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Disaster Economic Loss and Income:
An Assessment in Entitlement Perspective

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ABSTRACT

Disaster assessment is quite complicated considering the nature of the disaster and methodological ambiguity generated due to different guidelines of different institutions. This study analyzed various available techniques and, after that, proposed a model to estimate both direct and indirect losses with a single equation. The study used multidisciplinary tools and techniques to assess the 2017 flood in a micro-level area in Bangladesh. The analysis found that the flood inundating around 78.37% of the area, damaged crops, and various infrastructures. The cost of damages accounts for 2.44% of the income of the people, whereas they experience a 21.49% reduction in their yearly income. The study explains how a flood creates obstacles in accessing land, labor, and capital in such a way that people experience significant losses in their income, beyond the damage. Hence, if these access factors can be kept operating during any disaster, a huge amount of loss can be avoided. The study at the end proposed a solution to overcome such losses.

KEYWORDS

Amartya Sen, Disaster Economic Loss Assessment, Disaster Economic Protection Model, Disaster Economics, Disaster Risk Reduction, Entitlement Assessment Model, Entitlement Theory

INTRODUCTION

Both frequency and intensity of floods are gradually increasing all over the world, and therefore, disaster economic impact is also being escalated day by day (UNISDR/CRED, 2016; CDMP and IWM, 2008; Thomas and López, 2015). However, disaster economic impact does not proportionally match with hazard magnitude, as found in some research works. For example, Ali, Mahjabin, and Hosoda (2012) falsified the traditional belief of considering the depth of water level as the only determining factor of flood damage. They calculated Flood Intensity Index (FII) for major floods in Bangladesh, occurring from 1988 to 1998, where they found that the average inundation depth was almost the same in both 1998 and 1988 floods, but the economic impact was 2.33 times higher in the 1998 flood. Studying disasters from several countries, Benson and Clay (2004) explained that massive floods destroy properties and social structures and affect both short and long-term economic growths. However, long-term disaster impact cannot easily be explained only by measuring the direct disaster damages (Hallegatte and Przyluski, 2010), because some disasters may have a severe impact on the

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economy without causing any significant damage to infrastructure. For instance, the great Bengal famine happened slowly after a moderate level of drought, but it affected the economy so intensely that a third of the population of Bengal starved to death (Sen, 1981). This incident indicates that an indirect disaster loss often can be more significant than a direct loss occurring from structural damage.

However, indirect disaster loss is being neglected in disaster assessment by many disaster response practitioners and policymakers. Some international organizations, including UN-ECLAC, World Bank, GFDRR, among others, have developed various assessment guidelines for estimating the costs of disasters. These guidelines significantly differ from each other in terms of methodology and results (Hallegatte, 2015). Most of the donor agencies and institutions emphasis on direct disaster losses and the emergency needs under their guidelines, e.g., Damage, Loss, and Needs Assessment Guidance (Jovel and Mudahar, 2010), Damage and Loss Assessment (DaLA) Methodology by UN-ECLAC (ECLAC, 2003; World Bank, 2010), Post Disaster Need Assessment- PDNA (GFDRRR, 2013), etc. In this context, Hallegatte and Przyluski (2010) attempted to estimate indirect economic loss and disaster-induced opportunity loss. Using a regional input-output model, Hallegatte (2015) estimated that indirect economic losses of Hurricane Katrina in the US state of Louisiana amounting to $42 billion compared to $107 billion direct losses. Hallegatte (2015) outlined some conceptual methods linking output loss, ripple effect, and stimulus effect, which explain the process of occurring indirect losses from disasters.

It is noticeable that the United Nations (UN) outlined "reduce direct disaster economic loss in relation to global gross domestic product" as one of the seven global targets in the Sendai Framework for Action (SFA), but it avoided setting up any target or any such instruction to reduce "indirect disaster economic losses" (UN General Assembly, 2015.a). However, these direct loss-centric assessments and targets don't support the demand of disaster risk reduction (DRR) articulated by UNISDR's definition (UNISDR, 2009) because the term DRR[1] advocates a systematic set of actions to reduce exposure to hazard and to lessen the vulnerability of people, assets, and economy (Hallegatte, 2015), which are not only being affected directly but also are being hampered indirectly in disaster in such a way that a disaster-affected community feels more intense economic consequences than the amount of direct loss.

Some scholars (e.g., Mwape, 2009; Islam & Taujimoto, 2011; Bhuiyan, 2014; Siddik & Rahman, 2013) outlined both direct and indirect losses in disaster, but they didn't provide any standard guidance of estimating indirect loss by the monetary unit. Scholars also have developed some models, e.g., Input-Out Model (IOM), Computable General Equilibrium (CGE) Model, etc. to assess output losses due to disaster. However, these models contrast many ways. IOM estimates the short-term disaster economic impact where the price is not adjusted. On the other hand, CGE model can calculate long-term disaster output loss where there is a chance of being biased by other factors (Hallegatte, 2015:15-16).

Against this backdrop, the present paper attempted to analyze both direct and indirect disaster economic losses to provide clear guidance and also outline the key actions in preventing disaster losses. The paper thus also tried to contribute to achieve the third and fourth global targets of the Sendai Framework of Action (UN General Assembly, 2015.a:07), as well as fulfill the vision of the sustainable development goals (SDGs) the world is seeking for (UN General Assembly, 2015.b).

MATERIALS AND METHODS

Study Location

For a micro-level analysis of the direct and indirect losses of the flood, *Kochiar Beel*, one of the 98 sub-depressions of the Chalan *Beel* area of Bangladesh, was selected. The area falls under the agro-ecological zone of active Brahmaputra-Jamuna Floodplain (BBS, 2019). Though there is no specific demarcation line of *Kochiar Beel* (as it is interconnected with other sub-depressions of the