

Natural Disasters and Poverty: Understanding the Systemic Complexity

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Abstract

The disastrous effects of natural hazards on human lives are easily recognizable and quantifiable. While poverty reinforces people's vulnerability to natural hazards, disasters make their already precarious conditions worse. This creates a vicious circle that may result in poverty traps. Even though mitigation and preparedness appear as the logical strategies to deal with natural risks, the expenditures that government make on that activities are far from the required ones. In this sense, if countries are making increasing investments in order to address and reduce existing risks while at the same time are failing to address the underlying risk drivers, then more and more effort will be required to intervene an accelerating accumulation of risks. Natural Disasters and poverty, as were portrayed above, conform a complex and dynamic system that requires a proper conceptualization in order to capture such dynamic complexity as well as the conflict between short and long term policies. In this paper we design a causal loop diagram to capture the main feedback loops and the strategies attained to each one. It is organized as follows: a concept framework about natural disasters and poverty is presented, followed by a review of Systems Dynamics literature regarding natural disasters. The paper proceeds with the design of the causal loop diagram in stages, closing with some conclusion about the challenges that come up building resilient communities.

Key words: natural disasters, poverty, system dynamics, systems thinking.

Introduction

The effects of natural disasters on growth and development have just recently been recognized. The disastrous effects of natural hazards on human lives are easily recognizable

and quantifiable; socioeconomic effects are harder to. 75% of total world population lives in an area that was hit by an earthquake, cyclone, flood or drought between 1980 and 2000; 11% of them live in low HDI countries and, however, more than half of the consequential deceases happened there (PNUD).

While poverty reinforces people’s vulnerability to natural hazards, disasters make their already precarious conditions worse. This creates a vicious circle that may result in poverty traps (De la Fuente, López-Calva, & Revi, 2008). Natural hazards can, even though strategies for mitigation and preparation were carried out, still bring about death, injury, disruption of socio-economic activities and damage or destruction to property, crops, livestock, natural resources and other physical assets, pushing people into sudden poverty (De la Fuente, 2010).

As De la Fuente states, there is a double causality since poverty can drive people to settle in harm’s way (steep slopes, squatter settlements), and affect the intensity of hazard impacts on them, but hazard impacts can also impoverish people (De la Fuente, 2010). Besides, they also prefer to have easier access to jobs, even though this may imply living in slums on riverbanks prone to flooding or on hilltops subject to mudslides, becoming more likely to experience destruction of their homes because of pre-impact locational vulnerability (Lindell & Perry, 2000).

Since they have fewer resources on which to draw for recovery, they also take longer to transition through the stages of housing, sometimes remaining for extended periods of time in severely damaged homes (Morrow, 1999). The social consequences of settling in hazardous zones are beyond the householders in case of a natural hazard, so the correct response is for governments to make targeted intervention (WorldBank & UN, 2010). A synthesis of the low-income households vulnerabilities are presented at Table 1.

Table 1. Low income group vulnerabilities

Income	Insufficient financial reserves for purchasing supplies in anticipation of an event or for buying services and materials in the aftermath.
Housing	Typically live in insecure settlements with poorly built and inadequately maintained housing.
Employment	Unstable employment is more common in the low paying jobs of the poor which are more likely to be lost when business close or move after a disaster. Daily survival is frequently dependent upon informal sector living hood.
Assistance	Require substantial government assistance for shelters and temporary housing.

Source: Authors’ own elaboration using (Morrow, 1999), (De la Fuente, López-Calva, & Revi, 2008)

Thus the population and economies could take action before a contingency occurs to reduce their levels of vulnerability, or once occurred to mitigate losses and recover. More probable hazards are likely to mobilize communities to engage in hazard mitigation and emergency preparedness measures to reduce their vulnerability (Lindell & Prater, 2003). The economic

and welfare effects will be determined by the ability to prevent or resist disaster losses resulting therefrom.

It is only in recent years that more consideration has also been given to the need to reduce disaster risk through development work so as to attain sustainable poverty reduction (UN, 2014). At international and national level, the ongoing linking of disaster risk management to existing priority political commitments, such as the MDGs or climate change adaptation, and the creation of specific targets, can further assist in securing the political will for integrating disaster risk management into development programming.

But there are many competing demands on the resources of national and municipal governments and aid organizations that can negatively influence political commitment regarding disaster risk management.

The achievement of sustainable implementation of mitigation (to reduce vulnerabilities) and preparedness (to establish effective disaster response mechanisms and structures) often strongly depends on the existing relations between the local communities and national and municipal authorities. Improving these relationships to overcome, for instance, the loss of trust in community solidarity and in the hierarchical structures of planning and emergency authorities at municipal and national level can thus be important.

Table 2. Expenditures made on pre and post disasters (1998-2008)

Country	Total	Average	St. Dev.	Average (as share of total)
Colombia				
Pre	1,050.01	262.50	61.73	60.75
Post	757.51	189.38	95.42	39.25
Mexico				
Pre	2,614.51	237.68	78.93	32.20
Post	7,788.94	708.09	568.40	67.80
Nepal				
Pre	164.35	14.94	3.93	43.06
Post	237.21	21.56	8.78	56.94

Source: (De la Fuente, 2010)

Even though mitigation and preparedness appear as the logical strategies to deal with natural risks, as mentioned before, the expenditures that government make on that activities are far from the required ones.

