

## 23W856111: Scientific Methods and Writing Gruppe

### A2 - Scientific Essay

#### Spatial concepts matter for climate change

##### Introduction

The term “climate change” refers to the long-term changes in patterns and averages of meteorological parameters and atmospheric elements. Since the Industrial Revolution, scientists can measure a significant increase in the global average temperature of the earth – this is mainly caused by humans burning fossil fuels which consequently leads to a higher amount of greenhouse gases in the atmosphere. These greenhouse gases subsequently trap heat and act as a blanket. If the global average temperature of the Earth continues to rise, humans will face several life-threatening problems: agriculture will get more difficult and in specific regions not be possible anymore; environmental disasters like droughts, flooding, and wildfires will happen more frequently and become more severe; refugee flows will cause conflicts in many parts of the world posing a potential risk for civil wars. If humanity does not take appropriate measures to address these issues, there is a likelihood that the human race will become extinct. (United Nations, n.d.) Climate change is humanity's biggest challenge today – already now its impacts cannot be denied, no matter which continent you look at. Many issues relating to climate change are of a spatial nature. Whether on an individual level when you ask yourself where to buy a property or make major investments climate risk-free, or at the policy-making level when you have to investigate where the most amount of greenhouse gases are emitted in order to take measures at the right location. (Romm, 2018) As not only the contributors to, but also the effects of climate change are dispersed heterogeneously around the world, the question arises to what extent spatial concepts matter in this context.

##### Methods

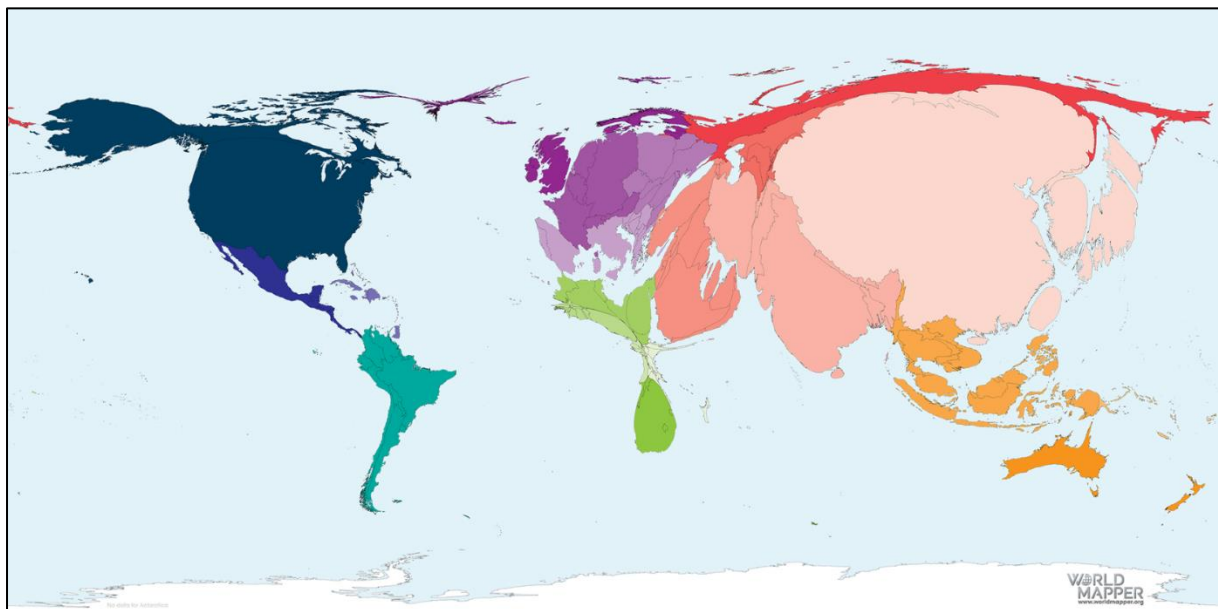
In order to investigate to what extent spatial concepts matter for climate change, I reviewed existing literature regarding that topic and tried to synthesize and critically reflect on the given outcomes. A literature review helps to get an overview of a specific topic's current state of the art and to find possible conflicts between achieved findings of different researchers (Ram et al., 2021). It therefore is an appropriate method to transform the current knowledge about

spatial concepts in climate change into a new form. The (United Nations Environment Programme, 2004) for example **used a similar method**, namely a desk study, to investigate the relationship between the environment and development efforts in a post-conflict scenario in Liberia. They gathered information from Liberian government officials, non-governmental organizations, and additional sources. **The study's authors concluded that the effective rebuilding of the country is only possible if proper environmental restoration is ensured.**

### **Spatial injustice concerning the emitters and the affected**

It is not hard to recognize the global inequalities concerning greenhouse gas emissions when looking at certain numbers. Considering the United States, for example, inhabited by roughly 323 million people: its annual emissions of carbon dioxide comprise five billion metric tons. In contrast, a region of the global south like sub-Saharan Africa with a population of approximately a billion, only has annual emissions of 823 million metric tons. (Adow, 2020) Another example of climate change related global inequalities can be seen when looking at the Commonwealth of Nations: 18 selected Commonwealth countries collectively, have a lower amount of carbon dioxide emission than one person in the UK (Power Shift Africa, 2020). It is undisputed that the industrialized countries, also known as the Global North, are the main emitters of greenhouse gases. But only because these gases are released above certain regions of the Earth, does not mean that they only affect their emitters – the spatial injustice regarding the emission point and the affected regions is therefore obvious. Figure 1 illustrates this idea again in an exaggerated way. It shows a world map on which the countries are distorted according to their absolute carbon dioxide emissions in the year 2020 – the larger the size of the country, the greater the quantity of its emissions.

