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CASE STUDY: CLIMATE CHANGE

Etat de la littérature

Supervized by Christine Thomas

1) Urbanization effect

2) Climate imbalance

3) Warming and
Migration

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02 The not taken into account effect of urbanisation

- It is a fairly well-documented fact that urbanization raises temperatures locally (through various mechanisms that we will not discuss here. But one thing that is not proven at all is the effect of said urbanization on global warming on a more global scale, which is more difficult to quantify.
- This fact entails me to point out some potential bias in our particular study. Let's take for instance a country that has been urbanizing a lot for the last decades, then it is highly probable that some of our points of data were located 20 years ago in medium size urban area that have now become highly urbanized cities with potentially millions of inhabitants. We could even have a point of data which was located in the countryside and is now in a fast growing medium city.
- In such cases the risk is that we observe a high raise in temperature and wrongly assume that it is fuelled by global warming. In this event my point is that we need to be more cautious when trying to draw conclusions on a country-scale or more.

- Urbanization and Global Environmental Change : Local Effects of Urban Warming on JSTOR. (s. d.). www.jstor.org. <https://www.jstor.org/stable/30113496>
- Zhou, D., Xiao, J., Frolking, S., Zhang, L., & Zhou, G. (2022). Urbanization contributes little to global warming but substantially intensifies local and regional land surface warming. *Earth's Future*, 10(5). <https://doi.org/10.1029/2021ef002401>

03 Where is this mechanism more prevalent?

- To help know where this mechanism could be prevalent here is a non-exhaustive list of fast urbanizing countries during the last decades :
 1. Rwanda : average rural to urban migration has increased from 3.1 % (1968) to 30.7 % (2017)
 2. Qatar : urbanization rate is estimated at 7.9 %
 3. United Arab Emirates : 7.5 %
 4. Burkina Faso
 5. Laos
 6. Burundi

Which are all African countries.

Lang'at, V., Junior. (2018, 23 février). Countries who are urbanizing at the fastest rate. WorldAtlas. <https://www.worldatlas.com/articles/countries-who-are-urbanizing-at-the-fastest-rate.html>

04 What about Europe?

- This is a really lengthy paper to read but there is plenty information. However, there is no generalization for the whole continent and this is more a case per case thing that we need to do in our situation.
- Eib. (2019, 29 mars). L&Rsquo ; Europe et son développement urbain de 1970 à 2020. European Investment Bank. <https://www.eib.org/fr/essays/the-story-of-your-city>
- An other paper on the subject, points out that most meteorological stations in Europe are in rural surroundings regardless. Moreover, it is specified that when urbanization around a station there is, it's impact on temperature is mainly prevalent during spring and summer.
- Chrysanthou, A., Van Der Schrier, G., Van Den Besselaar, E., Tank, A. M. G. K., & Brandsma, T. (2014). The effects of urbanization on the rise of the European temperature since 1960. Geophysical Research Letters, 41(21), 7716-7722. <https://doi.org/10.1002/2014gl061154>

05 Why monitoring the min and max and not only the mean is a sound idea

- Global warming isn't about smoothly rising temperatures but more about having more extremes both in terms of high and lows
- In our study, we have not only monitored the mean of the temperatures but also the minimum and maximum. This paper suggest that it is indeed a wise move since there are increasingly stark variations in temperature.
- Beniston, M. (2015). Ratios of record high to record low temperatures in Europe exhibit sharp increases since 2000 despite a slowdown in the rise of mean temperatures. *Climatic Change*, 129(1-2), 225-237. <https://doi.org/10.1007/s10584-015-1325-2>

06 Global warming and human migration

- Increase in average temperature -> drought and desertification
 - Changes in precipitation pattern -> floods, water and food scarcity
 - etc...
 - In both recent and ancient history, people responded and adapted to such threats through migration
 - However, there is no unified theoretical approach that adequately represents the relationship between climate change and human mobility.
 - And response to climatic events is heterogenous. In some circumstances, climate change represents a constraint to migration
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- Cattaneo, C., Beine, M., Fröhlich, C., Kniveton, D., Martínez-Zarzoso, I., Mastrorillo, M., Millock, K., Piguet, É., & Schraven, B. (2019). Human migration in the era of climate change. *Review of Environmental Economics and Policy*, 13(2), 189-206. <https://doi.org/10.1093/reep/rez008>
 - Black R., N. W. Arnell, W. N. Adger, D. Thomas, and A. Geddes (2013) Migration, immobility and displacement outcomes following extreme events" *Environmental Science and Policy*, 27, Supplement 1, 32-43