As De la Fuente states, the interventions aimed at reducing social and economic vulnerability and investing in long-term mitigation activities are often believed to be few, poorly funded, and insignificant in comparison with money spent on humanitarian assistance and relief, as well as on post-disaster reconstruction (De la Fuente, 2010).

This can be observed in the México's government expenditures on pre and post disasters at **Error! Reference source not found..** The cost of disasters that occurred from 1998-2008

was far greater than governmental outlays to cope with them. The government committed 2.98 times more resources to cope with disasters than to prevent or mitigate them (De la Fuente, 2010). The expenditures on emergency responses, rehabilitation and reconstruction have always exceeded the resources dedicated to risk management prior to disasters. This is particularly relevant when it is compared with Colombia, a country with similar characteristics regarding average income and percentage of total population exposed to natural risks, where around the 60% of the expenditures goes to prevention.

Those figures confirm that the emphasis is still on reducing or compensating disaster losses and damage as opposed to transforming the underlying drivers that generate risk in the first place, as Lavell et al. (2015) pointed out. In this sense, if countries are making increasing investments in order to address and reduce existing risks while at the same time are failing to address the underlying risk drivers, then more and more effort will be required to intervene an accelerating accumulation of risks.

Natural Disasters and poverty, as were portrayed above, conform a complex and dynamic system that requires a proper conceptualization in order to capture such dynamic complexity as well as the conflict between short and long term policies.

This research proposes the design of a causal loop diagram to capture the main feedback loops and the strategies attained to each one. It is organized as follows: a concept framework about natural disasters and poverty is presented, followed by a review of Systems Dynamics literature regarding natural disasters. The paper proceeds with the proposal of a qualitative causal loop diagram design in stages closing with some final remarks and recommendations.

Natural Disasters Conceptual Framework

Natural hazards evolve into natural disasters when the threat they pose becomes real and affect life and property significantly (Hyndman and Hyndman, 2006). In this sense, disasters occur when a hazardous event strikes a vulnerable human settlement, with the coping capacity of its inhabitants further influencing the extent and severity of the impacts caused (Wamsler, 2007). Those are derived from (a) the exposure of households and economic assets to natural contingencies, which are events that have potentially harmful consequences, and (b) its vulnerability to suffer losses from these events due to such exposure (De la Fuente, 2010). They are not only short-lived, but can over long term negatively impact the urban poor, as well as municipal and national development.

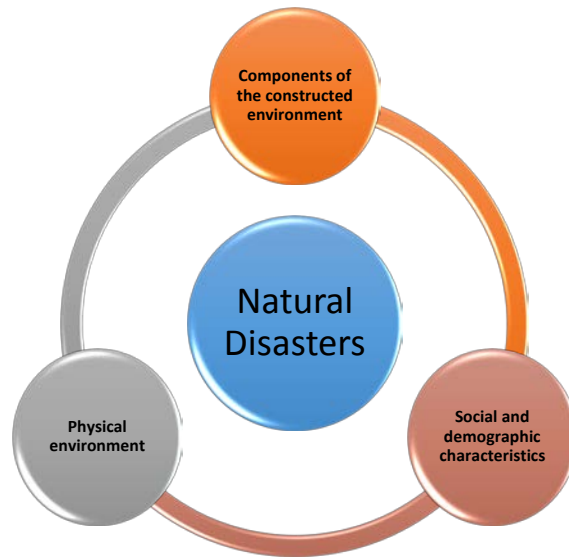


Figure 1. Natural disasters systems interaction. Based on (Mileti, 1999).

As Mileti refers, many disaster losses, rather than stemming from unexpected events, are the predictable result of interactions among three major systems (Figure 1): the physical environment, which includes hazardous events; the social and demographic characteristics of the communities that experience them; and other components of the constructed environment. Growing losses result partly from the all these systems, and their interactions are becoming more complex with each passing year (Mileti, 1999).

Disasters involve widespread hardships and losses. The magnitude of these has been growing as people become concentrated in hazardous areas, and social and economic systems become increasingly complex (Gillespie, Robards, & Cho, 2004). The scope of impact defines the number of affected social units e.g., individuals, households, and businesses. The physical impacts of disasters include casualties (deaths and injuries) and property damage, plus both vary substantially across hazard agents (Lindell & Prater, 2003).

Prevention measures should be carried out to increase the capacity to avoid or reduce the potential intensity and frequency of natural hazards that threaten households, communities, and/or institutions (Wamsler, 2007). Knowing how to mitigate the negative consequences of a natural disaster and prepare to respond effectively to it requires three steps: understanding the physical and social systems involved in disasters, communicating said understanding clearly to decision makers, and knowing what interventions may be effective (Gillespie, Robards, & Cho, 2004).