**Figure 1**  
*CO<sub>2</sub> Emissions 2020*



Note. From CO<sub>2</sub> Emissions 2020 MAP NO. 1166, by (Worldmapper, n.d.) (<https://worldmapper.org/maps/co2-emissions-2020/>). Copyright 2023 by Worldmapper.

However, maps like in Figure 1 can also be deceptive – the population numbers of the respective countries are not considered, so a comparison between them makes little sense. A better approach would have been to visualize the per capita emissions of the respective countries to make the results more comparable. But even then, such representations are unsuitable for statistical purposes because the actual quantity of emissions cannot be derived from such a visualization.

### **Location-dependent climate change impacts and adaptation strategies**

Many countries across the globe are **assessing the effects** that climate change may have on them and **how to adapt** in an optimal way (De Bruin et al., 2009). Alongside **strategies** to mitigate climate change, adaptation to climate change is a complementary approach accepted by scientists and political decision-makers in the fight against global warming (McCarthy et al., 2001). The status quo of initial environmental circumstances important for climate change in different places around the world, could not be more differentiated. Many areas around the globe for example are already increasingly prone to environmental disasters than others. In addition to the prevailing environmental conditions, socio-demographic differences should also be taken into consideration. The two points mentioned above play a major role in the question of how countries in different parts of the world can adapt to the effects of climate change. (Intergovernmental Panel on Climate Change, n.d.)

### **Discussion**

Unquestionably, climate change is a topic that inherently takes place in physical space. We as humanity cannot address this challenge by focusing on specific regions and on specific circumstances in that area. Instead, we always have to see the bigger picture and take the whole world with all its localities into consideration. However, the role of spatial concepts in climate change should also not be overestimated – a common saying amongst geographers is that 80% of all information is spatially related. (Hahmann & Burghardt, 2012) investigated this assumption and concluded that in fact only 57 % of all information is related to space. That is still a high number, but it also indicates that geographical research is often based on assumptions that need to be examined more closely. Also, the question of the extent to which spatial concepts are important for climate change cannot be fully answered by this study and requires further research.

## Reference list

- Adow, M. (2020). The Climate Debt: What the West Owes the Rest. *Foreign Affairs*, May/June.  
<https://www.foreignaffairs.com/articles/world/2020-04-13/climate-debt>
- De Bruin, K., Dellink, R. B., Ruijs, A., Bolwidt, L., Van Buuren, A., Graveland, J., De Groot, R. S., Kuikman, P. J., Reinhard, S., Roetter, R. P., Tassone, V. C., Verhagen, A., & Van Ierland, E. C. (2009). Adapting to climate change in The Netherlands: An inventory of climate adaptation options and ranking of alternatives. *Climatic Change*, 95(1–2), 23–45.  
<https://doi.org/10.1007/s10584-009-9576-4>
- Hahmann, S., & Burghardt, D. (2012). Forschungsergebnisse zur Frage: Haben 80 % aller Informationen einen Raumbezug? *gis.SCIENCE*, 3, 101–108.
- Intergovernmental Panel on Climate Change (n.d.). *Summary for Policymakers*. Retrieved November 19, 2023, from <https://www.ipcc.ch/report/ar6/wg2/chapter/summary-for-policymakers/>
- McCarthy, J. J., Canziani, O. F., Leary, N. A., Dokken, D. J., & White, K. S. (Eds.). (2001). *Climate change 2001: Impacts, Adaptation and Vulnerability* (1. publ). Cambridge University Press.
- Power Shift Africa (2020). *Climate Change Inequality in the Commonwealth: How the UK, Canada and Australia are Endangering Africa*.  
[https://www.powershiftafrica.org/storage/publications/Climate-Change-Inequality-in-the-Commonwealth-compressed\\_1639389940.pdf](https://www.powershiftafrica.org/storage/publications/Climate-Change-Inequality-in-the-Commonwealth-compressed_1639389940.pdf)
- Ram, M., Nautiyal, O. P., & Pant, D. (Eds.). (2021). *Scientific methods used in research and writing* (First edition). CRC Press.
- Romm, J. J. (2018). *Climate change: What everyone needs to know* (2nd edition). Oxford university press.

United Nations (n.d.). *What Is Climate Change?* Retrieved November 12, 2023, from <https://www.un.org/en/climatechange/what-is-climate-change>

United Nations Environment Programme (Ed.) (2004). *Desk Study on the Environment in Liberia* (Rev. ed). United Nations Environment Programme.

Worldmapper (n.d.). *CO<sub>2</sub> Emissions 2020*. Retrieved November 18, 2023, from <https://worldmapper.org/maps/co2-emissions-2020/>