

Considering causation: Understanding the linkages between climate stress and human migration

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Abstract

This paper explores the relationship between environmental stress and human mobility, comparing cases from Ethiopia and Bangladesh. Specifically the paper attempts to understand the extent to which the idea of environmental change ‘causing’ migration might be relevant. In doing so the paper offers the idea INUS conditions as a means to capture the complex interactions that shape migration outcomes in a context of environmental stress. It is suggested that finding such complexity in such dramatic shifts in livelihoods as those generated by migration, does not bode well for modeling other causal relationships between biophysical variables and vulnerability, at the scale of the household or individual. Finally the paper offers some brief discussion of the possibilities for using more aggregated approaches to understanding causation in vulnerability.

Introduction

This paper offers an exploration of the relationship between environmental stress and human migration, as a means to explore some of the challenges of modeling the causal dynamics of vulnerability. It does so by looking at the how we might conceive of the causal relationship between environmental stress and human migration, and then considering how such mobility responses reconfigure vulnerability amongst migrants in the receiving areas. This approach is thought to be potentially useful as a means to explore the possibilities for modeling causal pathways in vulnerability more generally. This is because rural-urban migration is thought to have dramatic implications for vulnerability: not only does the act of physical relocation change exposure to environmental stresses, it also fundamentally reconfigures household and individual vulnerability profiles by changing their relations of production – from subsistence agricultural economy to wage labor. As such, understanding the challenges in comprehending causality in vulnerability, through the phenomenon of rural-urban migration, should present as a test case of the challenges of modeling one of the simplest cases of the relationship. Prior to discussing the two case studies that inform this work – from Ethiopia and Bangladesh – it is worth briefly reflecting on the way causality has been debated within the literature, linking environmental stress and human migration.

Early literature on this relationship manifest around writing on ‘environmental refugees’, a term which has been invoked with the intention of galvanizing action on climate change and other (perceived) environmental crises, going back as far as the 1970s (Saunders 2000). Honorable as the intention of this literature might have been, aimed at protecting the environment, its logic drew heavily on exploiting negative stereotypes of migrants which cast them paradoxical as simultaneously hapless victims of the environment, and vigorous agents of disease and destabilization, capable of wreaking havoc in the places they arrived (Morrissey 2012).

As such migration scholars, who at the time were working in a context of powerful anti-immigrant sentiment, came to worry about the potentially damaging implications that the the notion of ‘environmental refugees’ might hold for migration politics. Their response was to contest the notion of the environmental refugee by focusing on the complexity of the relationship between environmental stress and human migration (Black 2001, Lonergan 1998). Such complexity, it was

argued, invalidated the term, and therefore, ‘environmental refugees’ were posited not to exist (Morrissey 2012).

Although it has been shown elsewhere that the ‘debate on environmental refugees’, as a debate over causal mechanisms has been overblown – with the debate being more about the suitability of the moniker ‘environmental refugee’ to describe people who move in a context of environmental stress (Morrissey 2012) – interest has grown over the best means for conceiving of, and studying, the causal relationship between environmental stress and human migration (Neuman and Hilderink 2015). In this regard the complexity of the relationship has come to be a defining feature of the discourse with the idea of ‘environmental refugees’ being largely replaced with unwieldy language describing ‘migration in a context of environmental stress’ (Morrissey 2013).

While there has been some debate as to whether migration represents an effective adaptation to climate stress, or whether it should be seen as a failure to adapt, most people working in the space consider migration to be an important livelihood response to environmental stress (McLeman and Smit 2006). For these reasons, among groups concerned about vulnerability outcomes in a context of environmental stress, the issue of how we understand the causal relationships between environmental stress and human migration, as well as the vulnerability outcomes of that migration is a worthwhile question.