Those measures are related to the capacity to react during and after the event, refereed as preparedness, as well as the capacity to minimize the vulnerability of households, communities, and/or institutions to ‘natural’ hazards/disasters, known in the disasters’ literature as Mitigation.

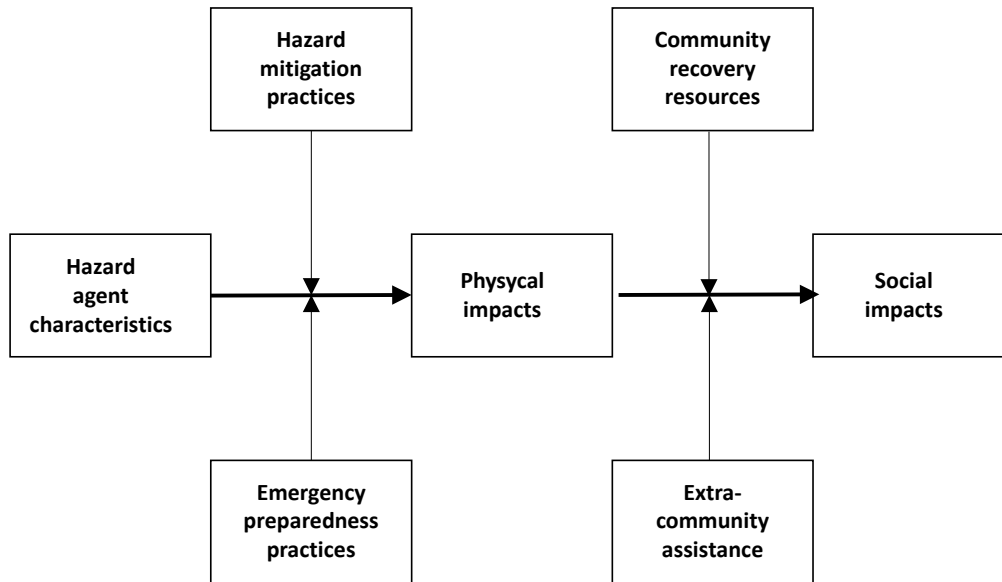


Figure 2. Stages on natural disasters, based on (Lindell & Prater, 2003)

One way to reduce the physical impacts of disasters is to adopt hazard mitigation practices. These can be defined as pre-impact actions that protect passively against casualties and damage at the time of hazard impact (as opposed to an active emergency response), and include community protection work, land use practices, and building construction practices (Lindell & Perry, 2000). Government agencies can encourage the adoption of appropriate land use practices by establishing regulations that prevent development in hazardous locations, providing incentives that encourage development in safe locations, or informing landowners about the risks and benefits of development in locations throughout the community (Lindell & Perry, 2000).

The current hazards literature identifies some of the important stakeholders, especially those necessary for building sustainable communities focusing on mitigation (Mileti, 1999). These stakeholder groups include: home owners, business owners, insurance companies, land developers, environmental groups, emergency managers, building inspectors, engineers, community planners and elected officials.

Another way to reduce a disaster's physical impacts is to adopt emergency preparedness practices, which can be defined as pre-impact actions that provide the human and material resources needed to support active responses at the time of hazard impact (Lindell & Perry, 2000).

Once the emergency response actions were defined, other relevant activities related to preparedness should be carried out, such as determining which organization will be responsible for accomplishing each function, developing procedures that each organization should perform for accomplishing those functions, acquiring response resources (personnel, facilities, equipment) to implement the plans, and staying prepared through continued planning, training, drills and exercises.

The measures referred above aim to reduce the vulnerability and the lack of capacity to respond to natural hazards/disasters. Wamsler (2007) proposes another two measures to tackle the aftermath, which aim to improve the capacity to recover from hazard and/or disaster impacts, that is, to ‘bounce back’ quickly and to a reasonable level:

1. Risk ‘financing’, which purpose is to increase the capacity to transfer or share risk so as to establish a safeguard for households, communities, and/or institutions that comes into force after potential hazard/disaster impacts and helps obtaining ‘readily available’ compensation. This measures are related to those provided by the Social Protection Systems, such as cash transfers and social funds (De la Fuente, López-Calva, & Revi, 2008).

2. Stand-by for recovery, which aims to increase the capacity to establish appropriate recovery mechanisms and structures for households, communities, and/or institutions that are accessible after a potential hazard/disaster. This includes mechanisms and structures for both rehabilitation and reconstruction.

A Systemic approach to Poverty and Natural Disasters

It is well documented that poverty is a multifactorial and complex phenomenon that requires strategies for tackling root causes, beyond the traditional ones that sometimes, contribute to increase poverty in the long term. When poverty faces natural disasters, the complexity of this systems increase in such way that challenge any traditional approach for understanding and helping in the design of long term and sustainable strategies to deal with.

In a great synthesis exercise, De la Fuente et al. (2008) presents a map showing how a natural disaster could aggravate the poverty situation in a reinforcing loop where poverty increases in each iteration. Figure 3 shows how some previous conditions in time t , working on an institutional setting and certain socio-cultural influences, lead to certain outcomes in time $t+1$ regarding poverty situation.

