Habitability and Carrying Capacity

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Having listened to the introductory seminar, I am intrigued that this discussion, carrying the very open title "*The habitability concept in the field of population-environment studies: relevance and research implications*," has immediately homed in on climate change, and on migration, with climate change inferred as the most important driver of migration.

It is as if 'habitability' is perceived as a quality of a location, with no quantitative dimension at all. Habitable for how many? At what trade-offs as population density rises? How does rising population density affect adaptation capacity?

There appears to be no scope for carrying capacity considerations in the Wrathall et al. equation. The Safety, Livelihood and Adaptation dimensions interact with each other, and all interact with population pressure, largely through competition for resources and opportunities.

It should not be controversial to state that population increase is by far the greatest push-factor driving migration. The exception of Eastern European countries, which have had high out-migration to the extent of causing population decrease, can be explained by "pull factors" rather than "push factors" as access to Western European labour markets were opened to them.

'Carrying capacity' is inherently a quantitative concept, but it would seem to me that 'habitability' sits entirely within this concept, and discussing it without reference to carrying capacity is not being entirely honest. We are presented with "migration being one signal of changing habitability" where the only situation we are asked to consider is that of a previously stable community faced with a decline in habitability, without considering the case of a stable habitat faced with an increase in population.

Actually quantifying carrying capacity is complicated by all the notions discussed in relation to habitability, from the standard of living people expect or will tolerate to the tele-connections and translocality that allows people to be sustained in a place that would not sustain them but for transfers from elsewhere. Nevertheless, net outmigration can be interpreted as a sign of the population exceeding local carrying capacity (given the modes of livelihood actually practiced and the opportunity-over-expectation actually perceived by residents, not dissembling into hypotheticals about how more people *could* be sustained). This is a broader interpretation than Wrathall's, since either an increase in population or a decrease in environmental capacity to sustain human safety and livelihoods can push the system beyond carrying capacity.

While translocality can be seen as valuable adaptation, it is also a vulnerability. Complex interdependencies tend to collapse in a crisis, and hard times bring charity closer to home, cutting off more distant beneficiaries first. Self-sufficiency seems to be disparaged in this era of globalised economies, and certainly it doesn't represent the highest whole-system productivity. We could not support 8 billion people today without regional specialisation and globalised distribution of food and fertilisers (not to mention energy and minerals). But that just means we're all in this pact of increasing vulnerability together, compelled down this path by our failure to end population growth before local carrying capacities were overrun. As Joseph Tainter likes to emphasise, increasingly complex societies inevitably collapse.

So it is no good saying, "Population growth isn't the problem, it's just that food is not equitably distributed." This dependence on redistribution, not just for added variety but for absolute survival, is the hole we're digging ourselves into.

Redistribution of people (migration) is similarly problematic, in a world where all the destinations already have more people than are sustainable in the long term. Yet academic migration discourse seems increasingly focused on framing migration as a solution and a right, dismissing any legitimacy of concerns expressed for impacts on receiving communities and natural habitats.

Regarding 'climate migration', the following is mostly extracted from a chapter I recently drafted, and I'd be interested in feedback from this forum:

There is a tendency to overuse the term 'climate migrant', applying it to any migrant whose previous life has been impacted in any way by climate change, regardless of whether this was the main cause of their migration. It infers an obligation of developed countries to receive them, since developed countries contributed most to climate change. The pro-migration discourse rarely acknowledges population growth as a driver of out-migration, since this shifts responsibility for the migrants' plight from the receiving country to the sending country, and highlights that unwillingness to receive large numbers can be based on a rational desire to avoid population pressure rather than xenophobic nationalism.

Yet population growth is clearly the greater cause of relocation. A World Bank study estimated that, in sub-Saharan Africa, South Asia and Latin America, by 2050 more than 140 million people could relocate within their country due to effects of climate change.[i] The authors suggest that strong climate change mitigation measures could reduce this flow to around 50 million. However, these numbers represent a small proportion of the anticipated rural-to-urban migration due mainly to demographic pressure. UN projections suggest that well over 800 million people will move from rural to urban settings between 2020 and 2050, just in the three regions included in the World Bank study.[ii]

Likewise, Lustgarden (2020) described a study using the same modelling framework as the World Bank report, which found that unmitigated climate change (i.e. worst case scenario) could increase international migration from Central America to USA by more than a million people between 2020 and 2050. But this represented less than four per cent of the total migrant flow of 30 million expected over this period. This migration, mainly driven by population pressure, was expected to increase each year regardless of climate change.[iii]

Note that neither of these publications discussed population growth as a driver of migration. The comparisons are mine.