Based on the above this paper will focus on describing the relationship between environmental stress and human migration in case study sites in Ethiopia and Bangladesh. The approach will be to start with relatively simplistic causal accounts, linking environmental change to migration and then describe how increasing elements of complexity complicate the relationship. The paper therefore starts with a description of the dominant livelihoods in the sending areas, as well as the environmental stresses which compromise them. The paper then goes on to describe the host of non-environmental factors that also shape livelihood outcomes and introduce complexity into the relationship between environmental stress and human migration. Based on this the paper attempts to describe a means for conceiving of causality between environmental change and human migration, highlighting the potential relevance of INUS conditions. Finally the paper discusses the outcomes of these migration strategies in terms of the vulnerability of migrants, in their new livelihoods, in the receiving areas. The paper closes with a discussion of the implications of this work for appreciating the complexity of the causal pathways by which vulnerability is manifest.

Livelihoods and environmental stress in Ethiopia and Bangladesh.

Livelihoods in the study sites are all heavily reliant on the biophysical environment. In all cases livelihoods are predominantly subsistence-based and their different forms reflect the physical environment in which they are embedded. Livelihoods in highland, Ethiopia, comprise of mixed farming activities. High-altitudes (and low temperatures) mean that crops are generally limited to barley and wheat. Households cultivate small vegetable gardens in the rainy season and also keep livestock. Large livestock are used in the production process, particularly for ploughing and threshing. It should be noted that there are a significant number of landless households in Ethiopia, who rely on renting or labouring on, other people’s land.

Bangladeshi livelihoods in the sending areas tend to be reliant on agriculture (based on a mix of rice and vegetable cultivation), shrimp farming and work on the fishing boats. Many households also own some livestock. Like Ethiopia, Bangladesh also has a sizeable landless population whose livelihoods are reliant on work in other people's fields, on their shrimp farms, or on daily labour in the villages.

Environmental stresses

In Ethiopia, changes in rainfall have manifest in the complete loss of the spring rainfall season. Reduced rainfall has compromised the harvest and limited access to pasture. At high altitudes changes in the timing and length of the main rainfall season have also resulted in an increased exposure to frost which has further undermined agricultural production.

Notably, reduced production as a result of rainfall stress has important implications for both landed and landless households. While reduced harvests compromised food and wealth for landed households, it also diminishes the available work available to landless households.

Flooding constitutes the major environmental stress in Bangladesh where it is a major cause of river bank erosion, compromising both residential and productive land that is located along riverbanks. Large scale erosion can lead to the loss of both land and housing infrastructure. Erosion and siltation in Bangladesh was also reported to decrease the number and diversity of fish species available for fishermen in the rivers.

In addition to river bank erosion, flooding in Bangladesh is heavily associated with tropical cyclones which impact the south of the country. Such cyclones cause flooding and the intrusion of salt water into agricultural lands. This in turn undermines crop production and access to bamboo, which is important for house construction. The effects of salination can persist for a number of years following a major flooding event. Cyclones are also capable of doing large-scale physical damage to infrastructure (including housing) as well as killing both people and cattle.

Linking Migration and Environmental Stress

While human mobility constitutes an established livelihood response in both of the fieldsites, a brief examination of migrant narratives, describing their motivation for moving, makes clear that the impacts of environmental stress play an important role in mobility outcomes. Among the highlands of Ethiopia, migrants, moving from the rural areas to the towns, described conditions of persistent hunger and poverty in their descriptions of why they had migrated to the towns. Both migrants and non-migrants were quick to cite the deteriorating environmental conditions and lack of rainfall as the cause of this impoverishment.

In Bangladesh, mobility is an established strategy for dealing with flooding, erosion and cyclones. However the role of agricultural decline was also evident among contemporary migrants who cited poverty and joblessness as their reasons for moving. A fundamental feature in this mix was the lack of available land in the sending areas. In addition to agricultural decline, respondents described having left the area due to an absolute lack of income after a cyclone events had destroyed all of their property. In such circumstances people described not even being able to survive the period until government relief arrived.