Even though this framework is relevant to understand the dynamic nature of this complex system, lacks of clarity to understand how this causalities work and how strategies related to risk response could help to break the vicious cycle of poverty and natural disasters. So, in order to gain a deep understanding of those causalities, it is proposed to use Systems Thinking as an alternative framework.

Systems Thinking is a discipline for perceiving wholes to understand complex systems, helping decisions makers to identify leverage points. It is a framework for observing interrelationships rather than things, for seeing patterns of change rather than static ‘snapshots’ (Senge, 1990). Rather than trying to predict outcomes at a given point in time, this aims to understand the structure of relations that is driving the levels of performance over time, having in mind that the understanding of a dynamic structure could lead to a high-leverage intervention.

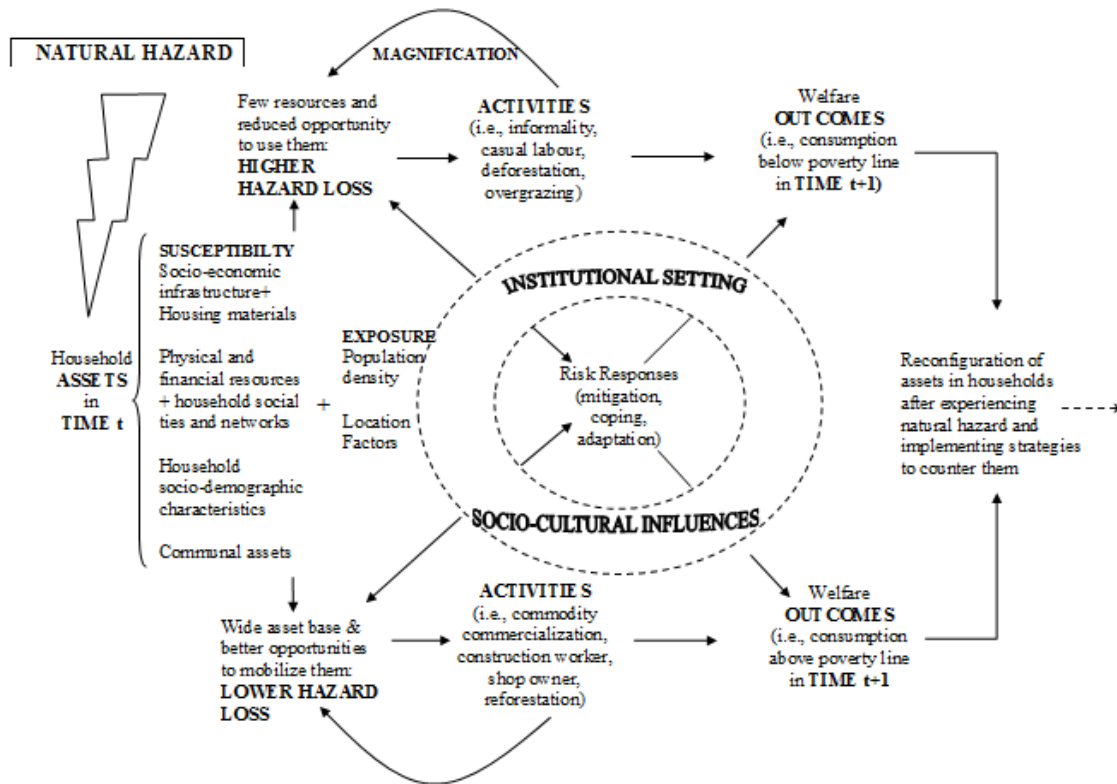


Figure 3. Suggested causalities between Natural Disasters and poverty (De la Fuente, 2010).

As Richmond (2001) states, although people are able to understand the form or pattern apparent in the way variables are interrelated, they are not very good at understanding how the changing patterns of interrelationships operate. This limitation results from people’s mental models, which tend to emphasize direct cause – effect and linear extrapolations (Sterman, 2000).

The elements of a system and their interconnections create the system structure. This structure with a well-defined purpose generates a specific outcome. In the systems language it is said that the structure of the system generates its behavior. As Meadows (2008) states: “Once we see the relationship between structure and behavior, we can begin to understand how systems work...and how to shift them into better behavior patterns”.

Systems Thinking assumes that variables are linked in circular processes that form feedback loops. This shift from one-way to circular causality, and from independent factors to interdependent relations helps out to identify leverage points not easy to identify in a linear thinking. This perspective shifts the focus from blaming particular individuals or groups for what is wrong to what is inadequate about a particular situation and how the interactions of various components maintain less-than-optimal outcomes and discourage optimal ones.

Gillespie (2004) presents a comprehensive review about how Systems Thinking and System Dynamics could help to capture the dynamic complexity of Poverty and Natural Disasters system. He mentions that instead of viewing mitigation and preparedness as

“outcomes” resulting from a set of static, stimulus-response relations, they should be viewed as an ongoing, interdependent, self-sustaining, dynamic process.