Kirezci et al. (2020) modelled the impact of climate change and sea level rise on land area exposed to coastal flooding events.[iv] Only some of these areas would require permanent evacuation. They estimated that, by 2100 under the worst-case climate scenario, the population exposed to such flooding events would increase by 52%, from 148 million currently to around 225 million, based on current population distribution (not allowing for population growth). They emphasise that these figures could be lowered by the construction of protective infrastructure such as sea walls. Again, population growth on the most vulnerable islands and river deltas, particularly in South- and South-East Asia, will likely expose more extra people to this hazard than will climate change. Again, the authors of the study gave this no attention whatever. Although coastal lowlands (less than 10 metres above sea level) occupy only 2% of global land area, they contain 10% of global population, and over 20% of the urban population of least developed countries – cities whose populations are doubling every few decades.[v]

These studies demonstrate the close interactions between climate change and other drivers of migration. Environmental, economic or security factors might be proximal drivers but, as a

rule of thumb, if the population of the sending region is not permanently lowered as a result of emigration, the underlying driver is likely to be population pressure.

In the case of small islands, out-migration has long been the strategy of surplus youth. If Pacific atolls are eventually evacuated due to sea level rise, the people who migrate at that time will be a relatively small addition to the diaspora already settled in Pacific Rim countries, evicted from their homeland due to population pressure.

Migration literature, particularly under the "new economics of labour migration" (NELM) theory, tends to ignore population growth as a driver of migration. Analyses typically present the decision of a household to send migrants as one of income diversification and self-insurance. Taylor (2002) sees rural-urban migration as a phenomenon driven by GDP growth and its implicit link with economic diversification, and suggests that constraints on local production and livelihoods are due to "market failures" such as inadequate market access, finance and insurance systems.[vi] The presumption is that, without climate change or other exogenous factors undermining livelihoods, the economic situation would be stable or gradually improving due to development, and migration offers a means to enhance development. But nothing is stable where populations are growing. The climate migration literature does not discuss the common reality that the alternative to out-migration from rural areas is an ever-dwindling allocation of natural resources per household (arable land, water, or access to common forest, pasture or fishing resources),[vii] and the inevitable degradation of those resources due to overuse.[viii] Equally absent is any recognition that such subdivisions and degradations over the past two generations have contributed to the impoverishment of households and their vulnerability to climate change.

Often impacts of human overuse of resources are attributed to climate change, especially when they occur at a distance from the activity causing them. For instance, deforestation not only changes the hydrology of river catchments, increasing flooding and the seasonal variability of flows, but reduces rainfall downwind across whole continents.[ix,x,xi] Groundwater depletion contributed 13% of sea level rise between 2000 and 2008.[xii] In addition, over-extraction of groundwater is causing widespread land subsidence, sometimes more than two meters per decade, affecting agricultural lands and coastal cities.[xiii] Climate change-related sea level rise is often cited as the cause of saltwater intrusion into groundwater of deltas and coastal plains,[xiv] where over-extraction of groundwater and expansion of aquaculture are mostly responsible.[xv,xvi] This is not to belittle the vulnerability of atolls and coastal lowlands to inundation from sea level rise and related storm surge. But we should be mindful that climate change is not the only, and often not the biggest, cause of loss of livelihoods due to environmental change.

For migrants to be called climate change refugees, the sending region should be depopulated, reflecting its lower carrying capacity due to climate change. An absence of population decline does not mean a community is unaffected by climate change, but it means the community has been able to adapt to live with that change. In the meantime, hardships caused by climate change and extreme weather events might have contributed toward many households' decisions to leave, but their place has been filled by local population growth. Without climate change, perhaps the region could have sustained an even bigger population thanks to other advances that increase opportunities for local livelihoods. But without the population growth, the same advances would increase incomes and climate resilience. We should not ignore impacts of population growth on migration, as migration literature tends to do.

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