Although the above appears to present a reasonable argument in favour of a causal relationship between environmental stress and human mobility, this simple account ignores a great deal of complexity. Most notably, as was mentioned above, migration is an established livelihood strategy in both of the fieldsites. An obvious question then is whether migration would have happened anyway, regardless of this environmental stress, and as such, can we really see environment stress as *causing* migration. In addition, if we are interested in understanding vulnerability outcomes (and their causes) this conceptual model is not very useful, for it fails to describe a host of important features of migration, for example why are migrants overwhelmingly young and landless in both countries?

Considering the above the problems with this simple causal account – focussed on worsening ecological conditions and declining production – can be identified based on four main points:

1. Environmental stress is not the only thing driving production shocks,
2. Factors other than environmental stress shape mobility imperatives,
3. Certain non-environmental factors shape both exposure and vulnerability to stresses in the first place
4. Households respond to the host of stresses they experience in many ways, with migration being but one potential strategy.

All of these processes vastly complicate the causal relationship between environmental stress and human mobility. To make this clear the next section of the paper goes about exploring the role of some of these non-environmental factors and their impacts on mobility outcomes.

Non-environmental factors

Beginning with *stresses, other than environmental stress*, that impact on migration imperatives: in both of the country studies pressure on land, and resultant patterns of access, played an important role in shaping the stresses households and individuals were under. In all cases such pressure was thought to be the result of demographic pressures, which, in the case of Bangladesh, was exacerbated by the impacts of erosion, placing further pressure on land. In the fieldsites, respondents described how pressure on household land served to decrease holdings, and thereby further compromise harvest volumes. In this way land pressure, impacts on production in a manner similar to that of rainfall stress. Attributing migration to environmental stress, through its impact on production is therefore clearly overly simplistic as it ignores the role of other factors which undermine production.

In addition to other stresses, there are also a host of *imperatives, outside of production stresses* which shape mobility. Land again plays a role here, but this time it is the condition of landlessness that should be distinguished. While pressure on land decreases production, the experience of landlessness (in a context in which there is no possibility of attaining land) reduces the opportunity cost of migration, thereby increasing its attractiveness as a livelihood response. Landless groups are not only impoverished by the impacts of environmental stress, described above, but also find themselves without means to improve their position though increases in production. They are also usually the first to experience the impacts of declining production as labour is laid off and profits are held by the owners of the land.

In Bangladesh, in addition, to the material value of land, landlessness shapes mobility imperatives through cultural norms which confer social status on land ownership. In such a context the opportunity cost of migration is further diminished as leaving removes some of the social shame attached to landlessness.

Another livelihood stress which shaped mobility imperatives in both of the fieldsites was inflationary pressures. Such pressures exacerbated the impact of production shocks, as increasingly large parts of the household budget had to be used in order to purchase the agricultural goods that would have otherwise been produced on the land.

Finally, a lack of facilities was described as driving migration in rural Ethiopia. In this regard multiple respondents lamented a lack of access to health facilities, shops, government offices and electricity, all of which reduced the opportunity cost of migrating in response to environmental stress.

Moving now to consider the fact that *certain non-environmental factors shape both exposure and vulnerability to environmental stresses in the first place*. As was mentioned above the lack of facilities in the rural areas contributes to mobility outcomes by reducing the opportunity cost of not moving in a context of environmental stress. In addition, however, a lack of facilities also shapes people's vulnerability to environmental stress. For example, rural households in Ethiopia had no access to

irrigation, rendering them vulnerable to rainfall stress in the first place. In a similar fashion, flood prone sites in Bangladesh revealed how the government's failure to maintain embankments, dykes and roads contributed to increasing both the likelihood and impacts of flooding.

While a lack of investment in flood defences was thought to play a role in exacerbating flooding, similarly important was thought to be the role played by a number of human activities which undermined both natural and man-made flood defences. In Bangladesh for example shrimp farmers had undermined flood barriers in order to allow saline water to flow into their shrimp ponds.