In the case of natural disasters and the strategies to deal with, a causal loop diagram could show how those strategies operate, making explicit the time delays. In Figure 4 three feedback loops are presented. People interested in raising the level of preparedness could see from this structure that their leverage lies in raising the desired level of safety or increasing concern, because these two factors influence perceived need, which triggers the infrastructure development as well as the training and education necessary to increase the level of preparedness (Gillespie, Robards, & Cho, 2004).

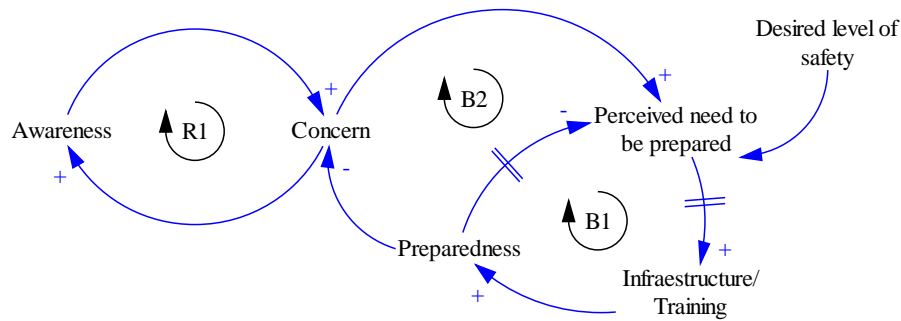


Figure 4. Causal Loop diagramming and Natural Disasters. Authors’ own elaboration based on (Gillespie, Robards, & Cho, 2004)

In the same line, Deegan designed a framework for analyze flood mitigation policies and policy design challenges using a System Dynamics approach (Deegan, 2007). The generic structure developed explains the dynamics of major pressures in any flood-prone community.

Deegan states that natural hazards research has changed its focus over the years, moving from a linear disaster stages model to a more dynamic decision-making process which reflects how preparedness, response, recovery, and mitigation are interrelated, thus the effectiveness of any one phase affects and is affected by the other phases (Deegan, 2006, 2007). The problem definition for his research recognizes a high degree of complexity, despite the availability of policy tools to mitigate property damage, relief costs for disasters continue to rise.

Another relevant work regards natural disasters and Systems Thinking is presented by Wamsler (2007). Through a deep and comprehensive field research the study concludes that urban settlement development and related practices are not only affected by disasters but are also one of their main causes. Furthermore, it is identified that increasing risk through urban settlement development strongly fosters the already existing vicious circle of poverty. (Wamsler, 2007).

The previous literature review on the field of Systems Thinking shows that this approach is truly helpful to frame poverty and natural disasters as a multifactorial and complex phenomenon, and also the strategies for tackling root causes, beyond the traditional ones. The next section develops a causal loop model of natural disasters and poverty.

The systemic framework proposed

As presented before, natural hazards are exogenous events that, when combining with some endogenous factors like anthropogenic risks (exposure and vulnerability to physical hazards that are socially constructed through the interaction of economic, territorial, cultural and political processes operating at several different scales), and a weak response capacity, become in Natural Disasters.

Under this conditions, the impact of such disaster on physical and human capital could be so devastating, leading to the exposure of households and economic assets to natural contingencies, increasing the loss of physical capital and leading to a decrease on income generating capacity. Thus, it can be observed at Figure 5 that, in *short term* (*Feedback Loop R1*), less physical capital (damage or destruction to property, crops, livestock, natural resources and other physical assets) and human capital (due deaths and injuries) could increase the welfare fluctuations pushing people into sudden poverty, particularly those with fewer resources on which to draw for recovery.

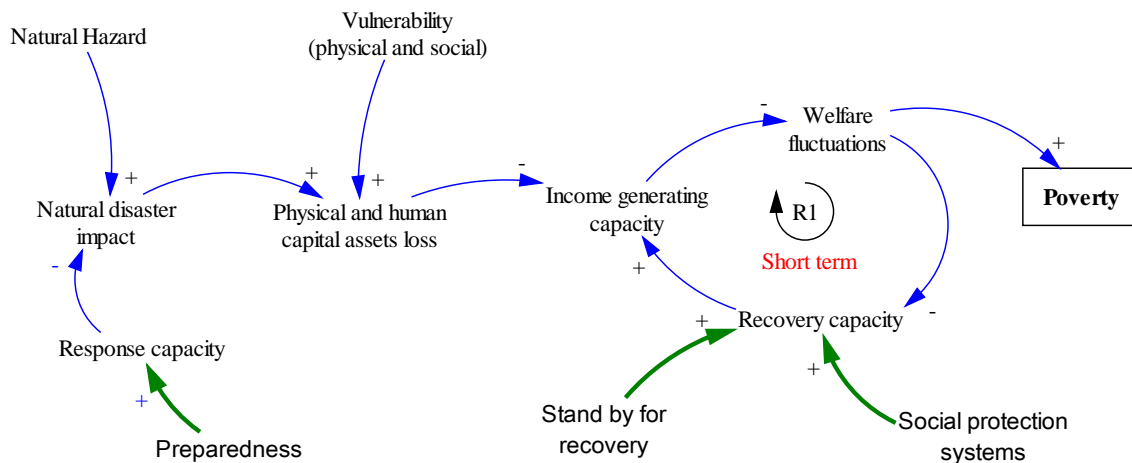


Figure 5. The effects of natural disaster in short term. Authors' own elaboration.

