power of self-regulation. Lovelock maintains that life regulates climate by controlling the composition of the atmosphere and, thereby, its temperature (cf. McGregor 2004). Accordingly, for Lovelock climate change was the result of an unbalanced man-climate relationship. He proclaims:

We are taking so much that Gaia is no longer able to sustain the familiar and comfortable climate we have taken for granted. Now it is changing, according to its own internal rules, to a state where we are no longer welcome. [...] This is why it is much too late for a sustainable development; what we need is a sustainable retreat (Lovelock 2008, 7f).

According to such a view the possible strategies how societies should deal with climate change are limited. If one assumes, that a natural balance between climate, man and society exists (or has existed), then everything should be done to maintain or restore this balance. Consequently only mitigation – or *protecting climate from society* as the German climatologist Hans von Storch puts it (2008, 54) – seems to be legitimate option. Mitigation policies serve in this case as a moral imperative: "reduce emissions as much as possible" is the order of the day. Because of the *telos*, which is immanent in the climate system, adaptation is seen as secondary and, most notably, little promising. Thus, even the institutionalizing and the emphasis of mitigation policies resonate with a discourse that invokes teleological and deterministic assumptions (see again the UNFCCC-article cited above).

Something similar applies to the so-called syndrome concept, which was acquired by the German Advisory Council of Global Change (WBGU) during the 1990s. The syndrome concept is an integrated approach to describe and explain global environment and development problems and their specific dynamics, thereby making extensively use of a terminology borrowed from medicine. The WBGU "diagnoses" 16 syndromes of modern "pathological" environmental situations (cf. WBGU 1996). Recently the WBGU has its focused on global climate change as the overarching and most acute syndrome. Contrary to the diffuse and classical form of climatic determinism, the problem of this approach is less the way, in which climatic and social factors were linked, but how the WBGU semantically portrays its work. The medical terminology, when applied to scientific entities, not only seduces to metaphysical and mythical assumptions, but also predetermines solutions. This semantic framing again results in a unilateral focussing on mitigation policies: The patient climate would recover, if the "climate killer" CO₂ could be stopped.

III The historical context: roots and branches of climatic determinism

In the preceding section the diverse aspects of climatic determinism have been explicated in-depth. It has become clear that climatic determinism is still present in scientific discourses and that it should not be shrugged aside as a bygone episode of scurrile thinking. For the purpose of an all-embracing understanding, it is useful to illuminate the historical contexts of climatic determinism and its varieties. In a postmodern way, the career of climatic determinism from its ancient origins to its current forms will be outlined briefly.

Climatic Determinism has deep historical roots, which can easily be traced back to the ancient world. The question of climate consequences on humans and societies was already systematically discussed by some ancient Greek and Roman philosophers.¹ It is commonly said that Hippocrates of Cos (ca. 460-370 B.C.) in his most popular treatise *Airs, Waters, Places* was the first, who analysed the influences of climate on the psychological and physical

¹ It is noteworthy here, that the ancient meaning of the term climate differs from the contemporary scientific understanding. Etymologically climate stems from the Greek term *klima*, meaning inclination. Until the emergence of modern climate science, climate was – even more than today – a catchall. In a traditional sense the term climate was more a synonym for physical environment.

constitutions of men in a systematic manner. Based on the assumption of a linear cause-and-effect relationship he established a causal connection between people's habits and characteristics in various places and the climatic conditions of their environment. In the final chapter of this early ancient work Hippocrates concludes:

Climate is the most important factor that creates differences in men's constitution [...]. For in general you will find assimilated to the climate of the land both the physique and the characteristics of the inhabitants. [...] Take these observations as a standard when drawing all other conclusions, and you will make no mistake (n.d., 137).

A little later Aristotle (ca.384-322 B.C) argued in a similar way. Aristotle thought to have found a climatic explanation for the assumed superiority of the Greeks over the "barbarians". He contended that by virtue of their intermediate geographical position the Greeks were able to combine the superior mental attainments of southern peoples and the greater bravery of northerners, while escaping the fickleness of the southerners and the stupidity of the inhabitants of cold climates (cf. Barnes 1921). The most comprehensive work on the relations between topography, climate and civilization of the antiquity originated from the Roman thinker Strabo (ca. 63 B.C.-23. A.D), who was bent on showing in his 17-volumed *Geography* how the physical features of a country influenced the character and history of its human inhabitants (cf. Glacken 1967).