The case of flooding in Bangladesh also revealed how specific development projects had increased the impacts of flooding. These included the management of upstream dams in India which restricted water flow, therefore exacerbating the problems of water access during the dry season and allowing saline intrusion further inland during storm surges. In addition the case of Moralganj, in Bangladesh, highlighted how the construction of a canal, aimed at increasing the speed with which goods could be transported between Mongla and Dhaka, has resulted in salt water now irrigating large parts of Moralganji district. This increase in salination has made agriculture impossible in areas surrounding the canal.

Having described how certain non-environmental factors worsen the impacts of environmental stress, it similarly needs to be pointed out that a host of non-environmental factors also serve to mitigate such impacts and thereby undermine the imperative to migrate. In this regard it is obvious that while landlessness might increase the imperative to migrate, having land increases the opportunity cost of moving and therefore decreases that imperative. Likewise access to assistance such as food aid, acts to significantly retard the imperative to move, as was the case in both Bangladesh and Ethiopia. Finally being of old age tends to undermine the imperative to move. Explaining the link between old age and (non)migration is complicated by the fact that age tends to co-vary with access to assistance (as older populations are often identified as particularly vulnerable by assistance programs), however elderly respondents in Ethiopia also explained how they could not leave the rural areas as they felt they were too frail to undergo the stress of moving, and that because of their age, they would not be able to compete in the unskilled labour markets of the destination areas (see below).

Given that the link between environmental stress and human migration has been based on the former's impact on production, one might be tempted to think that poverty drives migration. It should be noted however, that moving requires resources. A lack of resources can therefore also act as a barrier to migration. This dynamic was apparent in amongst very poor, non-migrants, in both Ethiopia and Bangladesh, who pointed to their inability to afford the costs of transport to the town, as well as a lack of savings necessary to cover the initial settling-in period.

Finally, respondents in Ethiopia, and Bangladesh both described forms of cultural attachment to their land as undermining the imperative to move. In Ethiopia this took the form of not wanting to leave the land of their ancestors, where their local church was located and where the altitude was associated with their good health. In Bangladesh, such attachments manifest around the social prestige of owning the land and house in which one lived.

With the above in mind it should be emphasised, that barrier to migration were not negligible in their impact. In all the contexts, the research encountered conditions of extreme poverty and livelihood stress, in which people had no intention of moving, regardless of how bad livelihoods conditions became. To this end, when asked about what people would do if agricultural conditions continued to get worse, respondents in Ethiopia answered with a mix of defiance and despondency, explaining how there was nothing left for them to do but wait for, or pray to, God. To this end, the notion of barrier effects has come to be well appreciated in the literature on

environmental migration, through the idea of ‘trapped populations’ (Foresight 2011), and emphasising that migration is not simply the end point of poverty

Finally, in considering the role of non-environmental factors in mobility outcomes, it is absolutely essential to understand that households experiencing environmental stress pursue a variety of *strategies, other than migration*, for securing their livelihoods. Across the fieldsites, these included: agricultural experimentation, selling assets, mobilising credit, reducing household expenditure, mobilising support, seeking divine help, and engaging in new or different forms of livelihoods. The last of these responses can often involve some form of mobility, or a change in existing mobility strategies.

In terms of agricultural experiments farmers in Ethiopia shifted their agricultural focus towards barley (in order to avoid the impact of frost) and drought resistant eucalyptus. They have experimented with new crops (such as chickpea), sought to convert pasture land into land for cultivation in order to take advantage of the water sources found on the valley floors, taken to ploughing their land with horses rather than cattle and begun planting in response to rainfall rather than in anticipation of it.

Among mixed farming communities it was common to sell cattle during times of stress. Notably cattle is often sold as a means to generate household income, however under times of stress such sales undermine cattle stocks, taking place at a rate which exceeds rates of replenishment. In addition, under conditions of extreme duress, households in Bangladesh were noted to have sold land.