Prevention measures should be carried out to increase the response capacity to avoid or reduce the potential intensity of impact, and frequency of natural hazards that threaten households, communities, and/or institutions. Those measures are related with the capacity to react during and after the event, referred as preparedness. Examples of these include actions to define the potential scope of the disaster impact, to protect properties, warnings and household's evacuation.

Most countries have designed protocols well defined to adopt emergency preparedness practices, leading to mortality associated with floods, winds, drought and other hydro meteorological events to a downward trending. As the Hyogo Framework of Action (HFA) experts' review mentioned, "*the strengthening of legal, institutional and legislative structures as well as systems for disaster management, early warning, and local capacities for preparedness and response have made an important contribution*" (Lavell, Maskrey, & Andrew, 2015).

While important progress are made on preparedness, there are still room for improvements on natural disaster’s aftermath. Two measures are proposed to improve the capacity to recover from hazard and/or disaster impacts for households, communities, and/or institutions, that is, getting back quickly and to a reasonable level: 1) Stand-by for recovery, which aims to increase the capacity to establish appropriate recovery mechanisms and structures that are accessible after a potential hazard/disaster. This includes mechanisms and structures for both rehabilitation and reconstruction, 2) Social Protection Systems, which aims to increase the capacity to transfer or share risk so as to establish a safeguard after potential disaster impact, helping to obtain compensation, such as the provision of cash transfers, conditional and unconditional, workfare programs, food/nutrition aid, social insurance, social funds, and labor market policies.

Natural disasters, as mentioned before, are not only short-lived, but can negatively impact the poor over an extended period. Figure 6 pictures the effects on the midterm (R2), showing that since poor people have fewer resources on which to draw for recovery, they take a longer transition through the stages of housing, sometimes remaining for extended periods of time in severely damaged homes. Another factor to consider is that unstable employment is more common in the low paying jobs of the poor, which are more likely to be lost when business close or move after a disaster, thus daily survival is frequently dependent upon informal sector livelihood (De la Fuente, López-Calva, & Revi, 2008).

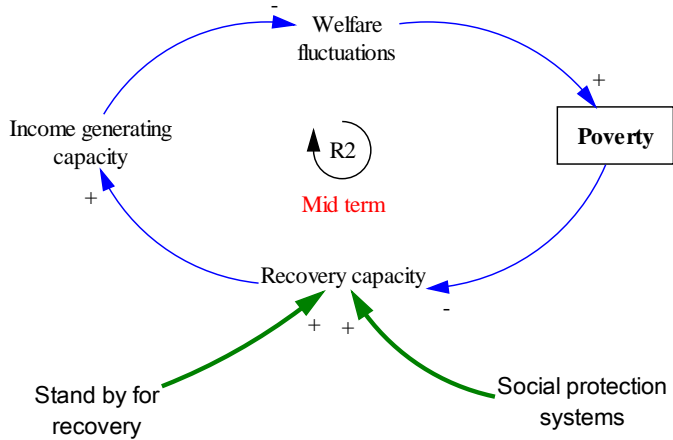


Figure 6. The midterm effects of natural disasters on poverty. Authors’ own elaboration.

Under these conditions, poor households with capital (both physical and human) undermined, which during natural disasters fight to preserve the few assets they have, with insufficient and delayed strategies for recovery, they are exposed to the risk of remaining longer under poverty lines. Thus, after several time cycles this temporary vulnerability turns out on a permanent one (Feedback loop R3).

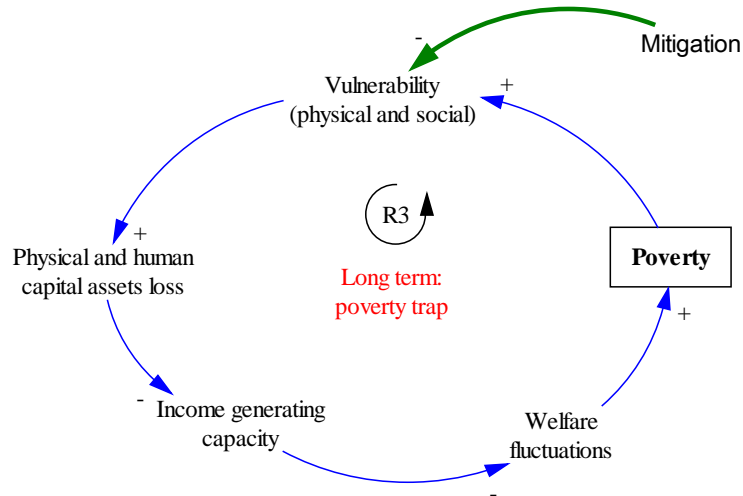


Figure 7. The poverty trap. Authors' own elaboration.