Interestingly, in these ancient writings the climatic stimuli were interpreted contrarily compared to those of the heydays of climatic determinism in the early 20th century. Exemplary, a hot and dry climate was considered to be beneficial for cognitive performance, whereas colder and cyclical climates were considered to be dulling and development-inhibiting. Already in these ancient writings the arbitrariness and fallacy of – even contemporary – climatic determinism came into its own: the observed realities, like differing cultures, became *subjective judgments*, calling for *objective explanations*: obvious coincidence became causality. A further interesting common basis of climatic deterministic writings was the notion, that it was always the own and familiar climate, which was considered favourable and inspiring, whereas *the others* have to reside in climatically disadvantageous regions. Climatic determinism works through a process of crude *othering*.

Although most of the ancient knowledge had fallen into oblivion during the middle ages, climatic determinism stayed momentarily. Thereby the ancient notions of climate and its consequences were reinterpreted and put into a religious and therefore teleological context. The observable fact, that differing cultures inhabit distinct climate regions, was seen as a part of a God-given cosmological order. Interestingly, due to this teleological notion of climate, even in medieval times, the possibility of climate change became a reason of concern. In a sense of *causa finalis* observed climate anomalies, such as droughts or wet periods, were explained by authorities of the church as divine responses to people's sinful lifestyle (cf. Stehr & von Storch 2006).

Notwithstanding this long prehistory, it was in the writings of those celebrated Enlightenment that the outlines of an intellectual climatic determinism began to sketch out. It was especially

the French philosopher Montesquieu (1689-1755), who, in revisiting Hippocrates ideas, discussed the importance of knowledge of climate, in understanding the characteristics of people and ethnical and political diversity:

We have already observed that great heat enervates the strength and courage of men, and that in cold climates they have a certain vigor of body and mind which renders them capable of long, painful, great and intrepid actions [...]. This has also been found true in America; the despotic empires of Mexico and Peru were near the Line and almost all the little free nations, and are still, near the Poles (Montesquieu 1748, 276, as cited in Fleming 1998, 16).

In his climate theories Montesquieu was fond of finding nomothetic laws behind the interconnectedness between climate and human behaviour in order to give policy advice. He was sceptical about teleological forms of argumentation. Thus he was the first thinker, who tried to establish a positivistic form of climatic determinism. His writings lead to a first semi-scientific heyday of climatic determinism, which has created a cultural tradition whose effects can even be felt today. People adopted the principle, as Montesquieu expressed it, that there was no mightier kingdom than that of climate. An international survey among students, conducted by the psychologist James Pennebaker and colleagues in 1996, showed for example that Montesquieu's hypothesis is still enjoying great popularity.

In his work *Outlines of a Philosophy of the History of Man*, the German philosopher Johann Gottfried Herder (1744-1803) also analysed the climate problem in detail, but in a much more sceptical way than Montesquieu. Admittedly, Herder was convinced, that climate was an important factor, but he rejected a linear cause-and-effect relationship, because one could always find contrary historical facts, which refuted these strict causal relationships. Under the heading *What is climate? And what Effect has it in forming the Body and Mind of Man*, Herder stated in a (mild) manner of diffuse climatic determinism:

It is true, we are ductile clay in the hand of Climate; but her fingers mould so variously, and the laws, that counteract them, are so numerous, that perhaps the genius of mankind alone as capable of combining the relations of all these powers in one whole (Herder 1784 [1800], 173).

As this historical abstract pointed up, all varieties of climatic determinism were already momentarily in the end of the 19th century. Therefore, the scientification of climatic determinism, which took place during the early 20th century, could be based on widely accepted knowledge. The field of academic geography was the turning point. So it is valuable to focus in more detail on this process of scientification and the particular role of geography. For this purpose, I will draw on Bruno Latour's model of how modern science has emerged and how it dichotomized nature from society (cf. 1993).

