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Climate change adaptation case studies: Impacts of drought and floods on local farming

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Abstract. It's not easy; the current local community really is that climate change and associated disasters are becoming more intense, unpredictable, frequent and costly impacting on rural and urban areas. How can we help communities? Many rural communities, particularly in low income countries and their local governments, residents and small to medium business enterprises (SMEs), find in the context of climate change adaptation that shifting towards Disaster Risk Reduction (DRR) difficult. Local governments in rural areas particularly in developing countries and SMEs are often exposed and cannot better protect and prepare themselves. However, there are many resilient rural communities, farmers, businesses and good tools and examples where more public-private sector partnerships can help local government and business shift to DRR. This paper/presentation will review 3 case studies, based on research in this area at CESDI – Griffith University's' Centre for Sustainable Development for Indonesia with its main office in Brisbane, Australia

1. Introduction

First, a cross-sectional study in Bangladesh [1] compares participants' present and retrospective information (before migration) in seven slums located in the 3 areas of Dhaka City; 74 participants who migrated from rural places of origin because of slow onset drought were interviewed about health status. Second, traditional subsistence farming is an important part of rural society in Indonesia, the seasonal yield is the main source of food to maintain health and livelihoods of these rural households, this yield is under threat from drought and then intensive rains. Third, an Australian case study in the Lockyer Valley Region in South-East Queensland will be discussed. This rural setting experienced extreme flash flooding in January 2011 that resulted in significant impacts in the rural farming township of Grantham. To reduce future risks, the local government (Council) immediately committed to an innovative community resettlement project.

Whatever the disaster impacts all communities need to 'Build Back Better'; this UNISDR concept will be discussed. In fact in all communities collaboration between all sectors involved including community (farmers) members, governments and land-use planning, business and emergency management and public health practitioners was essential. This research highlights the importance of community participation and the need for ongoing assessments in the DRR planning, response, resettlement and recovery processes.



2. Case Study 1 – Impacts of drought on farming and internal (not international) migration

First, a cross-sectional study in Bangladesh compares participants' present and retrospective information (before migration) in seven slums located in the 3 areas of Dhaka City - 74 participants who migrated from rural places of origin were interviewed about health status. A comparative understanding of access to basic services, disease issues and economic conditions of internal migrants living in slums in Dhaka was completed in 2017 by Mohammad Ehsanul Kabir, PhD Candidate supervised by Dr. Peter Davey from Griffith University. The purpose of this first case study was to make a comparative assessment of access to basic services, disease issues and economic condition of the disadvantaged internal migrants related to their places of origin and places of destinations. The analysis took place in seven slums located in Mohammadpur, Rayerbazaar and Jigatola areas of Dhaka City in Bangladesh. In brief, the findings show some improvements in basic household infrastructure and hygiene practices after migrating from their droughty affected rural farm to these city slums compared to their previous status in places of origin. However, the frequency of diseases increased in short to medium term after migration, as reported by the participants. The study argues that increased incidents of disease at places of destination can be associated with limited access to free healthcare benefits and the increased burden of living cost compared with the participants' places of origin. This study considered some key issues of internal migration with a temporal account before migration at places of origin and after migration at places of destinations. The feedback from the disadvantaged migrants which compared their current living conditions with life at their place of origin has not previously been studied in low income countries.

In Bangladesh, further research was conducted by [2] in northwestern farming areas. While little research exists to give a comprehensive understanding of the underlying drivers of vulnerability and how and why they change across the contexts of natural hazards, this case study looks at environmental factors having had influences on human vulnerability and the pattern of human mobility. People have historically migrated from places prone to natural hazards. However, the most significant trend in human mobility continues to be and will likely remain internal migration or inter-regional migration as opposed to move across international boundaries. To date, the majority of the research into the vulnerability of human systems has tended to focus on the biophysical impacts of hazards. There is only a limited understanding of how such groups are affected by various aspects of vulnerability.

[1] Presented to an Environmental Health National Conference in Brisbane reporting that climate-migration research in general and noted that more recent studies had recognized the need to investigate how climate and environmental vulnerability could result in incremental or non-linear migration outcomes, depending on various contexts of natural hazards. To examine such complexities, the concept of 'drivers of vulnerability' offers a valuable analytical alternative [3], supports an approach that can explain how multiple drivers can influence the livelihoods of various diverse populations across the contexts of natural hazards, time and space, and between and within social groups. This study adopted a multi-method approach and answered the research questions using structured interviews, focus group discussions and key informant interviews. Finally, the results illustrate details of the underlying drivers of vulnerability which potentially influence involuntary internal migration from the affected areas, mostly to cities and to slum areas. A range of drivers of vulnerability was identified and classified into five broad thematic divides including economic, institutional, infrastructural, environmental and health-and-wellbeing.