When households have few assets to protect and to use for generate income, the negative and seemingly transitory effects on their members can become permanent disadvantages. Thus, damage from natural hazards to human and physical capital can undermine the capacity of households to earn a living, leading to sluggish consumption growth and earnings many years after the shock. De la Fuente (2010) reported that coping strategies that appear to be temporary adjustments to difficult times, such as depleting available productive assets, withdrawing children from school to get them to work or reductions in nutrition, may affect their human development later in life with high costs in the future. In this circumstances, their vulnerability (physical and social) will increase with time as well as the risk they are facing up to any natural hazard incoming, as Figure 7 shows.

In order to reduce vulnerability, mitigation practices should be adopted. These pre-impact actions will protect passively against casualties and damage at the time of hazard; includes community protection works, land use practices, and building construction practices. Government agencies can encourage the adoption of appropriate land use practices using strategies like establishing regulations that prevent development in hazardous locations. But as De la Fuente states: *“The interventions aimed at reducing social and economic vulnerability and investing in long-term mitigation activities are often believed to be few, poorly funded, and insignificant in comparison with money spent on humanitarian assistance and relief, as well as on post-disaster reconstruction”* (De la Fuente, 2010).

When short term strategies, like those mentioned at feedback loop R1 analysis, work along with mitigation strategies, vulnerability, both physical and social, could be reduced helping people affected to avoid poverty trap. But the UN evaluation towards post 2015 Framework (2014) states that exposure of people and assets in both higher- and lower-income countries has increased faster than vulnerability has decreased.

The experts of the UN commission (UN, 2014) came to the conclusion that, since the governments emphasis is still on reducing or compensating disaster losses and damage as opposed to transforming the underlying drivers that generate risk in the first place, disaster losses and impacts would continue to rise, thus reinforcing poverty.

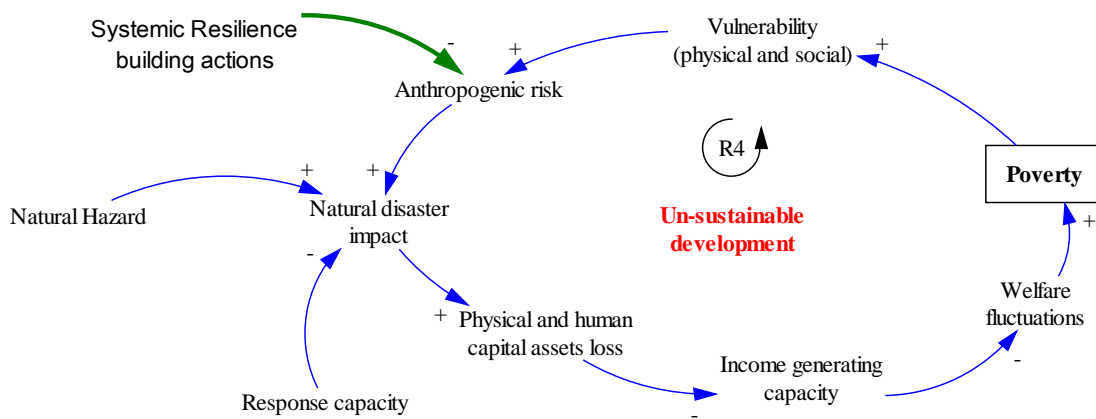


Figure 8. A long term perspective: systemic resilience. Authors' own elaboration.

After several crisis (along years, maybe), with government agents interested mostly in short term responses aftermath natural disasters -as the expenditure budgets showed in the previous section- the anthropogenic risk (R4) would be increasing, as feedback loop of Figure 8 shows. Without strategies and actions focus on long term, disasters are manifestations of unresolved development problems and outcome-based indicators, as the evaluation report of HFA showed. On this report, it is mentioned that there is increasingly convincing evidence to support the assertion that exposure and vulnerability to physical hazards are socially constructed through the interaction of economic, territorial, cultural and political processes, operating at several different scales (UN, 2014). For instance, the inadequate management of runoff waters due to the increase in impervious urban space often leads to recurring flooding in downstream areas. Furthermore, the hazardous nature of extreme events such as tropical cyclones, multi-annual drought and major river floods is increasingly mediated by factors such as environmental degradation and land-use, as well as climate change. Towards Sendai Framework for disasters risk reduction 2015-2030, the experts showed their concern about the reductionist view of natural disasters:

“The vision of disasters as exogenous events has led to disaster risk becoming established as an independent field of inquiry, rather than a much more complex, integrated, and mutually influencing process where financial, health, economic and social risks are considered as both facets and at the same time contributing factors in an interdependent process of risk creation, accumulation, mitigation, transference, and at some point, actualization. This more holistic vision of risk is coherent with the idea of a risk continuum and a linked set of incremental, systemic, transformative adaptation and evolutionary responses.” (Lavell, Maskrey, & Andrew, 2015).