Latour brought forward the argument, that an *ontological differentiation* between nature and society was established in western thinking during the end of the 19th century, which led to a conceptual divide between natural and social sciences. Nature as well as society were increasingly considered as distinct entities, which needed to be *objectively* and *independently*

explained, and not just holistically described. Whereas, the sciences therefore gradually abdicated from the holistic ideal of the enlightenment and emerged to independent disciplines at the universities, geography still focused on holistic regional descriptions. The emerging new scientific disciplines like biology or sociology propagated a nomological concept of science with the quest finding law-like cause and effect relationships. To maintain its scientific and social standing academic geography would thus also have to be explanatory. Geographers therefore drew on Darwin's evolutionary theory in order to elaborate climatic determinism - academic geography's first and only major attempt at a universal, grand theory of the relationship between nature, climate and society. Such a deterministic relationship was much more akin to the explanations offered by the reductionist disciplines regarding their phenomena of interest than the holistic explanations traditional geography had offered. Yet climatic determinism held great appeal not only because it promised deterministic laws but because it systematized rather than countered existing ideas about the relationship between climate and society. It built on the gratuitous climate theories that – as this historical abstract points up – always had been taken for granted. And it promised a smooth transition from former prevailing natural theology, because both climatic determinism and natural theology emphasize outcome to the exclusion of process. It thus offered explanatory theory without threatening the western myth of superiority (cf. Sluyter 2002).

Numerous papers of early 20th century academic geography showed the transformation of the cosmological climatic determinism into a quantitative empirical approach. First and foremost the American geographer Ellsworth Huntington described in details questions about the impact of climate and climate change on human affairs and the development and localisation of civilization (for a detailed discussion of Huntington's work see Stehr & von Storch 1999). Huntington attempted to move the analysis of climatic forces on society away from the kind of impressionistic variety of determinism exemplary represented by Montesquieu towards a much more rigorous scientific objective footing. An attempt, which was even supported in a current paper on climate impact research (Auliciems 2009), however not for its specific claims, which Auliciems basically rejects, but for the ambition of identifying deterministic, causal, law-like relations when examining climatic phenomena. Huntington's approach soon became the exemplary platform for the geographic analysis of climate and is theoretically as well methodologically particularly interesting and revealing. Some of his methodological shortcomings and fallacies re-emerge in contemporary discourses about the consequences of climate change.

Although, Huntington articulately refused subjective perceptions as the basis of scientific argumentations, he nonetheless invoked and appealed to experiences that he expected surely every one of his readers shared and could replicate almost perfectly and instantly. For example, in his most popular monograph *Civilization and Climate* (1922), Huntington advanced the hypothesis, that the genesis of a civilization would be feasible only in regions with favourable climatic conditions. His conclusions were based on a statistical analysis of the work records of factory workers and marks of college students. Huntington argued to have

shown, that humans are most energetic at a temperature range of 15-21°C, combined to a moderate range of annual temperature and the presence of short term variability.

Based on these theses, Huntington constructed a world map of “climatic energy” using the average temperatures from approximately 1,100 weather stations around the world. "Favourable climatic conditions" prevail in especially in Western and Central Europe and most of North America. On a second map, the “civilization levels” of the regions of the world were displayed. These civilization levels were determined from a survey among 50 scholars from 15 (western) countries. The two world maps, therefore not surprisingly, resembled one another; according to Huntington, this proofed that climate had and would continue to have a decisive influence on the civilized and cultural development of various regions of the world (cf. Stehr & von Storch 1997). This seemingly objective line of arguing is a further example for the inevitably fallacy of climatic determinism. As already seen in the ancient forms of climatic determinism, it is always the own and familiar climate, which is considered favourable and inspiring, whereas *the others* have to reside in climatically disadvantageous regions. Climate is ex ante attributed to unconditional and un-situational characteristics. The correlations, Huntington found, which not necessarily mean causality as Durkheim already noted, just heightened the plausibility of the *already known*.

The most conspicuous characteristic of Huntington's work is the attempt to calculate exact correlations between economic, sanitary or other social parameters and all kind of climate variables, and to generalize these inductive findings to theorems of the efficacy of climate. On the basis of these theorems, Huntington was even anxious to give policy advice. Especially scurrile and often cited is his recommendation that the United Nations should built up their headquarters in Providence, Rhode Island, because this location was to be found the most productive climate in the world (cf. Stehr & von Storch 2009, 50). In a similar vein, even some contemporary climate impact researchers act on the assumption that current observable consequences of climate could be extrapolated into the future without reservation. But the efficiency of climate – if such a determination might be procurable at all (what I venture to doubt) – is not a diachronic constant and the world in twenty years will differ from today at least as much as the year 1940 differed from the year 1920.