3. Case Study 2 – Food insecurity and subsistence farmers

This second case study [4], investigated food insecurity issues in Antoin Meto, a subsistence community in semi-arid parts of West Timor. It discussed the concept of subsistence living from the perspective of food insecurity in severe drought conditions. Yenny Tjjoa a PhD graduate also from Griffith University from 2014 collected data in Kupang and Timor Tengah Selatan Regencies in West Timor. Data were analyzed via mixed-methods of quantitative household surveys, and qualitative in-depth key informant interviews and participant observations are assisting a way forward for subsistence farmers.

In summary this case study looked impacts on at traditional subsistence farming as an important part of rural society. This community maintains food sovereignty without overly using the local resources:

following seasonal cycles to grow staple food (being self-sufficient) and earn cash income via multiple activities within and outside the community to offset declining food stock in drought conditions. This study found that local knowledge and values of Atoin Meto are founded on their existing clan regime and emotionally-bonded moral values, which is a sustainable historical approach. However, the system has weaknesses and to support their adaptation to climate change and drought [5], suggested three solutions - to enhance their food production; improve nutritious value of local diets and develop their ability to market products, but keeping enough nutritious produce in the household for families to survive droughts.

4. Case Study 3 – Farmers and floods and ‘build back better.’

Third, a case study in the Lockyer Valley Region in South-East Queensland, Australia will be discussed. This rural setting experienced extreme flash flooding in January 2011 that resulted in the loss of 19 lives including 12 in the rural farming township of Grantham. To reduce future risks, the local government (Council) immediately committed to an innovative community resettlement project despite an environment of political resistance and bureaucratic turmoil. During the summer of 2010-11 Queensland experienced a series of natural disasters that will long be remembered. The floods that devastated central and southern Queensland coupled with the destruction by Severe Tropical Cyclone Yasi resulted in the entire State being declared disaster affected and the tragic death of 37 people. Grantham floods near Brisbane was a major disaster and the community working with local government built back better away from the floodplain and the low lying productive farming areas.

To monitor and coordinate the Government’s program of reconstruction and recovery of the Queensland Reconstruction Authority (the Authority) was established [6]. The Authority operates under the auspices of a comprehensive and integrated recovery and reconstruction plan for the State – Operation Queensland; its mission is to ‘reconnect, rebuild and improve Queensland, its communities and economy.’ This is supported by four strategic objectives, two of which specifically focus on resilience: build a resilient Queensland and support resilient Queenslanders, and enhance preparedness and disaster mitigation. As part of the Operational Plan for Queensland, six lines of reconstruction were also established to coordinate key aspects of the reconstruction and recovery effort: 1. Human and Social 2. Economic 3. Environment 4. Building Recovery 5. Roads and Transport and 6. Community Liaison and Communication.

In summary, disaster resilience is ‘the capacity to prevent, mitigate, prepare for, respond to, and recover from the impacts of disasters.’ Building resilience enhances our ability to minimize the effects of future disaster events on our communities, economy, and environment. The Qld Govt Reconstruction Authority in 2011 commented that building disaster resilience is about improving the capabilities of individuals, families, and communities, as well as that of businesses and governments.

Integral to this is strengthening partnerships between communities, the not-for-profit sector, industry, the private sector and tiers of government. For many in the community, an important aspect of this is planning to reduce disaster risks and produce coordinated and effective efforts during disaster events. This approach is referred to as ‘Betterment – Build Back Better’; building back better enhances a community’s immunity to natural disasters [6]

5. Conclusion

Let's continue to research climate change impacts, including building resilience towards disasters particularly drought and floods but embrace the concept of ‘Build Back Better’. The UNISDR suggests community’s use of the recovery, rehabilitation and reconstruction phases after a disaster to increase the resilience of nations and communities; through integrating disaster risk reduction measures into the restoration of physical infrastructure and societal systems, and into the revitalization of livelihoods, economies, and the environment United Nations General Assembly, Consequently the impact of future disaster events on the community is substantially reduced. Betterment should not, however, be limited to building better infrastructure alone as it can be demonstrated or applied to rebuilding the social and economic fabric of disaster-affected communities.

Local authorities with increasing drought and flood conditions shoulder the enormous responsibility of providing access to housing, health care, education, skills training and employment opportunities for internal migrants and long-term residents alike. Solutions to internal refugee crises start at the local level and require that everyone plays a part: every city, every neighborhood including farming areas, and every individual can contribute. Leaders must create spaces where everyone can live in safety, become self-reliant, and contribute to and participate in their local community, and not allow people to shift into slum areas after disasters strike. Rural farmers must be supported with more sustainable irrigation infrastructure to enable them to ‘stay’ on the land and not ‘go,’ migrating to cities is the last option.

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