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Exodus and the Anthropocene

Tracing climate-change-induced migration in India

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For thousands of years humans have concentrated in a surprisingly narrow subset of Earth's available climates, characterised by mean annual temperatures of around ~ 13 °C. Depending on scenarios of population growth and warming, over the coming 50 years, 1 to 3 billion people are projected to be left outside the climate conditions that have served humanity in the past. Absent climate mitigation or migration, a substantial part of humanity will be exposed to mean annual temperatures warmer than nearly anywhere today. (Xu et al., 2020)

Internal climate migrants are rapidly becoming the human face of climate change. By 2050—in just three regions—climate change could force more than 143 million people to move within their countries. (Kanta Kumari Rigaud et al., 2018). Our studies indicate that a substantial number of instances of climate change-induced migration are already happening across the Indian subcontinent. Often, these changes in the climate are the direct result of anthropogenic activities.

We propose that migration is not a system but a behaviour of the system that governs how suitable a location is for long-term settlement. We also propose a set of factors, called the Human Liveability Factors (HLFs for short), that influence

this suitability. The impact of these factors is interpreted with a subjective lens by the inhabitants according to the means at their disposal. As the perceived “liveability” of a place falls, the inhabitants tend towards migration.

From a systems perspective, we observed that HLFs influence each other and are externally influenced by factors such as changes in population, particularly in the case of climate migrants' natural environment stressors. We also draw correlations between NDVI data of the past decade to current climate migration hotspots in the Indian subcontinent, confirming that most of these hotspots lie in regions with a significant loss in vegetation.

We use the HLF framework to demonstrate the case for the Beed district in Maharashtra, India, in the present day and the case of Mumbai, India, against the projected rise in sea level for the year 2040.

We also present three conceptual solutions that cater to the needs of adaptability and resilience to tackle climate migration in India within the context of livelihoods, urban planning, and CSR Initiatives

KEYWORDS: migration, climate change, liveability, livelihoods

RSD: Socioecological Design, Policy & Governance, Mapping & Modelling

Project brief

Internal migration in India has been historical, generational, mostly temporary, and partly driven by the aspirations of the migrants (Tumbe, 2018).

Considering the nature of migration in India, for the purpose of this study, we define migration *as the movement and settlement of people away from their homes for extended periods of time, intended to improve the quality of life either of the people who are migrating and/or of their kin.*

From findings collected through secondary and primary sources, we were able to put together a framework that accounts for the seasonal migration patterns observed in India. We also realised that human settlements often undergo a cyclic pattern of migration, settling, resource depletion, and migration again. It is seen that migration due to climate change follows a similar pattern where a once bountiful location runs out of resources to sustain a population.

Following insights into India's climate migration patterns emerged

- Migration is mostly seasonal or temporary, though one can observe a steady decline in populations in some of the affected areas
- Socio-economically backward communities are impacted the most, especially those dependent on primary sector activities for their livelihood
- Analysis of vegetation change over the last decade shows that, intuitively, most outmigration hotspots lie in regions with a substantial loss in vegetation.
- Most migrant destinations are the nearest major city where migrants find work in primary and secondary sectors
- Climate migrants face challenges in integrating with the new cultures they migrate to. Considering the diversity of cultures in India, this challenge is exacerbated

Our objective through this study has been primarily to establish the causal relationship between climate change and migration and to further the discussion surrounding these two domains.

Methods

This presentation will showcase parts of an academic Systems Thinking project on the relationship between climate change and migration. Data was primarily collected through secondary sources, supplemented by interviews with the climate-displaced and domain experts.

Research insights were used to put together the HLF framework. The entire study was further compiled into a systems map.

The purpose of this presentation would be to evaluate the study in terms of its future potential, as well as to enrich the understanding of the phenomenon it tackles through the ensuing discussions.

Relevance

Our research revealed the causal relationship between climate change and migration, especially considering that the people most affected by climate change are the ones that have the least to do with it, which is absent from the everyday notion of the consequences of climate change in India.