The report concludes that the separation of disasters and disaster risk from development leads to a fragmented practice, dominated by segmented or sector specific approaches. This occurs at the national and international level, where interventions (focuses, rhythms, timing, etc.) are determined by agency (mostly administrative rather than operative) and not by territorial priorities. The challenge however is that anthropogenic risk in co-evolved socio-ecological systems is being created and concentrated at rates that are rare in natural

systems, such as climate change, which has feedback loops that reinforce and magnify the effects.

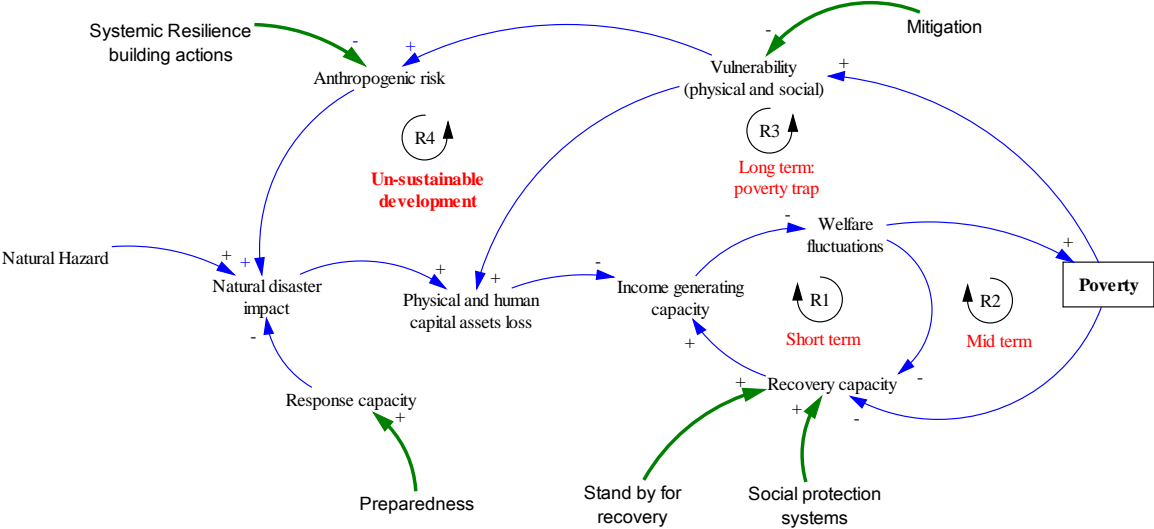


Figure 9. The integrated systemic model. Authors’ own elaboration.

Conclusions

In order to attend the systemic nature of natural and social systems interaction, as presented integrated at Figure 9, which in the context of natural disasters and poverty leads to a continuum of vulnerability and poverty traps, it is required to move from agency –actions operating in close silos - towards a systemic resilience building actions. This imply that those actions to increase response and recovery capacity, as well those oriented to mitigation, will have to be design in a transversal and holistic way.

Sustainability, as the model showed, implies the construction and accumulation of resilience and transformative capabilities in society and its communities through a “combined approach aimed at preventing future risk creation, reducing existing levels of risk and strengthening social and economic resilience” (UN, 2014).

The international efforts towards disaster risk reduction have identified the need for to build resilient communities by integrating disaster prevention, mitigation preparedness and increasing local capacity (Cutter, Barnes, Barry, & Burton, 2008).

This systemic model of natural disasters and poverty designed helped out to evaluate the agenda of Mexican government in that regard. This is a work on progress so the ongoing analysis leads us to recognize the efforts of Mexican government towards disaster risk reduction. However, the formation of resilient communities is hardly the focus. The coordination between the three levels of government and the several agencies related to civil protection presents difficulties for institutional development, due to the lack of approval of regulations between the federal and local levels, as well as the fragile system of penalties, which proves insufficient to prevent negligence and corruption of federal, state and municipal authorities.

In this context, the modernization of the National Civil Protection System is required to incorporate a component related to the constant updating of government policies, regulatory framework and management of public funds. Also, authors suggest an update in the following aspects:

Municipal Participation in the National Civil Protection Council. In this regard, it is noted that the municipalities are held accountable only for the coordination and execution tasks without being included in the monitoring and evaluation mechanisms for managing the various levels of government. Therefore, it is considered that the inclusion of the municipalities within the National Council will balance the relationship between the distribution of functions and the evaluation of performance of the National Program.

Concentration or centralization of management responsibilities and resources of the National Civil Protection System. The Interior Ministry centralizes the national system as well as decides the management criteria related financial resources. Thus, it is undeniable that this centralization / concentration favors the degree of immediacy of response to emergencies and disasters, but in the same way generates perverse mechanisms that hide mismanagement of resources by control mechanisms guided by a single political actor. Therefore, it is necessary to consider new mechanisms forward a real coordination, prevailing transparency and accountability in the entity responsible for the operation of the National Civil Protection System

Prioritization of preventive investment and review of FOPREDEN's policies. The effectiveness of preventive investment in the form of resilient communities is not fully exploited by the Mexican government and can significantly improve the economic outcomes of natural disasters. Nowadays, efforts are concentrated only in the creation of an Atlas of Disaster Risk.

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