In addition to selling assets to fund consumption, respondents in all of the fieldsites described taking loans as a means to cover production shortfalls, or in order to pay for emergency expenses – such as medical emergencies. As much as households sold assets to support consumption, they also sought to limit consumption, reducing expenditure on unnecessary items, reducing the number of meals eaten per day, and foraging for wild foods.

A final set of responses to environmental, and other stresses, includes people changing or diversifying their livelihood strategies. In Bangladesh, women would engage in catching shrimp and crabs in the flooded fields, while men would go to the nearby Sundarbans, to fish or collect wood. Both of these strategies were compromised by the fact that the crabs and shrimp in the flooded fields were finite following the flooding, while operating in the Sundarbans runs the risk of being robbed by gangs that operate there, or being attacked by tigers. Households who have lost their land to flooding, have become reliant on doing work on other people's land, working to make and maintain ponds for shrimp cultivation, or have had to find work in the nearby docks. The problems of livelihood security among landless groups have been further exacerbated by the shift that some farmers have made towards shrimp farming as a response to the increasing salination of their fields. Shrimp farming generates sufficient income for the land owner to replace that lost through compromised agriculture, however it is less labour intensive resulting in fewer jobs for landless groups.

Considering the above, it should be clear at this point that rather than viewing migration as a potentially simple outcome of environmental stress, or as an end-point of poverty, it makes more sense to view mobility as part of a complex suite of potential livelihood responses. As such, understanding the causal relationship between environmental change and human migration requires a complete understanding of the host of livelihood options available to potential migrants.

A more complete picture of mobility

In Ethiopia access to land, plays an important role in shaping different mobility strategies. Landless groups also tend to be younger, and are more likely to move on a permanent basis to the towns. A

large part of the motivation underlying this move also relates to young people wanting to continue their education which requires moving to the towns where educational facilities (for secondary school) are located.

Like in Ethiopia, land plays an important role in mobility decisions in Bangladesh with the combination of landlessness and environmental stress, being noted as an important driver of mobility. For such landless groups the urban areas offer an attractive migration option although interestingly this is not so much because of the higher wages or better access to services, as wages are similar in urban and rural areas while development indicators suggest that access to services may be better in the rural areas. Rather people described moving with the aims of attaining more regular and secure access to work in the urban areas, which allowed them to purchase more food which was also of a higher quality (including meat and fish), as well as other consumer goods, such as tea, clothing and mobile phones.

Gender dynamics play a significant role in shaping mobility in Bangladesh. Significant social stigma precludes women from working outside of the home in Bangladesh. In the rural areas such stigma commands greater respect than in the towns and cities. As such migration to the towns presents as an opportunity for a household to gain an extra income through the labour of women, which would not be possible in the rural areas. This effect is particularly strong in the garment factories which provide relatively good wages, even if the work is precarious (see below). Men, on the other hand, went to work on other people's land or on the construction sites in the cities. Gender dynamics also play out in Bangladesh through their interrelationship with land ownership with fewer than 10% of Bangladeshi women thought to have their name on any documentation of property rights.

While the above account offers us a greater sense of who migrants are, and the conditions under which they move, it worth noting that although migrants frequently cited conditions of poverty, deprivation and a lack of opportunity as informing their decision to move, the manner in which sense was made of these conditions was often more complex. For example migrants would identify features such as the 'ignorance' of people in the rural areas and the lack of change to people's lives as reasons they had left. As a contrast to this they would highlight the modernity of the city – 'tall building', 'cleanliness', 'straight lines', 'neatness' – as part of the narrative describing their decision to move.