Three out of six major cities in India, which includes the financial capital Mumbai, are vulnerable to rising sea levels. These cities also witness the bulk of urban in-migration. Considering the loss of available land in the pessimistic scenario (Kanta Kumari Rigaud et al., 2018), one can expect surrounding urban centres to absorb a bulk of their displaced population. This calls for urban preparedness that needs to start now. We believe a study of the current state of climate migration from a Systems lens can make cities better equipped for this scenario.

Migration is a last resort adaptation strategy, and people don't want to move. What is needed is to make sure people are comfortable where they already are (The YEARS Project, 2020). An understanding of what makes a place suitable to live in is the initial step toward this approach. We believe this complicated and layered topic can only be dealt with with an appropriate systems thinking approach.

References

1. Bharadwaj, R., Chakravarti, D., Karthikeyan, N., Hazra, S., Daniel, U., Topno, J., & Abhilashi, R. (n.d.). *Climate change, migration and vulnerability to trafficking*. 60.
2. Dina Ionesco, Daria Mokhnacheva, & François Gemenne. (2017). *The Atlas of Environmental Migration*. Routledge.
3. European Commission. Directorate General for the Environment. & University of the West of England (UWE). Science Communication Unit. (2015). *Migration in response to environmental change*. Publications Office.
<https://data.europa.eu/doi/10.2779/60150>

4. Kanta Kumari Rigaud, Alex de Sherbinin, Bryan Jones, Jonas Bergmann, Viviane Clement, Kayly Ober, Jacob Schewe, Brent McCusker, Silke Heuser, & Amelia Midgley. (2018). *GROUNDSWELL, PREPARING FOR INTERNAL CLIMATE MIGRATION*. World Bank Group.
<https://www.worldbank.org/en/news/infographic/2018/03/19/groundswell---preparing-for-internal-climate-migration>
5. Maharjan, A., de Campos, R. S., Singh, C., Das, S., Srinivas, A., Bhuiyan, M. R. A., Ishaq, S., Umar, M. A., Dilshad, T., Shrestha, K., Bhadwal, S., Ghosh, T., Suckall, N., & Vincent, K. (2020). Migration and Household Adaptation in Climate-Sensitive Hotspots in South Asia. *Current Climate Change Reports*, 6(1), 1–16.
<https://doi.org/10.1007/s40641-020-00153-z>
6. Rishu Garg, Dipak Zade, Jayanta Basu, Hridayesh Joshi, Sanjay Vashist, Rushati Das, Nakul Shandilya, & Santosh Patnaik. (2021). *CLIMATE-INDUCED DISPLACEMENT AND MIGRATION IN INDIA | Case studies from West Bengal, Maharashtra, Odisha, Uttarakhand & Bihar*.
https://cansouthasia.net/wp-content/uploads/2021/02/Migration_India_20_02_2021.pdf
7. TED. (2020, January 30). *Climate change will displace millions. Here's how we prepare | Colette Pichon Battle*.
<https://www.youtube.com/watch?v=8NSQYO2es3U>
8. The YEARS Project. (2020, February 1). *Refugees Are Fleeing Climate Change*.
<https://www.youtube.com/watch?v=nllMHFwC1MM>
9. Torres, J. M., & Casey, J. A. (2017). The centrality of social ties to climate migration and mental health. *BMC Public Health*, 17(1), 600.
<https://doi.org/10.1186/s12889-017-4508-0>
10. Tumble, C. (2018). *India Moving: A History of Migration*. Penguin.
<https://www.overdrive.com/search?q=ADC43592-5B14-440C-A4FA-FC9B69B82110>
11. Xu, C., Kohler, T. A., Lenton, T. M., Svenning, J.-C., & Scheffer, M. (2020). Future of the human climate niche. *Proceedings of the National Academy of Sciences*, 117(21), 11350–11355. <https://doi.org/10.1073/pnas.1910114117>