Nevertheless, in some regards the situation of the early 19th century is comparable to the present situation: Already Huntington recognized that climate was not constant in historical times. The manner, in which he dealt with his insights, reveals how much scientific practise is – then as now – socially embedded. His concept of geography and of science in general significantly influenced Huntington's views, scientific aims and in his willingness, to accept certain answers as objective and coherent. Huntington worked during a time, when the lines between different branches of knowledge and academic disciplines had not yet been firmly established, just as much as the currently observable renaissance of climatic determinism takes place at a time, where the divide between the cultures of the social and the natural sciences seems to crumble again.

This briefly presented discourse came to an abrupt end in the middle of the 20th century. Because of the conclusive establishment of the – from now on – great intellectual divide between the natural and social sciences, questions of the influence of climate on people and society hardly played a role any longer among social scientists. Both scientific cultures narrowed their view to processes *sui generis*. Therefore, geography's traditionally intellectual core was no longer acceptable for modern sciences, because the modern concept of science renounces analysing both, natural and social phenomena. Thus the discipline declined into public and academic obscurity. Climate was no longer primarily considered an issue of the field of geography, but of modern and specialised disciplines like meteorology and oceanography (cf. Skaggs 2004).

Freely adapted from Thomas Kuhn (1962), the paradigm of climatic determinism inevitably lost its intellectual attraction, but not primary because of its fallacies or restrictive facts, but rather because it was artless incompatible with the intellectual divide between nature and society and with the modern concept of academic disciplines. The problem was not that climatic determinism theorized the relationship between climate and society in an unacceptable way but that it presumed to theorize that relationship in anyway at all. In the face of global environmental challenges like climate change it is now not surprising that climatic determinism becomes structurally interesting again.

V Conclusion: avoiding determinism and fostering socio-scientific research

This essay has expressed the conviction that even today climatic determinism often serves as the basis for relevant and influential way of thinking. It shows that especially moderate forms of climatic determinism may influence public as well as scientific discourses on climate change. But the basic assumption of climatic determinism, namely that climate – or nowadays climate change – could determine or actuate social conditions and processes, can not be maintained. Social processes do not depend on the natural environment. There is no direct access of natural processes to society – as the German Sociologist Niklas Luhman convincingly elaborates in his book *Ecological Communication* (1989). Climate change does not have effects independently of social contexts. Therefore one cannot state that changes in climate or effects caused by climate change will in themselves cause any social events. Instead of that, the effects of climate change will vary according the prevailing social contexts.

The dynamics of the social transformation process continuously accelerate and therewith also the contingency and fragility of social contexts rises – not only in the western world. It is not only the climate that is changing, but the social circumstances as well. Climate change is only one part of an immensely complex and multilayered Global Change. Indeed, this does not mean that one should fall into indifference or trivialize the problems regarding to climate change. In fact, alterations of the climate and of the environment pose a challenge for every society, but the social consequences arising from these challenges, depend on social processes only: The impacts of climate change are always contingent and never bound to occur. Having

revealed these unavoidable shortcomings of climatic determinism some recommendations for a more appropriate form of social science based approaches to the climate issue arise:

Climate impact research needs to be denaturalized. Purely natural scientific scenarios offered by Earth-system scientists are not able to accomplish useful insights of social processes, because they leave out of consideration the most relevant factors, for example technological innovations or the development of social norms and values. Projections of future climate will always be difficult and remain uncertain. Predictions of social consequences will even pose more problems, not only concerning the specification of future dangers, but also concerning the social reactions those predictions might cause– independent of their validity.

It was in the beginning of the last century, when proponents of the emerging sociological discourse like Max Weber or the introductory cited Emil Durkheim propagated that social phenomena are unique in fundamental respects, for example, in terms of their unmatched complexity as well as their particular developmental patterns that demand and require a distinct separation in explanatory principles and methodological procedures from already established natural sciences. Therefore those theoretical perspectives, which refer directly to the effect of natural factors, were excluded in social science discourses. And I think even today there are many good reasons for this exclusion. The objects of research of social sciences are incompatible to those of the natural sciences. Most of the supposed interdisciplinary and innovative approaches, pretending to bridge the great divide between the two scientific cultures, appear to be rearticulations of theories or holistic musings of the past. Anyhow, a closer connection of social and natural sciences discourses, as the ubiquitous siren calls for greater inter-disciplinarity suggest, could be useful but only when resisting the temptation of naturalism. Therefore the persistent claim of natural science discourse to be located upstream and upfront of social science must be overcome.

The challenge for social sciences will be to reflect the complexity of – rather than to simplify – divers views of the world. There is a job to be done to make further complex contexts accessible and powerful in public debates.

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