The above account is relevant, not because it compromises the fact that conditions of material deprivation have informed mobility strategies, but because it suggests that the ways in which these conditions of material deprivation are understood are influenced by a host of factors which operate far outside of the realm of rural livelihoods and environmental stress. Understanding such features requires acknowledging the ways in which rural livelihoods are being incorporated into global processes. Recent electrification, and the arrival of satellite television in small villages in rural Ethiopia, for example, is exposing residents to western movies, the English Premier League, and WWE wrestling. It is through these lenses that young potential migrants are coming to understand themselves and forge identities quite distinct from that of their parents. The result is that we should be wary of understanding mobility decisions simply in terms of efforts to maximise reified ideas of utility, income, or livelihood security. For while deprivation appears to underpin mobility decisions, the actual decision to move is mediated through more complex channels of human psychology, including notions of identity and aspiration.

Complex interactions and causality

Considering all of the above we are in a position to consider the complex causal pathways between environmental stress and human mobility. The most fundamental question that we can ask in this

regard is whether there is any causality between environmental stress and human migration. The case for this critique stems from the fact that a) migration can happen without environmental stress and b) even in a context of environmental stress, not everyone migrates.

One of the most definitive means for answering this question is through the use of a counter-factual: a case where all other things being equal, we removed environmental stress from someone's livelihood and it turned out that they didn't move. If we were able to conduct such an experiment we could show, convincingly, a relationship between environmental stress and human mobility. That said, it is obviously impossible to create such an experiment, and we therefore have to compromise. In this case, it would seem reasonable to argue that, given the impoverishing effects of environmental change on rural livelihoods, and given the extent to which migrants cited issues of poverty and deprivation in their decision to leave the rural areas, that we can say environmental stress plays some role in causing migration. The extent to which farmers identified environmental stress as driving impoverishment, enhances this claim.

With the above in mind, a second complication might be introduced into this simple causal model. It seems that other factors have to interact with environmental stress in order to drive migration. As such, how do we know whether it is environmental stress or the interacting factors that is the cause of migration. To make this clear consider the case of Ethiopia, where the presence of food aid means that environmental stress does not induce migration. In a case of migration, is it the lack of food aid (and the drivers of this) that cause migration, or is it environmental stress.

As a response we might offer an account of 'necessary but insufficient conditions'. Environmental stress is necessary, for migration, however, without conditions such as a lack of food aid, and a lack of land, migration would not take place. Based on this we can go about generating an over-riding picture of the dominant factors shaping the conditions under which environmental stress will result in migration.

There are two problems with this account. Firstly, as has already been mentioned, environmental stress is not a necessary cause of migration in the fieldsites. This is evidenced by the fact that migration is an established livelihood strategy in Ethiopia and during this research numerous respondents cited factors other than poverty as driving their decision to migrate. Secondly, it should be noted that, despite the general case of migrants being young and landless, such cases were contradicted by exceptions. For example, while it is generally, young landless school-goers that constitute migrants in Ethiopia, there are also young landless individuals who do not leave. Similarly the research encountered elderly landed migrants who had migrated.

Considering this heterogeneous complexity of migrant narratives I propose that the most useful means for understanding causation between environmental stress and human migration is notion of an *Insufficient but Non-redundant part of an Unnecessary but Sufficient* (INUS) condition (Mackie 1989). The notion of cause as a set of INUS conditions, points to the idea that it is bundles of events that matter in causation. Consider the case of the following set of events: environmental stress, landlessness, the location of schools in urban centres, a lack of food aid. Each event, by itself, is *insufficient* to cause migration. Notably, however none of them are *redundant*, as they all matter in the mobility decision. Together, these events are *sufficient* to cause migration, however they are not *necessary* as migration can occur as a result of other combinations of events.

It should be noted that while the idea of an INUS condition is thought to be a helpful in thinking through causation between environmental stress and livelihood outcomes, practicality implementing it into causal models is still difficult. This is because the issue of exceptions is still a challenge. The problem here is that describing sets of INUS conditions that provide a genuinely sufficient condition for an outcome can result in having to describe the entire universe of events that happened prior to the observed event.

Vulnerability outcomes

Migrants in both Bangladesh and Ethiopia, as well as those moving to the urban areas of Ghana, tended to describe their experience of arriving in their places of destination as relatively harrowing. Many describe feeling lonely, or lost, and enduring hardships, such as sleeping in the open and going without food. The dominant feature shaping this experience was migrant's access to migrant networks (social capital).

Migrants, face a number of risks and stresses in their places of destination. In the towns the experience was dominated by the precarity of work, and the high costs of living, driven in all cases by high rates of inflation. Informal daily labour, carrying bags or pulling rickshaws, for example, was characterised by highly variable incomes. Even in cases of more consistent work (such as waitresses, shop clerks or factory worker (in the case of Bangladesh's garment industry)), migrants described being taken advantage of by their employers. Such instances included being fired without warning, and in many instances receiving no pay for hours accrued. In the garment industry, in particular, it was noted that factories would fire and re-hire their labour on a regular basis, in order to prevent organisation and to avoid contract issues.

Given the degree to which a general state of precarity frames urban livelihoods amongst migrants, in all contexts, it is worth briefly reflecting on the possibilities for social mobility, whereby migrants attain more secure work. Job opportunities for migrants tended to be heavily influenced by gender norms with men and women doing quite distinct menial work. Men tended to be involved with more manual tasks, such as carrying luggage or working in construction as daily labourers. Women tended to do take more domestic roles such as working in people's homes, in restaurants, and in factories (mainly in Bangladesh's garment industry). Desirable work for men involved more skilled labour, which was less physically demanding, and, due to its rarity, allowed for more regular income. For women, desirable work was that which was more formalised. This included being in a more public establishment (such as a restaurant), rather than working in someone's home, as this tended to be more secure and employees were less exposed to abuse. Both men and women sought to own their own small businesses, which were perceived to provide relatively stable incomes.

In most cases, access to such desirable work was determined by access to social and physical capital. In terms of desirable jobs, it tended to be happenstance or social networks which connected people with employers. Owning a small business, or attaining skills, usually required access to capital. In many cases this too was an issue of social networks who were able to vouch for a potential loan, provide collateral or provide the loan itself.

It was not possible to say anything systematic about the changing nature of either vulnerability among migrants, or about their prospects for social mobility, across time. It should be noted however that while some migrants described being able to improve their livelihood security by finding better jobs, saving money, and investing in assets, many described not being able to improve their lives despite having been in the urban areas for long periods of time. For example, numerous respondents in Ethiopia and Bangladesh described being involved in menial daily labour for more than 20 years since moving to the town. Likewise, migrants in Ethiopia, despite citing a desire to attend school as the main motivation for moving in the first place, described how they had been unable to continue with their schooling, as the demands of finding work that paid well enough to compensate for the high costs of living, left no time to study. Students either dropped out or failed to meet the requirements necessary to continue their schooling beyond grade 10.

Considering all of the above we should keep in mind that migration does not appear to clearly alleviate the conditions of precarity which characterise livelihoods in the rural areas. While there appears to be some potential for securing a livelihood, that is impossible in the rural areas,

moving to the towns is in no way a guarantee of livelihood security. Thus while we see a dramatic reconfiguring of vulnerability, it is not clear that such vulnerability is in any way diminished.

Possibilities for causality: linking environmental stress, migration and vulnerability

Considering the above, it is not easy to think of simple ways in which causal pathways might be effectively incorporated into causal models which aim to incorporate models of biophysical processes. Looking simply at the interactions around the INUS conditions, the complexity of these interactions is daunting. Part of the problem here is that while migration had previously been viewed dichotomously as either an adaptation to environmental change (a panacea to environmental stress), or as failure to adapt (the end point of interminable poverty), there had been ideas that environmental stress and human migration could be linked in deterministic ways. What studies such as this one show however is that migration is neither a solution to environmental stress, nor is it an inevitable outcome of extreme poverty. Rather neither life in the urban areas, nor that in the rural areas offers an easy path out of precarity. As such potential migrants weigh the decision of whether or not to migrate in terms of factors which differentiate them internally from the communities of which they are apart. In contexts where material deprivation is relatively homogenous, such decisions are taken based on small differences in social capital – for example: does a household hold a position of authority in the rural community or does an individual have an uncle in the towns.

Considering the above, two major problems present for modelling these causal relationships. The first is a problem of initial conditions. Given the highly detailed terms upon which migration decisions are taken, it seems unlikely that efforts to model causation could collect the sorts of information, and at the level of granularity required to drive an effective understanding of these relationships.

Secondly, even if we had complete information to describe the INUS conditions, as mentioned earlier in the piece, it is not clear that we have a complete sense of the exact terms upon which migrants make decisions to move. While we might be able to simplify this to rational frameworks, as was suggested, such an approach is unlikely to capture the complexity of migrant decisions.

With above two problems posing inherent challenges to modelling causation in livelihood processes, a third problem, regarding efforts to integrate this work with climate data and biophysical processes is that the time scales involved are vastly different. The factors shaping migrant decision making change over exceptionally short time scales – someone in a social network getting a job, an inflationary hike, a political decision to approve food aid, an eviction – while those driving climatic change are much slower. Developing a means for integrating these two disparate time scales into one causal model presents a significant challenge.

While the above discussion might be disheartening it does suggest that there is likely value in moving away from trying to understand, or model, individual-scale processes of livelihood change. That said, it is not clear how these processes might be better aggregated. One option might be to develop empirically derived ‘fudge factors’, based on dominant drivers of mobility, such as percentages of landlessness, extent of environmental stress and demographic information (gender and age). It is not clear, however how the veracity of such factors might be determined without the ability to easily hind-cast migration events.

The idea of shifting away from individual-scale processes to look at broad drivers of vulnerability might also be useful. In this regard it is worth noting that although the rural urban livelihoods of migrants showed decidedly distinct vulnerability profiles (market-based vs subsistence livelihoods), the drivers of that vulnerability were in many ways common, in both the rural and urban areas. Essentially it was the institutions governing access to capital and credit which shaped

exclusion, with gender playing a particularly important role in Bangladesh. In this regard, we can see the drivers of vulnerability – regardless of whether livelihoods are rural or urban – as being shaped by the same forces located at the nexus of the State, international capital, and gender. As such, there is possibly an opportunity to focus our efforts on understanding how changes are manifest within the architectures of entitlement (Watts 1991), and how these drive aggregate changes in vulnerability. It is worth noting that this paper had originally made an effort to undertake such an analysis – linking conditions of compromised access to the power structures which determined institutional rule-setting – however the project quickly became too big, lacking the empirical data to support it.

Conclusion

This paper has sought to explore the causal processes shaping the relationship between environmental stress and human migration. In doing so it has built an increasingly complex model of how these causal processes work, using the idea of INUS conditions as a means to best capture this complexity.

The focus on migration is thought meaningful as a means to explore the possibilities for deriving causal models for understanding the relationship between environmental stress and human vulnerability. This is because migration represents a dramatic shift in vulnerability, reconfiguring exposure shifting from a subsistence-based to market-based livelihood.

The complexity of the process that this work reveals however, poses real challenges for developing a more general causal model of vulnerability, due to problems of initial conditions, causal mechanisms, and incommensurate timescales. That these problems present when studying such dramatic shifts in livelihood as generated by migration, suggests that the challenge will be even greater when examining less dramatic shifts, such as: different production activities, diversification, etc.

Finally, while these findings might prove disheartening to efforts aimed at linking causal models of vulnerability to biophysical models, understanding the exact nature of the limitations, is a potentially useful outcome. In this regard it is proposed that a focus on modelling individual, or even, community level dynamics might not be the most productive avenue. To this end a more fruitful option might be looking at dynamics which shape the architecture of entitlements that are thought to drive vulnerability. On the other hand, if the intention of understanding causation in vulnerability is to determine where to leverage interventions, then a focus on such macro-scale features might not be very helpful.

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